City of Durham
Stormwater Management
Program Plan

For Discussion Purposes
January16, 2009
Revised May 6, 2010
Revised November 29, 2010

Draft Revision of December 28, 2011

Notice Under the Americans with Disabilities Act

The City of Durham does not discriminate against qualified individuals on the basis of disability. Citizens who require an auxiliary aid or service for effective communications or assistance should contact the ADA Coordinator at (919) 560-4197 x21254, TTY (919) 560-1200 or ADA@durhamnc.gov.

SIGNIFICANT CHANGES IN THE 2011 SMP

Section 1 has been updated including, tables and map figures to reflect changes in jurisdictional land area, population, MS4 conveyance, and other metrics. Table 2-1 was added to provide Hydrologic Unit Codes. Figure 3-1 was updated to reflect the 2010 EPA approved 2010 303(d) list. Section 3.1 discussions of existing water quality programs have been revised in part to account for changes in local ordinance and programs, and cover recent applicable Nutrient Sensitive Waters Strategies. Chapter 7 has been updated to reflect operational changes discussed in annual reports and to reference some of the written procedures and guidance that have been developed. Section 7.1-Implementation has been updated with current organizations charts. Section 7.6-Post-construction has been revised to reflect the latest Performance Standards for Development, to incorporate implementation information provided in previous annual reports, and to simplify annual reporting. Other sections of Chapter 7 have been updated.

Ordinance changes and proposed changes discussed in this annual report have been included in the SMP Appendix:

- Appendix C includes Chapter 8 – Environmental Protections Standards where have been updated to reflect in tree protection standards and a major revision of protection standards of riparian buffers.
- Appendix I – Position Contact Names has been updated
- Appendix K provides a draft ordinance revising the City's Phase II post-construction ordinance submitted for state review on August 9, 2011; the ordinance would make minor adjustment to the loading limits adopted in 2010, and revised conditions, procedures and implementation to comply with Falls Lake and Jordan Lake Nutrient Sensitive Waters Strategies.
- Appendix N provides a copy of the agreement establishing the Clean Water Education Partnership
- Appendix P provides a summary description of the BMP Certifying Engineer (BCE) program.
- Appendix Q provides a summary description of the BMP Maintenance Certifier Program.

A list of changes is provided in the preface to the SMP.

Summary of CHANGES IN THE 2010 SMP

Section1
Table 1-4 was corrected so that it did not include Conveyance System Features outside city limits.

Section 2
Table 2-2 was updated_based on EPA approved 2010 303(d) list.

APPENDICES
Appendix C: City/County UDO Environmental Protection Standards (Chapter 8) revisions effective April 21, 2010)
Appendix D: City/County UDO Sedimentation and Erosion Control Ordinance (Section 3.8, 12.10, 15.1, 15.5, revised)

Appendix F: City of Durham Stormwater Performance Standards for Development, adopted in 2009 and revised June 15, 2010

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APPENDIX C	City/County UDO Environmental Protection Standards (Chapter 8), 2011
APPENDIX D	City/County UDO Sedimentation and Erosion Control Ordinance (Section 3.8, 12.10, 15.1, 15.5, revised)
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APPENDIX F	City of Durham Stormwater Performance Standards for Development, revised June 15, 2010
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Acronyms Used In the SMP Plan

BIMS	Basinwide Information Management System
BCE	BMP Certifying Engineer
BMC	BMP Maintenance Certifier
BMP	Best Management Practice (see SCM)
BOD	Biochemical Oxygen Demand
CCC	Continuous Chronic Criteria
COD	Chemical Oxygen Demand
CWA	Clean Water Act
CWEP:	Clean Water Education Partnership
DEH:	Department of Environmental Health
DEM	Digital Elevation Model
DO	Dissolved Oxygen
DCSWS	Durham County Storm Water Services
DSWS	Durham City Storm Water Services
EAB	Environmental Affairs Board
EEUDO	Environmental Enhancements to the UDO
ETJ	Extra Territorial Jurisdiction
EPA	Environmental Protection Agency
EPT	Ephemeroptera, Plecoptera, and Trichoptera insect groups
FY	Fiscal Year
GIS	Geographic Information System
HAZMAT	HAZardous MATerials
HOA	Homeowners Association
IDDE	Illicit Discharge Detection and Elimination
IRCAT	Integrated Report assessment CATegory
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
NC	North Carolina
NCAC	North Carolina Administrative Code
NCBI	North Carolina Biotic Index
NCDENR	North Carolina Department of Environment and Natural Resources
NCDLQ	North Carolina Division of Land Quality
NCDOT	North Carolina Department of Transportation
NCDWQ	North Carolina Division of Water Quality
NDWRF	North Durham Water Reclamation Facility
NET	New Employee Training
NOV	Notice of Violation
NRCS	Natural Resources Conservation Service
NPDES	National Pollutant Discharge Elimination System
NPP	Notice of Proposed civil Penalty
NSW	Nutrient Sensitive Waters
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls

Acronyms Used In the SMP Plan (continued)

PSA	Public Service Announcement
QAPP	Quality Assurance Project Plan
SARA	Superfund Amendments and Reauthorization Act of 1986
SCM	Stormwater Control Measure (BMP)
SDWRF	South Durham Water Reclamation Facility
SOS	State of Our Streams
SSO	Sanitary Sewer Overflow
SMP	Stormwater Management Program
SPPP	Stormwater Pollution Prevention Plan
SWS	Storm Water Services (City of Durham, Public Works)
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TRI	Toxic Release Inventory, Section 313 of Title III of SARA
TSS	Total Suspended Solids
UDO	Unified Development Ordinance, Durham City-County Planning
USGS	U.S. Geological Survey
W&S	Water and Sewer Maintenance Division (City of Durham)
WLA	Waste Load Allocation
WQBA	Water Quality Basin Area
WQCA	Water Quality Critical Area
WQAMP	Water Quality Assessment and Monitoring Plan
WQI	Water Quality Index (City of Durham)
WQRP	Water Quality Recovery Program
WRF	Water Reclamation Facility

Background

The City of Durham is authorized to discharge stormwater from the City's Municipal Separate Storm Sewer System (MS4) to receiving waters of the State in accordance with the discharge limitations, monitoring requirements, and other conditions set forth in National Pollutant Discharge Elimination System (NPDES) permit NCS000249 under Section 402(p) of the federal Clean Water Act. The City's municipal separate storm sewer system is located within the City of Durham Jurisdictional Area and Durham County. The system discharges to receiving waters within the Cape Fear River and Neuse River basins.

The City of Durham Municipal Separate Storm Sewer System is the system of drainage conveyances owned and operated by the City of Durham. Durham's MS4 is primarily the drainage conveyances in City-owned streets and on City property. The City's MS4 includes curbs, street gutters, catch basins, storm drain pipes, swales, ditches, and other man-made conveyances designed or used for collecting and conveying stormwater.

On May 17, 1993 the City of Durham submitted its application for a NPDES Municipal Stormwater Permit under the federal Clean Water Act's Phase I regulations for large and medium size cities. The City's first permit was issued by the North Carolina Division of Water Quality and became effective December 30, 1994. On December 23, 1998, the City submitted a timely application for permit renewal. In October of 1999, NC DENR, Division of Water Quality acknowledged the City's timely application, and authorized the City to continue operating under its initial expired permit in accordance with federal regulations. The City was allowed to implement program elements outlined in the renewal application while it awaited issuance of a new permit. The North Carolina Division of Water Quality subsequently developed implementation requirements for the Phase II stormwater program and requested a supplemental permit application addressing the new requirements of the Phase II program; the City submitted the supplemental information June, 2003. The City was issued a second round permit that became effective July 1, 2007. The City again submitted an application for permit renewal in December, 2011.

Section I.I of the permit requires the City to develop and implement a Stormwater Management Program (SMP) applicable within the City's jurisdictional area. The purpose of this plan is to establish the means by which the City will achieve compliance with the permit (NCS000249) and the specific requirements of section 402(p)(3)(B) of the Clean Water Act. This section of the Clean Water Act requires that the City, to the maximum extent practical and allowable under State or local law, effectively prohibit non-stormwater discharges to the City's MS4 and that controls and management

measures are implemented by the City to reduce the discharge of pollutants from the MS4.

Part III of the permit requires the City to assess progress in implementation, effectiveness, and results of the SMP and individual components of the program. As part of this assessment, the City is required to provide information concerning areas of water quality improvement or degradation.

Municipal stormwater management is intended to be implemented in an iterative manner with each five-year permit containing better tailored requirements, and municipal permittees responding with better tailored, more advanced stormwater management programs. Iterative improvements may also occur on a shorter cycle, with permittees making minor revisions to their management plans annually.

The City developed the initial version of this SMP with input from City residents and other stakeholders. The initial SMP was submitted to the North Carolina Division of Water Quality with the City's first annual report under this permit term. The SMP has been updated annually to include revised ordinances, to more specifically reference written operating procedures, and to refine control measures or management practices based on experience and assessment. A copy of the updated SMP has been submitted with each subsequent annual report.

The state permit writer with the North Carolina Division of Water Quality (NCDWQ) has verbally notified municipal permittees not to wait for written approval of SMPs but to begin implementation. Permittees have been advised that NCDWQ will thoroughly review the SMP, annual reports, and records on SMP implementation when the state audits the City's municipal stormwater program.

SMP Plans approved by the North Carolina Division of Water Quality become enforceable parts of the permit (as outlined in part II, section I.2 of the permit). Implementation of best management practices consistent with the provisions of this plan will constitute compliance with the standard of reducing pollutants to the maximum extent practicable.

Section 1.0 -
Storm Drainage System Information

1.1 Population Served

This Stormwater Program Management Program (SMP) addresses the City's MS4 located within the City of Durham municipal boundaries. The City of Durham is the fourth largest City in North Carolina according to the 2000 census. Table 1-1 provides the population and estimated average annual growth rate for the City of Durham and for Durham County as a whole.

Table 1-1: Population and Growth Rate for the City of Durham[1]

City-County	Current Est. Population (2010)	2000 Population	1990 Population	Est. Annual Percent Change
City of Durham	228,330	187,035	136,612	2.2%
Durham County	-	223,314	181,835	-

Durham has a rich history and a long heritage as a multicultural center. Demographics are roughly evenly split between white and black which together account for 82 percent of the population. Housing is roughly evenly split between owner-occupied and rental housing,

1.2 Growth Rate

The population growth rate for 1990 to 2000 was estimated to be 3.7% while for 2000 to 2010 it was estimated to be 2.2% as shown in Table 1-1 for the incorporated area of the City of Durham. Growth rates were calculated using the percent change between decennial population totals, annualized by dividing this percent change by ten.

Table 1-2 provides the population, land area, and population density for the City of Durham. Population density remained relatively constant between 1990 and 2000 during which the City grew through voluntary annexation. The increase in density in 2010 may reflect a shift toward higher density accompanying recent redevelopment of the downtown area.

Voluntary annexation agreements are executed throughout the year, but formal annexations occur only twice a year. The Planning Department updates jurisdictional boundaries after annexations formally occur.

[1] The source of this population data is the 1990 and 2000 Decennial Census information obtained from the following website: http://linc.state.nc.us/ and represents corrected census data.

Table 1-2: Population, Land Area and Density for the City of Durham[2]

Parameter	1980	1990	2000	2010*
Population	101,149	136,612	187,035	228,330
Land Area (sq. mile)	42.32	70.22	94.64	107.5
Density (pop/ sq. mile)	2,390	1,946	1,976	2124

*estimate, updated 2011

1.3 Jurisdictional and MS4 Service Areas

The City of Durham is the only incorporated municipality in Durham County. The City and County enjoy a unique relationship, and jointly operate combined City-County Planning and City-County Inspections Departments. The location of the City in relation to Durham County and major watershed areas is provided in Figure 1-1.

The current jurisdictional area with the City of Durham is provided below in Table 1-3. The source of this is GIS data maintained by the Durham City-County Planning Department (GIS feature class gis_data.A1.Dur_City, updated December, 2011, contained in the Administrative Boundaries dataset).

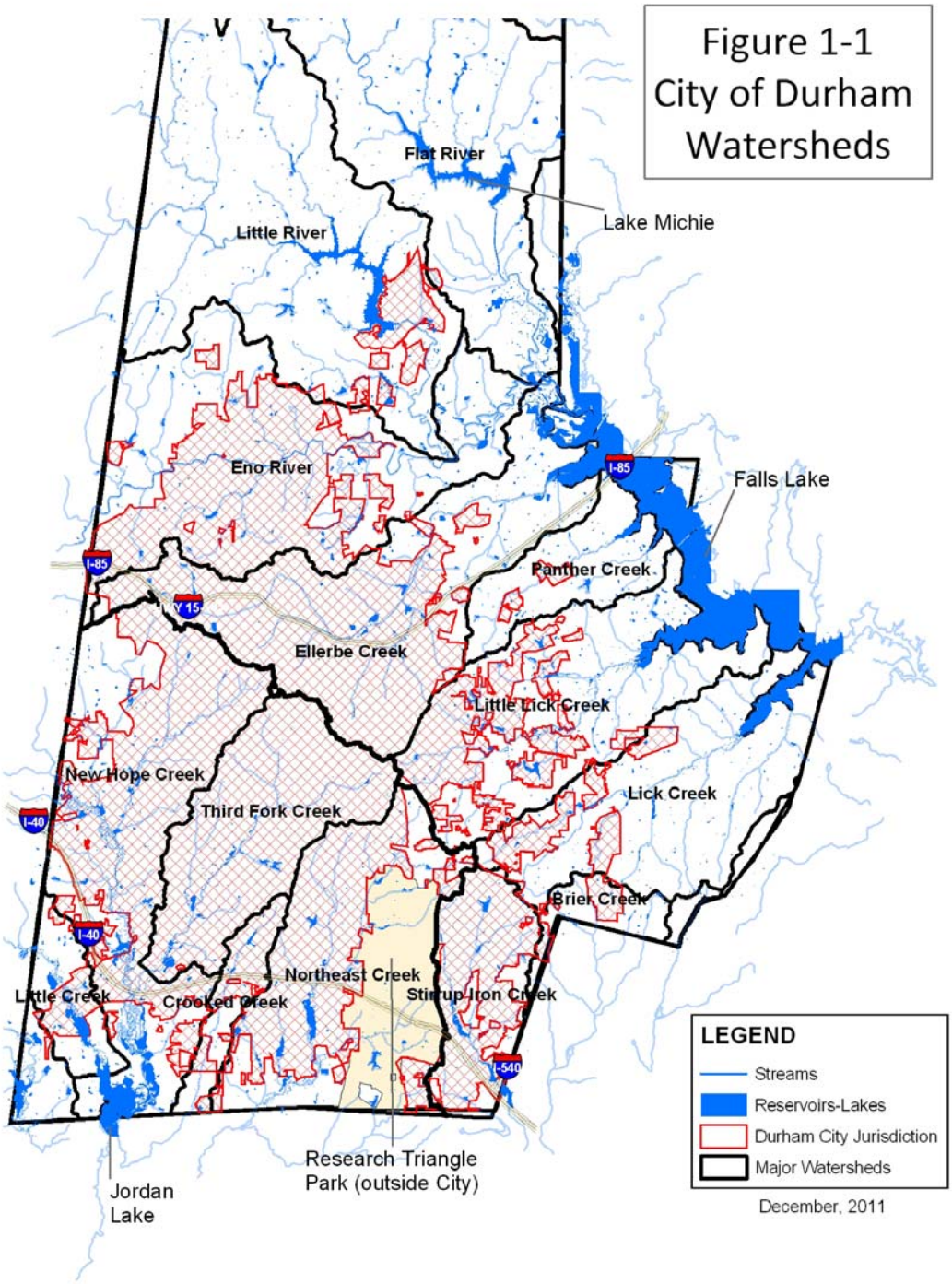
Table 1-3: Jurisdictional Area for the City of Durham (2011)

Incorporated Area	Total Jurisdiction
105.8 square miles	108.1 square miles

The City of Durham does not exert authority over extra-territorial jurisdictions. The City's authorities are constrained by its municipal boundaries.

[2] This data was obtained from the same state website, http://linc.state.nc.us/, and represents corrected census data. 2010 land area obtained from GIS layer of City jurisdictional extent.

Figure 1-1: City of Durham Watersheds and Jurisdictional Boundaries[3]



[3] City boundaries in Figure 1-1 are based on GIS feature class gis_data.A1.Dur_City (updated December, 2011, contained in the Administrative Boundaries dataset) maintained by Durham City-County Planning Department. Watershed boundaries are based streams and topographic data from high resolution aerial photogrametry mapping by Landmark under contract to City of Durham Engineering. Watershed delineations have been modified to reflect the mapped stormwater piping network in addition to detailed surface topography.

MS4 Service Area - A Municipal Separate Storm Sewer System or MS4 is a publicly-owned and operated stormwater conveyance or system of conveyances. These conveyances can include curbs, street gutters, catch basins, storm drain pipes, swales, ditches, and other man-made conveyances designed or used for collecting and carrying stormwater. Any public entity that owns and operates a stormwater conveyance system has an MS4, but not all MS4s are currently subject to regulation. An MS4s' service area is that land area that drains to the MS4.

The City of Durham owns and operates the system of drainage conveyances in City-owned streets and on City property. The City's MS4 includes curbs, street gutters, catch basins, storm drain pipes, swales, ditches, and other man-made conveyances designed or used for collecting and conveying stormwater.

There are other public entities that have MS4s in Durham, the largest of which is the system of drainage conveyances within the rights-of-way of state and interstate highways operated by the NC Department of Transportation (DOT).

Drainage on private property is not part of Durham's MS4. In Durham drainage easements on private property are not public or municipal easements as may be the case in other communities; instead they are platted as private easements for the benefit of adjacent property owners, allowing neighbors to alleviate blockages in the event the property owner does not do so. As discussed below, most of the open channel drainage system and most of the stormwater piping in Durham is privately-owned drainage– meaning the property owner is responsible for maintenance. Drainage from some of these private systems may enter either the City's MS4 or NC DOT's MS4, but most of it drains directly to waters of the state.

As indicated in Section 1.4 below and discussed in Section 7.4, the City has developed a detailed feature inventory and map of both the public and private system of drainage conveyance. Using the inventory and map in combination with a parcel map, the City has determined MS4 features (this is discussed further in the section below).

Stormwater enters pipes through inlets; approximately 41% of inlets are owned and operated by the City. Approximately 37 % of drainage system pipes are owned and operated by the City. Typically each piping system collects stormwater from multiple inlets and discharged through a single outlet; 25% of outlets are owned and operated by the City.

The 2011 MS4 service area is estimated to be 37% of 108.1 square miles or 40 square miles. This estimate is likely to overestimate the MS4 service area because it assumes that all surface drainage enters a stormwater pipe, either

public or private. A significant land area in the city drains via overland flow directly to waters of the state, and most land in the City is private property.

Determining the City of Durham MS4 Service Area with greater accuracy than this estimate will require determining the private drainage that enters the City's MS4 and the inlets of this combined system. It will also require using surface topography to delineate areas or "catchments" that drain to each inlet. The City intends to develop a conditioned Digital Elevation Model (DEM) that would facilitate delineating drainage catchments. However, developing a detailed map of the City of Durham MS4 Service Area would require delineating the catchment of more than 40,000 inlets as well as land that drains directly to surface waters, and assigning drainage to either private property or to the MS4s located within City limits (City of Durham, NC Department of Transportation, Durham Technical Community College, North Carolina Central University, Durham City-County School System, and Durham County.)

While the City recognizes that it does not have authority to enter private property for purposes of operating, maintaining or retrofitting privately owned and operated stormwater systems, the City has generally taken a comprehensive approach to stormwater management to the extent allowed by law. For example, the City has mapped virtually the entire drainage system, including almost all public and private system components 12 inches and larger. Similarly, the City's illicit discharge ordinance addresses non-stormwater discharges to both public and private components of the drainage system, and the City has developed procedures for conducting investigation on private property that recognize rules of evidence and due process.

1.4 MS4 Conveyance System (Public and Private)

The existing City of Durham MS4 conveyance system is composed of curbs, gutters, catch basins, street culverts, pipes, ditches and swales all located within the right-of-way of City streets and on City-owned property. Much of the drainage in the City is on private property and is maintained by the property owner; drainage easements on private property are platted as private easements.

The City has detailed (2-foot contour) topography and hydrology maps. The City also has mapped stormwater inlets, underground pipes, manholes, junction boxes, street culverts, and other features of the conveyance system that collect and convey storm water within the City of Durham. Mapping of pipes initially focused on collecting data on pipes that are 12 inches and larger. Information on smaller pipes is now collected as the maps are

updated. Current minimum pipe size for new construction is 15 inches. These maps include features on both public and private property.

There are more than 715 miles of open channel sections in the City of Durham (1,560 previously reported included channel in Durham County). Of these channel miles, approximately 483 miles are identified as rivers and streams; 177 miles are identified as ditch. These drainage features have been identified based on detailed aerial photogrametry used to develop Durham's two-foot topographic mapping. These maps are used in conjunction with US Geological Survey (USGS) and the Natural Resources Conservation Service (NRCS) soil survey maps to determine where riparian zones should be protected from development. Field determinations are used when necessary to determine the beginning of intermittent and perennial stream segments.

There are more than 42,700 stormwater inlets, 765 miles of stormwater pipe, and 9,700 outlets in the City. Much of the conveyance system is private. Approximately 41% of the inlets and 25% of the outlets are identified as City-owned and operated. Often an outlet on private property may be discharging water collected from City inlets. The City's policy on conducting work on private drainage systems considers whether the private system conveys street drainage.

There is an average of 4.4 inlets for each outlet. While there are approximately 9,700 outlets, many of these involve small drainage areas and small pipes. Major outfalls are generally those 36 inches or greater draining approximately 50 acres, except in industrial areas where major outfalls include pipes 12-inches and greater, and drainages areas of roughly one acre. Before the City had mapped the stormwater infrastructure, the City identified approximately 890 major outfalls draining approximately 60 acres. With growth and annexation it is estimated that there are now approximately 1,100 major outfalls. Additional major outfalls will be identified during the permit term. Conveyance system features are summarized in Table 1-4 below.

Table 1-4: Conveyance System Features for the City of Durham
Corrected and updated to 2011.

Conveyance Feature	Total, City-wide
Linear conveyance features	
Storm drain pipe miles	765
Total storm drain pipe miles	**765**
Open Channel:	
River miles	121
Stream miles	361
Ditch miles	177
Unknown miles	55
Total open channel miles	**715**
Number of pipe segments:	
Storm drain pipe	44,734
Culvert	2049
Driveway	1628
Minor	174
Stub	1295
Unknown	1513
Total # of pipe segments	**51399**

Conveyance Feature	Total, City-wide	City-MS4
Point conveyance features (i.e. inlets, outlets)		
Drop inlets	10,463	1,519
Curb inlets	10,151	6,688
Combo inlets	15,052	7,028
Riser pipe inlets	245	6
Slab inlets	953	144
End-section inlets	5,918	2,261
Inlet Subtotal	**42,782**	**17,646**
Junction Boxes	571	117
Manholes	2,500	725
Connector Subtotal	**3,071**	**842**
End-section outlets**	9,738	2,393
Outlet Subtotal	**9,738**	**2,393**
End-section, unknown	479	66
Other	2,437	743
Total, all nodes	**58,507**	**21,690**

The City's stormwater system inventory is housed in an enterprise GIS database (ArcGIS) and has been made available to the public on the City's online mapping web site. The City's inventory was originally developed by an external vendor during the period from 1999 to the end of 2003. Currently two storm water staff members are dedicated to the update and maintenance of the storm water inventory. Development projects are required to submit As-Built information in digital form that is used to update the inventory. Staff members conduct field survey work to resolve conflicting information and to collect missing information using a survey grade GPS.

Integrated into the conveyance system are approximately 676 structural stormwater control measure (**SCM**s, also referred to as structural best management practices or BMPs). These SCMs were constructed during land development to manage peak flow and/or reduce pollutant concentrations. Virtually all of the SCMs in the City are located on private property.

Current design standards require conveyances be designed for 25-year storm events for drainage areas of 100 acres or more; smaller drainage area conveyances must be designed for ten-year storm events. For open channel sections, flow must be non-erosive and contained within the channel. Pipe systems must be designed to provide free-surface gravity flow throughout the system. Outlet energy is commonly dissipated through the use of concrete headwalls, end-walls, or flared end sections with riprap aprons. In newer

development energy dissipation of this type tends to be limited to outlets discharging to wet ponds, swales, and other stormwater treatment practices. In many cases the design is required to dissipate flows up to the one inch storm though level spreaders that return the concentrated flow to a sheet flow discharged through a vegetated riparian buffer.

Maintenance and improvements to the MS4 system are funded by storm water utility fees collected within the City of Durham. Under certain circumstances, the City also implements drainage projects on private property with the property owner's permission and financial participation. Ongoing maintenance of these projects remains the responsibility of the property owner.

The City provides comprehensive inspection and maintenance of the MS4 system through several different programs. These include:

- Routine maintenance such as street sweeping that cleans debris from inlet grates;
- Routine cleaning of catch basin sumps, during which pipes are inspected and cleaned as necessary;
- Routine inspection of major public and private stormwater outfalls that identifies illicit discharges, structural issues and maintenance needs so that they can be dealt with appropriately; and
- Removal of debris and blockages from channels where such materials could cause or contribute to flooding.

Improvements to the drainage system include stream restoration projects using natural channel design techniques, channel stabilization, small scale drainage improvement projects that address localized flooding, master planning for water quality improvements and habitat enhancement, and retrofitting to provide stormwater treatment.

1.5 Land Use Composition Estimates

The number of square miles and percentage of the MS4 service area under residential, commercial, industrial, and open space land use categories are provided in Table 1-5. This data is for land within the corporate limits of the City of Durham.

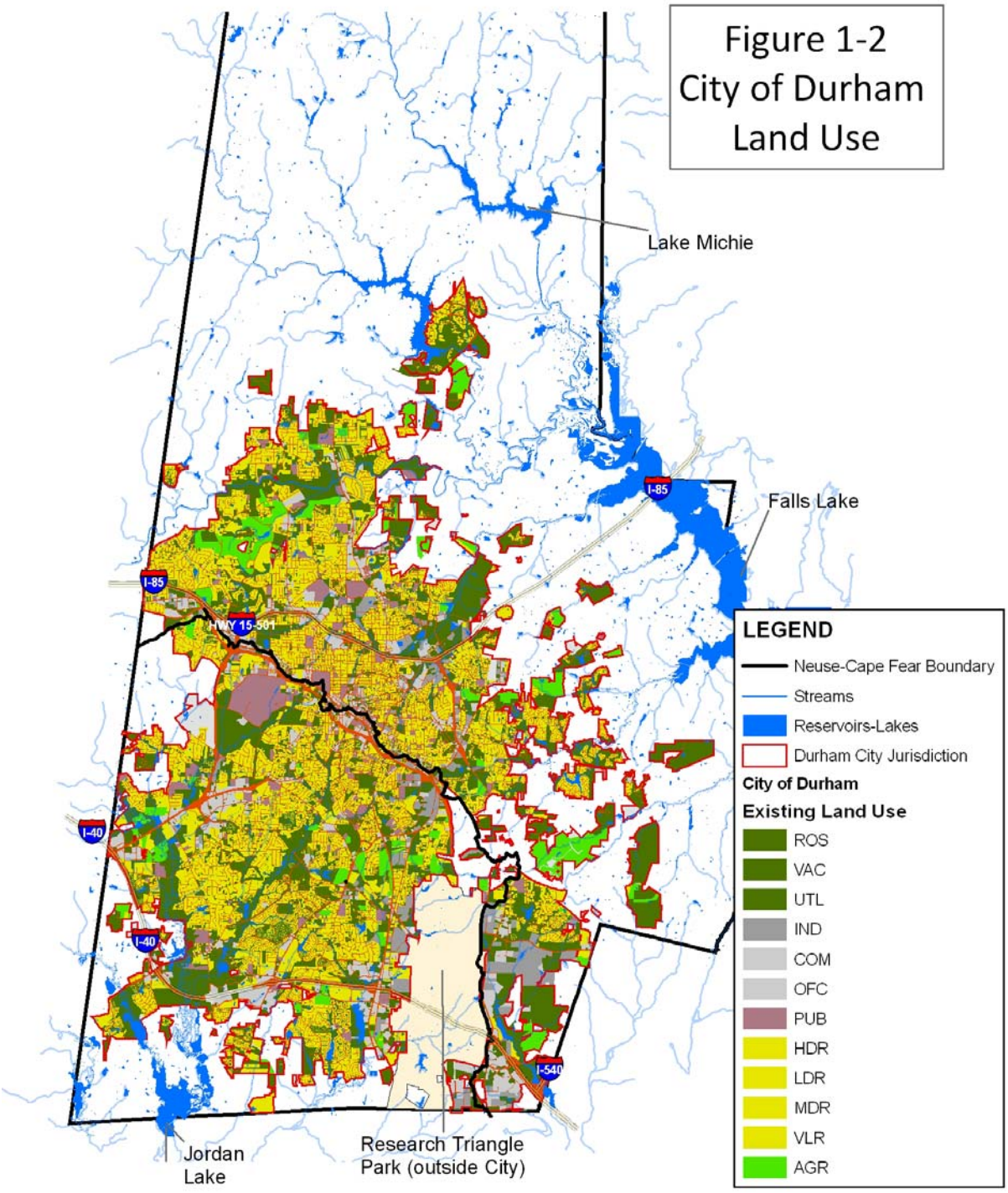
Table 1-5: Percentage of Land Uses in the City of Durham

Land Use Category	Number of Square Miles	% of Land Use within City
Residential	35.7 square miles	34%
Commercial, Office, Institutional	11.6 square miles	11%
Industrial	3.9 square miles	4%
Open Space	33.7 square miles	32%
Agriculture	5.5 square miles	5%
Right of Way	14.3 square miles	14%

1.6 Land Use Estimate Methodology

Figure 1-2 provides a map of the land use composition within the City of Durham corporate limits. The land use map and tabular data were derived from Durham County 2004 existing land use, and right-of-way datasets, and updated using the 2008 land parcel dataset.

Figure 1-2: Land Use Composition within City of Durham Corporate Limits[4]



[4] See Table 1-6 on the next page for a list of acronyms associated with the map legends existing land use.

Table 1-6: Acronyms Associated with Figure 1.3 Map Legend

Abbreviation	Land Use Category
ROS	Recreation/Open Space
VAC	Vacant
UTL	Utilities
IND	Industrial
COM	Commercial
OFC	Office
PUB	Public
HDR	High Density Residential
LDR	Low Density Residential
MDR	Medium Density Residential
VLR	Very Low Density Residential
AGR	Agricultural

1.7 TMDL Identification

Section 303(d) of the federal Clean Water Act requires North Carolina to:

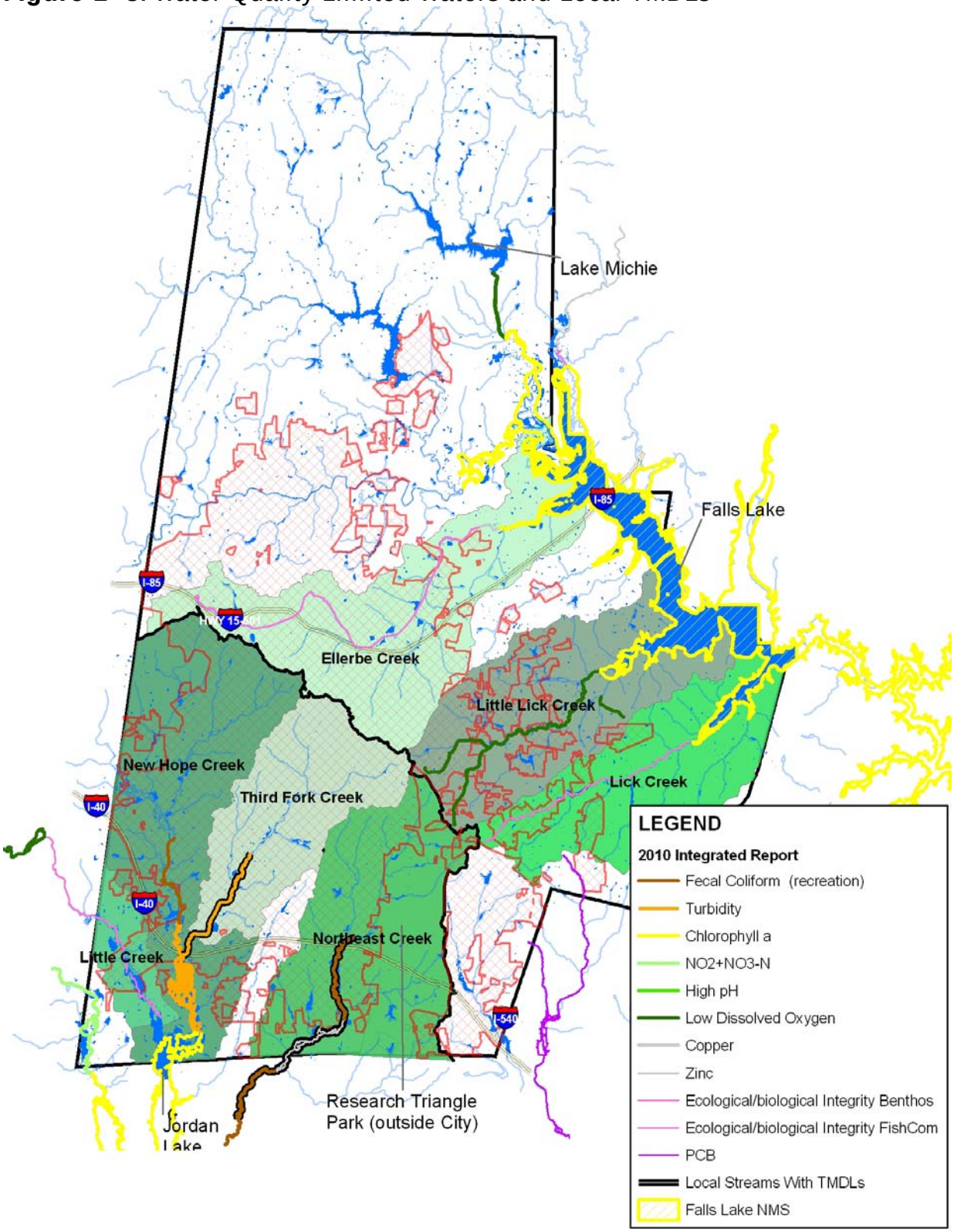
- Identify and establish a priority ranking for water bodies that do not meet applicable water quality standards (referred to as the 303(d) list);
- Establish total maximum daily loads (TMDLs) for the pollutants causing impairment of these water bodies; and
- Submit the list of Water Quality Limited waters and the TMDLs to the U.S. Environmental Protection Agency (EPA) for approval.

For a water body that is not a meeting water quality standard, a TMDL determines the pollutant(/s) primarily responsible for the water quality violations and establishes the allowable pollutant loading (including a margin of safety) that will result in the water body meeting water quality standards. The TMDL process is used to establish water quality based controls to reduce pollutants from point and non-point sources and restore and maintain the quality of the water resources in compliance with applicable standards. Table 1-7 lists the Environmental Protection Agency approved TMDLs assigned to bodies of water within the City of Durham. Figure 1-3 shows the location of Water Quality Limited waters and local TMDLs.

Table 1-7: EPA Approved TMDLs with Loads Assigned to the City of Durham

Water Body	Index Number (in Durham Co.)	Location of Impairment	Water Quality Violations	Target Pollutant	Percent Reduction	Status
Northeast Creek	16-41-1-17-(0.7)a 16-41-1-17-(0.7)b	From NC Hwy 55 to 0.5 mile downstream of Panther Creek	Fecal coliform bacteria	Fecal coliform bacteria	**FC: 92%** reduction	Approved, Sept. 12, 2003
Third Fork Creek	16-41-1-12-(2)	From a point 2.0 miles upstream of N.C. Hwy. 54 to New Hope Creek	Turbidity	Sediment	**TSS:** 0.75 tons/day, **53%**	Approved, Jan 11, 2005

Figure 1-3: Water Quality Limited Waters and Local TMDLs



In addition to the 303(d) list and the TMDLs associated with it, the state also requires the development of Management Plans for waters designated as Nutrient Sensitive Waters (NSW). For these plans, rule-making is used to develop consistent requirements across multiple jurisdictions. Table 1-8 below summarizes the status of rule-making for three water bodies for which NSW rules impact, or will soon impact, the City of Durham.

Table 1-8: Nutrient Sensitive Waters Subject to State Rule-Making

Water Body	Index Number (in Durham Co.)	Location of Impairment	Water Quality Violations	Target Pollutant(s)	Percent Reduction	Rule-making Status
Neuse River Estuary	N/A	Estuarine portion of Neuse River below New Bern	dissolved oxygen, chlorophyll (a)	Total Nitrogen	**TN**: 30%	Adopted as temp rule 7/97, perm rule August 1998
Upper New Hope Arm of Jordan Lake	16-41-1-(14)	Jordan Lake above SR1008	chlorophyll (a)	Total Nitrogen, Total Phosphorous	**TN: 35%** **TP: 5%**	State rules effective August 2009
Falls Lake below normal poll elevation	27-(1)	Falls Lake (turbidity: above Panther Creek)	chlorophyll (a), turbidity	Total Nitrogen, Total Phosphorous, Sediment	**TN: 40%** **TP: 77%**	Rules adopted November 18, 2010

The City has been implementing its approved Neuse River NSW Stormwater Management Program since 2004.

Jordan Lake and Falls Lake NSW rules require the state to develop a Model Program and Ordinance, and give the city until 2012 to adopt local requirements on new development. In advance of schedule the City modified its post-construction requirements effective June 15, 2010 in anticipation of Jordan Lake and Falls Lake rules. The revised requirements impose export limits on nitrogen that comply with both Jordan and Falls Lake strategies, and as an interim measure, add export limits for phosphorous that are mid-way between the two NSW strategies. The revised limits ensure that nutrient loads from development are managed.

Section 2.0
Receiving Streams

The high point within the City of Durham is a ridge line that roughly divides the area so that it drains into two major river basins: the Cape Fear River Basin and the Neuse River Basin. The City is almost evenly split; 51.8% of the City drains to the Neuse River Basin and 48.2% to the Cape Fear River Basin.

As a rough guide, waters to the south and west of the Durham Freeway (Highway 147) are generally in the Cape Fear River Basin. This part of the City drains first to B. Everett Jordan Lake (i.e., Jordan Lake), the Cape Fear River, and finally the Cape Fear Estuary near Wilmington, NC.

Waters north and east of the Durham Freeway are generally in the Neuse River Basin. These waters flow first to Falls Lake, the Neuse River and finally the Albemarle-Pamlico Sound. The exception is Stirrup Iron Creek in southeast Durham County which does not drain into Falls Lake, but drains into Crabtree Creek and enters the Neuse River downstream of Falls Lake.

Since the City sits along a high point, many streams originate within the City.[5] In these streams, human development and activity control the hydrology and water quality. For example, the natural alignment of many receiving streams has been altered over the past century. In the early 1960s the US Army Corps of Engineers straightened and dredged Ellerbe Creek to form a trapezoidal channel to alleviate flooding. The Corps continues to require removal of large woody vegetation as maintenance of this flood control project. A section of Goose Creek was similarly channelized and lined with concrete in the 1970s. The City is reviewing maintenance practices for the Corps of Engineers flood control projects.

In areas where the US Army Corps of Engineers have not worked, there are still localized drainage problems. Modeling and drainage master planning has been conducted to evaluate options to mitigate the threat of flood damage for other areas along the Eno River and a flood warning system has been enhanced. The City has worked with Federal Emergency Management (FEMA) on flood mitigation buyouts in the Old Farm area along the Eno River and along a tributary of Ellerbe Creek. More recently the City has devoted efforts to addressing localized flooding problems that impact or may impact occupied dwellings.[6]

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[5] Streams that do not begin within the City are the Eno River and New Hope Creek, both of which originate in Orange County to the west of Durham.

[6] Floodplain maps were updated in 2007. Drainage master planning to model smaller components of the drainage system has not been initiated in other areas.

Other examples of human development affecting hydrology and water quality are the lack of vegetation along stream banks in some areas of Durham. Development regulations first began protecting selected riparian buffers in 1994. Further regulations protected all riparian buffers in 2002.[7] However these regulations exempt existing uses. In many older developed areas, much of the woody vegetation that helps to anchor stream banks against erosion has been removed. Many stream banks remain vegetated in the newer developed areas. Efforts are underway to establish woody riparian vegetation where feasible

2.1 Hydrologic Units

The City of Durham has eleven hydrologic unit drainage areas, as listed in Table 2-1.

Table 2-1: City of Durham Watersheds

Cape Fear River Basin Watersheds	Hydraulic Unit Code
New Hope Creek	303000206011, 303000206013
Little Creek	303000206010
Third Fork Creek	303000206012
Crooked Creek	303000206013
Northeast Creek	303000206014
Neuse River Basin Watersheds	
Eno River	302020103004
Ellerbe Creek	302020105001
Panther Creek	302020105001
Little Lick Creek	302020105002
Lick Creek	302020105003
Stirrup Iron Creek	302020108001

For convenience and recognizing natural boundaries, the City has further sub-divided some of these watersheds. The Ellerbe Creek hydrologic unit has been divided into Ellerbe Creek proper and Panther Creek. Similarly New Hope Creek consists of three components: the main portion of New Hope Creek and its two urban tributaries: Mud Creek and Sandy Creek. A map of these watersheds and their hydrologic units and major subdivisions is provided in Figure 1-1.

[7] Utility easement maintenance also impacts vegetation along waterways. The City is working with utilities to try to change some of the ways these easements are maintained to allow riparian buffers to form.

2.2 Receiving Streams with Index Numbers

Stream segments listed on the NC Basinwide Information Management System (BIMS) website in Durham County that currently receive runoff from the City of Durham (or that may do so as the City grows) are provided in Table 2-2 at the end of this section. The table includes 30 segments in the Neuse River Basin and 21 segments in the Cape Fear River Basin. The table includes larger streams and the major tributaries of those streams; however, the BIMS system does not include small tributaries.

The receiving stream tables below include the stream index number and the name used by NC Division of Water Quality (DWQ) (any known alternate names are listed in parenthesis). Stream names are often not unique. North Carolina uses its own stream index numbering system in order to avoid confusion in identifying streams. North Carolina designates the uses of a water body through water quality classifications (this also determines which water quality standards are applicable to that water body). The table also includes water quality classifications based on the 303(d). In many cases a stream will be divided into several segments; each has its own water quality classification and 303(d) status. 303(d) listings have been updated based on the "NC 2010 Integrated Report" approved by EPA. A total of eight water bodies draining the City of Durham are identified on the 2010 303(d) list.

In the Neuse River Basin three streams are designated as water quality limited: Ellerbe, Little Lick, and Lick Creeks. The upper end of Falls Lake, which receives stream flow from Ellerbe, Lick Little Lick and other streams, is also included on the 2010 list for chlorophyll (a) and turbidity.

In the Cape Fear River Basin, Northeast, Third Fork, New Hope, and Little Creeks are designated as water quality limited, while the upper New Hope Arm of Jordan Lake is on the 303(d) list for chlorophyll (a) and turbidity.

Table 2-2 below provides more detail about which stream segments are water quality limited, and the specific issues that cause or contribute to the listing. TMDLs addressing Water Quality Limited segments of local streams and lakes are shown in Figure 1-3 above, which also figure shows 303(d) status as of 2008.

To supplement its own monitoring programs, City of Durham staff use other documents and resources to evaluate water quality. These documents include the Basinwide Assessment Reports for the Neuse River (1999) and Cape Fear River (2001) and the Basinwide Management Plans for the Neuse River (2001) and Cape Fear River (2003). Information from some of these documents is also included in Table 2-2 below.

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Neuse River Basin; Subbasin 03-04-01							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
1a	Falls Lake below normal pool elevation (NEUSE RIVER)	From source (confluence of Eno River Arm of Falls Lake and Flat River Arm of Falls Lake) to I-85 bridge	27-(1)	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	chlorophyll(a) turbidity	5 5
1b	Falls Lake below normal pool elevation (NEUSE RIVER)	From I-85 bridge to Panther Creek	27-(5.5)a	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	chlorophyll(a) turbidity	5 5
1c	Falls Lake below normal pool elevation (NEUSE RIVER)	From Panther Creek to Falls Lake dam	27-(5.5)b	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	chlorophyll(a)	5
2	Eno River	From Orange County SR 1561 to U. S. Highway 501	27-2-(10)	Portion within City	WS-IV; B; NSW	Fully Supporting		
3	Sevenmile Creek 759-F07	From source to Eno River	27-2-15	Not in City, but receives runoff	WS-IV; NSW	Not rated		
4	Jumping Run (a.k.a. Warren Creek) 760-C10	From source to Eno River	27-2-17	City	WS-IV; NSW	Not rated		
5	Mill Creek (Crystal Lake) 873-A01	From source to Jumping Run	27-2-17-1	City	WS-IV; NSW	Not rated		
6	Crooked Creek (a.k.a Crooked Run Creek) 760-D08	From source to Eno River	27-2-18	Portion within City	WS-IV; NSW	Not rated		
7	Eno River	From U. S. Highway 501 to a point 0.5 mile upstream of City of Durham emergency pumping facility raw water intake (Lat: 36 04' 40 Long: 78 53' 00)	27-2-(19)	Portion within City	WS-IV; NSW	Fully Supporting		

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Neuse River Basin; Subbasin 03-04-01							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
8	Eno River	From a point 0.5 mile upstream of Durham emergency pumping facility raw water intake to Durham emergency pumping facility raw water intake	27-2-(19.3)	Portion within City	WS-IV; NSW, CA	Fully Supporting		
9	Eno River	From City of Durham emergency pumping facility raw water intake to a point 0.5 mile upstream of Little River	27-2-(19.5)	Portion within City	WS-IV; NSW	Fully Supporting		
10	Cub Creek	From source to Eno River	27-2-20	Portion within City	WS-IV; NSW			
11	Eno River	From a point 0.5 mile upstream of Little River to Falls Lake, Neuse River	27-2-(20.5)	Not in City, but is downstream	WS-IV; NSW, CA			
12	Little River (Little River Reservoir)	From a point 0.1 mile upstream of Durham Co SR 1461 to dam at Little River Reservoir	27-2-21-(3.5)	Portion of watershed within City	WS-IV; NSW	Not rated		
13	Little River	From dam at Little R Reservoir to a point 0.9 miles from mouth	27-2-21-(6)	Outside of City	WS-IV; NSW			
14	Cabin Branch	From source to Little River	27-2-21-7	Portion of watershed within City, Brown WTP	WS-IV; NSW	Not rated		
15	Ellerbe Creek	From source to I-85 bridge	27-5-(0.3)	City	C; NSW	Water Quality Limited	•Ecological/ biological Integrity Fish (Poor)	5
16	Ellerbe Creek	From I-85 bridge to a point 2.2 miles upstream of Durham Co SR 1636	27-5-(0.7)	City	WS-IV; NSW			
17	Ellerbe Creek	From a point 0.2 miles upstream of Durham Co SR 1636 to Falls Lake, Neuse River	27-5-(2)	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	•Ecological/ biological Integrity Benthos (Fair) •Zinc	4s 5

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Neuse River Basin; Subbasin 03-04-01							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
18	South Ellerbe Creek	From Source to Ellerbe Creek		City	C; NSW	Not rated		
19	Goose Creek	From source to Ellerbe Creek (note not all of Goose Creek is WSWS)	27-5-1	City	WS-IV; NSW	Not rated		
20	Panther Creek	From source to a point 1.1 mile downstream of Durham Co SR 1818	27-6-(1)	Small portion within City	WS-IV; NSW	Not rated		
21	Panther Creek	From a point 1.1 mile downstream of Durham Co SR 1818 to Falls Lake	27-6-(2)	Portion within City	WS-IV; NSW; CA	Not rated		
22	Rocky Branch (Petty Lake, S of Redmill Rd)	From source to a point 0.5 mile upstream of Durham Co SR 1802	27-7-(1)	Currently outside of City	WS-IV; NSW	Not rated		
23	Rocky Branch	From a point 0.5 mile upstream of Durham Co SR 1802 to Falls Lake	27-7-(2)	Outside of City	WS-IV; NSW; CA	Not rated		
24	Little Lick Creek (Patterson Rd)	From source to a point 0.4 mile upstream of Durham Co SR 1811	27-9-(0.5)	Portion within City	WS-IV; NSW	Water Quality Limited	• Ecological/ biological Integrity Benthos (Poor) • Low dissolved oxygen • Turbidity	4s 5 5
25	Chunky Pipe Creek	From source to Little Lick Creek	27-9-(2)ut2	Portion within City	WS-IV; NSW	Not rated bioclassification	• Low dissolved oxygen	
26	Little Lick Creek (including portion of Little Lick Creek arm of Falls Lake)	From a point 0.4 mile upstream of Durham Co SR 1811 to Falls Lake, Neuse River	27-9-(2)	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	• Ecological/ biological Integrity Benthos (Poor) • Low dissolved oxygen • Turbidity	4s 5 5

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Neuse River Basin; Subbasin 03-04-01							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
27	Lick Creek	From source to Durham Co SR 1809 (Southview Road)	27-11-(0.5)	Portion within City	WS-IV; NSW	Water Quality Limited	• Ecological/ biological Integrity Benthos (Fair)	5
28	Stirrup Iron Creek	From source to Brier Creek	27-33-4-2	Portion within City	C; NSW	Not rated		
29	Page Branch tributary to Stirrup Iron Creek	From source to Stirrup Iron Creek	Not listed	Portion within City	Not listed	Not rated		
30	East Fork tributary to Stirrup Iron Creek	From source to Stirrup Iron Creek	Not listed	Portion within City	Not listed	Not rated		

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Cape Fear River Basin; Subbasin 03-06-05							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
31a	New Hope Creek	From source to a Sandy Creek	16-41-1-(0.5)a	Portion within City	C; NSW	Supporting (2003)		
31b	New Hope Creek	From source to a point 0.3 mile upstream of Durham Co SR 2220	16-41-1-(0.5)	Portion within City	C; NSW	Not Rated		
32	Mud Creek	From source to New Hope Creek	16-41-1-10	Portion within City	C; NSW	Not Rated		
33	Sandy Creek	From source to New Hope Creek	16-41-1-11	City	C; NSW	Not Rated		
34	New Hope Creek	From a point 0.3 mile upstream of Durham Co SR 2220 to Durham Co SR 2220	16-41-1-(11.5)a	City	WS-IV; NSW	Water Quality Limited	•Ecological/ biological Integrity Benthos (Fair) •Fecal Coliform Bacteria •Low DO	4s 5 5
35	New Hope Creek	From Durham Co SR 2220 to I-40	16-41-1-(11.5)b	Portion within City	WS-IV; NSW	Water Quality Limited	•Ecological/ biological Integrity Benthos (Fair) •Fecal Coliform Bacteria •Turbidity •Low DO	4s 5 5 5
36	New Hope Creek	From I-40 to a point 0.8 mile downstream of Durham Co SR 1107	16-41-1-(11.5)c	Not in City, but is downstream	WS-IV; NSW	Water Quality Limited	•Ecological/ biological Integrity Benthos (Fair) •Turbidity	4s 5

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Cape Fear River Basin; Subbasin 03-06-05							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
37	Third Fork Creek	From source to a point 2.0 miles upstream of N.C. Hwy. 54	16-41-1-12-(1)	City	C; NSW	Water Quality Limited	•Biological Integrity Benthos (Poor) •Fecal Coliform •Low DO •Zinc	4s 4t 5 5
38		From a point 2.0 miles upstream of N.C. Hwy. 54 to New Hope Creek	16-41-1-12-(2)	City	WS-IV; NSW	Water Quality Limited	•Copper •Biological Integrity Benthos (Poor) •Fecal Coliform •Low DO	5 4s 4t 5
39	Gum Creek	From source to New Hope Creek	16-41-1-13	Portion in City	WS-IV; NSW	Not Rated		
40	New Hope Creek (including New Hope Creek Arm of New Hope River Arm of B. Everett Jordan Lake)	From a point 0.8 mile downstream of Durham Co SR 1107 to confluence with Morgan Creek Arm of New Hope River Arm of B. Everett Jordan Lake	16-41-1-(14)	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	• Chlorophyll (a) • Turbidity	4t 5
41	New Hope River arm of Jordan Lake	From source at confluence of Morgan Creek and New Hope Creek arm of Jordan Lake to Chatham Co	16-41-(0.5)	Not in City, but is downstream	WS-IV; B; NSW; CA	Water Quality Limited	• Chlorophyll (a) • Turbidity	4t 5
42	Little Creek	From source to a point 0.7 mile downstream of Durham Co SR 1110	16-41-1-15-(0.5)	Small portion is in City	WS-IV; NSW	Water Quality Limited	• Ecological/ biological Integrity Benthos (Poor)	5
43		From a point 0.7 mile downstream of Durham Co SR 1110 to New Hope Creek	16-41-1-15-(3)	Not in City, but is downstream	WS-IV; NSW; CA	Water Quality Limited	• Biological criteria exceeded	6 (3c)
44	Crooked Creek (Southwest Creek)	From source to a point 0.7 mile upstream of mouth	16-41-1-16-(1)	Portion in City	WS-IV; NSW	Not Rated		

Table 2-2: Water Quality Classification and Receiving Stream Status for BIMS Indexed Streams by River Basin in Durham County

	Cape Fear River Basin; Subbasin 03-06-05							
#	**Receiving Stream Name**	**Description**	**Stream Index Number**	**City/MS4**	**Water Quality Use Classification**	**2010 Use Support Rating**	**Water Quality Issues - from 2010 303d Listing**	**IR Category**
45	Northeast Creek	From source to N.C. Hwy. 55	16-41-1-17-(0.3)	Portion in City	C; NSW	Not Rated		
46		From N.C. Hwy. 55 to Durham Triangle WWTP	16-41-1-17-(0.7)a	Portion in City	WS-IV; NSW	Water Quality Limited	• Copper • Fecal Coliform Bacteria • Turbidity • Low DO	5 4t 5 5
47		From Durham Triangle WWTP to Kit Creek	16-41-1-17-(0.7)b1	Portion in City	WS-IV; NSW	Water Quality Limited	• Zinc	5
48		From Kit Creek to a point 0.5 mile downstream of Panther Creek	16-41-1-17-(0.7)b2	Not in City	WS-IV; NSW	Water Quality Limited	• Copper • Fecal Coliform Bacteria • Turbidity • Zinc	5 4t 5 5
49	Burdens Creek	From source to Durham Co SR 2028	16-41-1-17-1-(0.3)	Not in City	C; NSW	Not Rated		
50		From Durham Co SR 2028 to Northeast Creek	16-41-1-17-1-(0.7)	Portion in City	WS-IV; NSW	Not Rated		
51	Buck Branch	From source to Burdens Creek	16-41-1-17-1-1	Small portion in City	WS-IV; NSW	Not Rated		

Methodology - Several sources were used to compile the information in Table 2-2.

- Names, stream index numbers and water quality classifications were obtained from the NC Division of Water Quality BIMS web site for Durham County (10/18/07).
- Identification of Water Quality Limited water bodies and other use support information updated from the "NC 2010 Integrated Report)," approved August 31, 2010.

- The tables include a "City" column to designate water bodies that receive runoff from the City of Durham. Heads-up evaluation of maps and GIS resources was used to assess whether a stream was located in the City or received runoff from the City. In areas where the City may annex property, some streams that currently do not receive runoff have been left on the list to facilitate correlation of stream identification where the names used in the BIMS system are different than those used by the City.

Water Quality Classification

B	Primary Recreation, Fresh Water
C	Aquatic Life, Secondary Recreation, Fresh (all Class C would become WS-V under 15A NCAC 02B 0262)
CA	Critical Area
HQW	High Quality Waters
NSW	Nutrient Sensitive Waters
ORW	Outstanding Resource Waters
WS-II	Water Supply II -- Undeveloped
WS-III	Water Supply III -- Moderately Developed
WS-IV	Water Supply IV -- Highly Developed
WS-V	Water Supply V -- Upstream

For more information see: http://h2o.ehnr.state.nc.us/csu/swc.html

Integrated Report Assessment Category (IR CAT)[8]

(1) Category 4a: TMDLs approved by EPA. Not yet meeting standards.
(2) Category 4b: Regulatory controls other than TMDLs expected to result in meeting standards by next listing.
(3) Category 5: Waters for which TMDLs are required.
(4) Category 6: Biologically impairment. Pollution/pollutant monitoring will place waters on Category 4c (impairment not caused by a pollutant) or Category 5 (TMDL required).
(5) Category 6: Biologically impairment. Pollution/pollutant monitoring will place waters on Category 1 or Category 2 (no use threatened).

[8] Source: North Carolina's Basinwide Information Management System, 2006 303(d) Report, Draft 2008 303(d) Report, Basinwide Management Plans for Neuse River (2003) and Cape Fear River (1999).

Section 3.0

Existing Water Quality Programs

3.1 Local Programs

The City initiated efforts to develop water quality programs for its forthcoming Phase I Stormwater Permit in 1991. New efforts included monitoring in urban streams, dry weather outfall inspection/screening for illicit discharges, and wet weather studies to characterize stormwater runoff quality from a range of land uses. As described below, these studies either have been completed or have been enhanced and expanded. In addition, other studies have been conducted and new monitoring programs have been added. All of these programs are outlined below.

3.1.1 Water Quality Monitoring - The City's monitoring programs have been evolving through annual assessment and incremental modification. Objectives of water quality monitoring now include evaluating the impacts of urban stormwater runoff and illicit non-stormwater discharges on water quality; identification of illicit discharges; assessing the quality of streams within the City of Durham; producing monitoring data comparable to data collected by the state; estimation of nutrient loads; evaluation of water quality trends; and assessing compliance with state water quality programs, including TMDLs and nutrient management strategies. Monitoring data may be used to support illicit discharge investigations, assess sources, evaluate trends, estimate nutrient loads, and, where possible, gauge the effectiveness of the Stormwater Management Program (SMP). Special studies are used to investigate specific questions that may relate to pollutant sources, fate and transport or to effectiveness of specific SCMs (BMPs).

In order to meet these objectives the City of Durham conducts two different types of monitoring programs, those that generate water quality information for later use and analysis, and those that generate water quality information for immediate use. Programs that generate water quality information and data for later use and analysis are generally structured to evaluate some long-term condition, such as the evaluation of trends or effectiveness of specific SCMs, as described above. These programs involve visiting streams throughout the city to collect samples on a regular basis or installing measurement devices that can record conditions continuously for later retrieval. Generally, water quality monitoring refers to these traditional monitoring schemes.

Other programs generate water quality information for immediate use. Investigations of discharges to the stormwater conveyance may result in the collection of water quality information and data, as will the regular inspection of stormwater outfalls. Illicit discharge and improper disposal programs are reactive programs designed to find illicit (and illegal) discharges of pollutants to the city stormwater conveyance system. These programs generate water

quality information and data selectively and quickly for the purposes of identifying and eliminating the pollution source.

The two types of monitoring, traditional and illicit discharge, are not mutually exclusive. Traditional monitoring may indicate the presence of an illicit discharge that staff then attempt to locate. For example, if bacteria concentrations from traditional monitoring are significantly elevated, the laboratory conveys these results within 24 hours so that staff can attempt to locate the illicit discharge.

3.1.1.1 Traditional monitoring programs

Traditional water quality and quantity monitoring in the city is comprehensive and includes a variety of types of measurements. Short descriptions of the monitoring programs are provided in Table 3-1. Traditional monitoring programs in the city have evolved as needs and permit requirements have changed. Monitoring began with fixed-interval water quality sample collection in the early 1990s. As the state and federal water quality programs evolved, and permits were modified, additional monitoring was needed to track progress toward reducing pollution in city streams and downstream reservoirs. As shown in Table 3-1, biological monitoring was added to the program in 1999 and fixed interval water quality monitoring was modified in 2004 to accommodate these needs. Significant changes occurred in 2008 following an audit of the program.

Table 3-1. Traditional monitoring programs

Type of monitoring	Duration	Description
Stream monitoring		
Water Quality (Fixed interval)	Quarterly collection began in 1991. Monthly began in 2004	Monthly collection of stream water samples from fixed locations throughout the city. Samples are analyzed for a variety of water chemistry parameters, including conventional pollutants and metals.
Biological	Since 1999	Annual collection of benthic macroinvertebrates from fixed stream locations throughout the city. Samples are analyzed for species diversity and pollution tolerance.
Stream Discharge	Since 2008	Continuous collection of stream discharge and/or stage from fixed locations. A significant portion of discharge monitoring is accomplished through the US

Table 3-1. Traditional monitoring programs		
Type of monitoring	Duration	Description
		Geological Survey. Pseudo-instantaneous measurements of stream discharge are also collected in streams throughout the city.
Meteorological monitoring	Since 2008. Monitoring at City Hall since 2000	Continuous collection of a variety of weather related parameters, with a focus on rainfall. A significant portion of rainfall monitoring is accomplished through the US Geological Survey.
Special Studies	Since 2008	Short-term continuous, wet weather, or SCM studies conducted to evaluate specific conditions or outcomes. These may include water quality, biology, and/or discharge monitoring.

Stormwater Services (SWS) reevaluates the monitoring program annually, generally at the end of the calendar year. Water quality and biology monitoring sites are reviewed to determine if any sites need to be added or eliminated. In order to support illicit discharge identification and elimination, the City may drop sites that do not have significant water quality issues in order to evaluate conditions in other streams, or may monitor selected sites one year out of two, alternating years. Stream discharge and meteorological monitoring are reviewed less frequently (e.g., every five to ten years) since the deployment of equipment requires a long-term commitment to those sites.

Once the City collects and evaluates water quality conditions, it shares them with the public. Because water quality parameters can seem overly technical and confusing, the City developed its own urban Water Quality Index (WQI) in 2004 to summarize water quality conditions for physical, bacteriological, and chemical parameters. The index has been used to evaluate the data collected after 2004 (the year when the City implemented consistent monthly monitoring and added quality assurance samples). The WQI incorporates the results of monthly monitoring of pH, turbidity, dissolved oxygen, biochemical oxygen demand, fecal coliform bacteria, copper and zinc. Seasonal variations are expected in the WQI because some parameters used in the index vary significantly with water temperature. The WQI is typically used to compute both quarterly and annual averages for each site. The quarterly average WQI is reported to department and city management

providing an uncomplicated parameter that can indicate overall change. The annual average WQI is the primary basis for summarizing water quality conditions in the city's annual State of Our Streams reports to citizens (made available on the City's web site). The City includes a copy of the annual State of Our Streams report when submitting the NPDES annual report. To reduce the impact of seasonal variation on the WQI, the City has begun to compute a twelve month rolling average.

In addition to the WQI, the City computes water quality statistics and publishes a one-page table to summarize water quality compliance statistics. This table is included in the City's annual reports. Summaries of bacteria and turbidity are also reported in the annual State of Our Streams report to convey easily understood parameters to citizens.

Special studies are designed and executed to answer specific questions about water quality conditions such as the functionality of SCMs. These studies are generally short-term, less than two years in duration. Priorities for special studies vary year-to-year. The decisions about which special studies to undertake depend upon resources available, effectiveness of existing programs, changes to state rules or procedures, and changes to federal rules or procedures. Examples of studies that have been undertaken in the past are as follows:

- Wet weather stormwater quality monitoring. Monitoring and evaluation to characterize stormwater runoff was initiated in 1993. Consultants selected seven sites with relatively small drainage catchments and collected samples. These sites represented a range of land uses including industrial; commercial; and low, medium, and high density residential development. City staff completed the monitoring for this study in 1999.
- On-Site wastewater treatment and disposal study. In 1999 and 2000 the City sampled effluent from septic sand filter systems. These systems treat residential sewage using a conventional septic tank combined with filtration through 18 inches of sand and dispose of any treated effluent that does not percolate into the Triassic clays soils of the area by discharging to surface drainage. A follow-up study was conducted in 2007 and 2008 showing that many systems had been eliminated but that effluent from the remaining systems had declined.[9]
- Bacteria Source Tracking. In 2004 City staff collected 62 samples of scat from domestic animals, wildlife, and human sources in the Northeast Creek watershed to support a state-led bacteria source tracking project. City staff also collected 22 stream samples under

[9] Woolfolk, et. al. 2008.

both base flow and storm flow conditions at two locations. Consultants tested bacteria in each sample for resistance to a range of antibiotics, and determined that the remaining sources were primarily pets and wildlife

- Northeast Creek Metals Study. The field component of the Northeast Creek Metals Study was completed in April 2011. A final report was completed in August 2011. The purpose of this study was to provide supplemental aqueous and sediment metals and sediment polycyclic aromatic hydrocarbons (PAH) data to support the development of the Northeast Creek Watershed Management Plan. Results of this study indicated aqueous cadmium, nickel, and zinc were not a problem in Northeast Creek, although zinc is listed as a contaminant of concern on the state list of impaired waters (303(d) list). This study confirmed the inclusion of copper on the state's list of impaired waters and supports the evaluation of copper removal in the watershed implementation plan. One PAH evaluated during this study, dibenzo(a,h)anthracene, exceeded toxicity benchmarks twice and may need to be addressed in the watershed implementation plan.

3.1.1.5 Illicit Discharge and Improper Disposal – The City of Durham uses multiple strategies to address illicit discharges and improper disposal. These strategies include publicizing a pollution reporting hotline, investigations of concerns presented by city residents and public employees, screening of dry weather flows at major outfalls for illicit discharges, tracing and eliminating the source of contaminated flows, household hazardous waste program, curb-side solid waste and recycling pick-up, promotion of recycling of used motor oil, coordination with city and county departments on sanitary sewage, public education on the hazards of illicit discharges and improper disposal, spill response program, and progressive enforcement under the City's Stormwater Pollution Control Ordinance.

The City operates a number of ancillary programs that support this effort. A comprehensive surface water monitoring program that measures stream flow, chemical, physical, and bacteriological parameters is used to identify problem areas. A biological assessment program using benthic organisms also identifies areas most likely to be subject to illicit discharges and improper disposal. The City has developed and continues to enhance GIS mapping of stormwater and surface water conveyance, impervious surfaces, land cover, NPDES permittees, industrial facilities, land use, water distribution system, wastewater collection system, and other mapping resources that facilitate tracking pollution sources and impacts. Adopt-A-Stream stream watch programs increase reporting from the community.

New storm drains have anti-dumping messages casted into the iron, while Storm Drain Marker programs place messages on older storm drains to increase awareness. The City also periodically conducts special studies to evaluate sources, transport, and/or fate of pollutants.

The City began focusing more heavily on illicit discharges after a comparative analysis (box and whisker distributions) of data from stream monitoring and from wet weather land use characterization indicated that fecal indicators were higher in certain streams than could be explained by contaminants being picked up by stormwater runoff. EPA guidance documents cite research indicating that, for some pollutants, dry weather illicit discharges contribute a greater pollutant load than wet weather discharges.

Inspection of major outfalls and screening of dry weather flows for contaminants (hereafter referred to as outfall screening) is an important strategy used by the City to identify and eliminate illicit discharges.

Outfall screening was initiated in 1991by hiring consultants to inspect major stormwater outfalls and test dry weather flows for the presence of indicator pollutants. The consultants used USGS topographic maps to evaluate drainage, identify appropriate catchment sizes, and discharge points. Field work followed to inspect the condition of the mapped major outfalls under dry weather conditions. When dry weather flows were found, analytical field tests were performed to screen for indicator pollutants. The consultants screened 344 major outfalls as part of the process of applying for the initial NPDES Phase I permit.

Once the permit was issued and a stormwater utility was implemented the City hired staff to continue and expand various programs. Beginning in FY97, City staff inspected the major outfalls identified by the consultants and identified additional outfalls to screen. Over 960 outfalls inspections were completed under dry weather conditions.

Regulatory guidance called for outfall inspection and screening to include assessing odor and visual indicators of contamination, and screening of dry weather flows for pollution indicators including chlorine, copper, surfactants (MBAS), and phenols.

Soon after City staff assumed responsibility for illicit discharge detection, ammonia was added to the screening indicators in order to find sources of inadequately treated sewage. Sewage has been the most common source of contamination encountered by the City's stormwater program. Ammonia has been the best single screening indicator to identify illicit discharges. Illicit discharges tend to be more frequent in areas of much older development resulting from a combination of aging infrastructure,

inadequate capacity for changed conditions, less protective design practices, poorer materials and little or no inspection and oversight of construction. More recent guidance by EPA on Illicit discharges echoes these findings and also recommends the use of ammonia as a screening parameter.

The City has pilot-tested several alternative indicators of illicit discharges including potassium, phosphate, and optical brighteners (using a prototype hand-held fluorometer.) The City has also evaluated alternatives to outfall inspection and screening.

The City conducted short-term, intensive monitoring programs that focused specifically on fecal coliform bacteria. Because the concentration tends to follow a log-normal distribution, single measurements are not reliable in identifying hotspots. In areas where illicit discharges were suspected, 6 to 8 samples were collected at closely spaced sampling sites over a period of weeks to characterize the spatial distribution of fecal coliform bacteria. In areas of older development with open channel drainage that is easily accessible for sample collection, this method has been successful at localizing hotspots, making it much easier to identify or isolate sources that are intermittent.

When a contaminated flow is found, an investigation is conducted to locate the source so that it can be eliminated. Initially this typically involved tracing the pipe up-stream until the source of contamination is located. In many cases, this process may identify a fairly small area of origin, where dye testing can be used to identify or confirm a source.

Completion of a project to map the City's stormwater infrastructure system provided new tools to facilitate source identification. Initially, GIS maps were accessed using desktop computers. For the last few years, investigations staff often access GIS data in the field. Outfall screening teams use Trimble handheld GPS units equipped with ArcPad software or tablet PCs equipped with the full ArcGIS application.

Since 1997 the City has operated a pollution reporting hotline (560-SWIM), which it has promoted regularly through the City's stormwater education and outreach program. The City has also made efforts to train its employees about stormwater, the NPDES permit, the MS4, and the hotline. A training module on stormwater pollution prevention and reporting is included in the City's New Employee Training that is mandatory for all new staff. Increased awareness of both residents and City employees has resulted in increased calls and investigations.

In addition to programs to find and eliminate illicit discharges, the City implements proactive programs to properly store, manage and dispose of

materials that could become pollutants. The City operates curbside pick-up for residential solid waste, white goods and recyclables. The City also operates a Household Hazardous Waste collection center that accepts used motor oil. The City has also conducted events where city residents can dispose of electronics (E-Wastes) and sensitive papers (shredding events.)

The City's Stormwater Pollution Control Ordinance requires auto parts stored outside to be covered, and automotive fluids and hazardous materials stored outside to have both covering and secondary containment.

Other strategies to detect and eliminate illegal discharges include:

- Dry-weather inspection/screening to detect contaminated flows;
- Development and maintenance of GIS mapping of the stormwater, surface water conveyance, and other data to facilitate tracking of pollution sources;
- Field use of tablet PCs and mapping GPS units to facilitate investigations;
- Maintenance of a comprehensive chemical, physical, bacteriological, and biological monitoring program;
- Regular visits to monitoring sites;
- Routine evaluation of ambient water quality data;
- Use of WQI and fecal coliform bacteria concentrations to target problem areas and changing conditions;
- Same-day laboratory alerts for fecal coliform bacteria samples exceeding action levels;
- Promotion of a pollution reporting hotline;
- Education of, and reporting by, City inspectors and other employees;
- Responding to citizen requests for service concerning water quality problems;
- Administration and enforcement of the City's Stormwater Pollution Control Ordinance;
- Reporting by citizen Stream Watch groups;
- Use of public participation efforts such as Stream Cleanups, Adopt-A-Stream, and Storm Drain Marker Programs;
- Coordinating with City Water and Sewer Maintenance to capture water contaminated by sewer overflows and pump it back into the collection system; and
- Special studies to evaluate sources, transport, and fate of pollutants.

To support the IDDE program and to meet other needs, the City revised its Stormwater Pollution Control Ordinance in November of 2006 to clarify allowable and prohibited discharges. The ordinance prohibits non-stormwater discharges to the drainage system, with a limited number of specific exceptions for certain discharges that do not significantly impact

water quality, consistent with Part 1, 9(a) and 9(b) of the City's NPDES permit, NCS000249. In addition to prohibiting non-stormwater discharges, the ordinance also requires certain preventative measures like secondary containment, requires timely clean-up of spills, and provides for escalated enforcement when necessary to achieve compliance.[10] The ordinance was renumbered in 2008 as part of a reorganization of the entire City code; a copy of the current ordinance is provided in Appendix B.

Facilities that have violated the ordinance may be required to develop and implement stormwater pollution prevention plans. The ordinance contains many options for achieving compliance. Thus far, the City has begun assessing civil penalties where necessary to achieve compliance. Under state law, civil penalties that are part of an ordinance containing criminal sanctions must be turned over to the school system.

Currently, the City of Durham has a very active Illicit Discharge Detection and Elimination (IDDE) program that includes a pollution reporting hotline, citizen complaint response, stream monitoring-response investigations, and education of new City employees. As of the end of September 2011,, the City had conducted more than 2,750 initial investigations, and 1,440 follow-up investigations.

The program employs a wide range of strategies to find and eliminate non-stormwater discharges that are pollutant sources. Stormwater Services personnel have executed an agreement with NC Division of Motor Vehicles to obtain vehicle owner information based on vehicle license plate information for water quality investigations. In conducting investigations, staff members may work with personnel from many other agencies including NCDENR's Division of Water Quality, Division of Waste Management, and Division of Land Quality; Durham County Engineering Department's Stormwater and Sediment & Erosion Control Division; Durham County Emergency Management; and Durham County Health Department. City agencies include Solid Waste Management, Durham Housing Authority, Depart of Water Management Department Sewer Maintenance and Pretreatment; Zoning Enforcement; Inspections; and Neighborhood Improvement Services. The City Attorney's Office is typically involved in enforcement cases where the defendant elects to bring an attorney to enforcement meetings.

3.1.1.6 Inter-Departmental Coordination – Over many years, Stormwater Services (SWS) has developed a role of providing technical assistance and guidance to the City's Water and Sewer Maintenance Division (W&S) when a Sanitary Sewer Overflow (SSO) occurs. This role became formalized when

[10] The ordinance also requires specific pollution prevention practices for automotive service facilities. It requires implementation of a stormwater pollution prevention plan for facilities with a significant number of junk or inoperable cars.

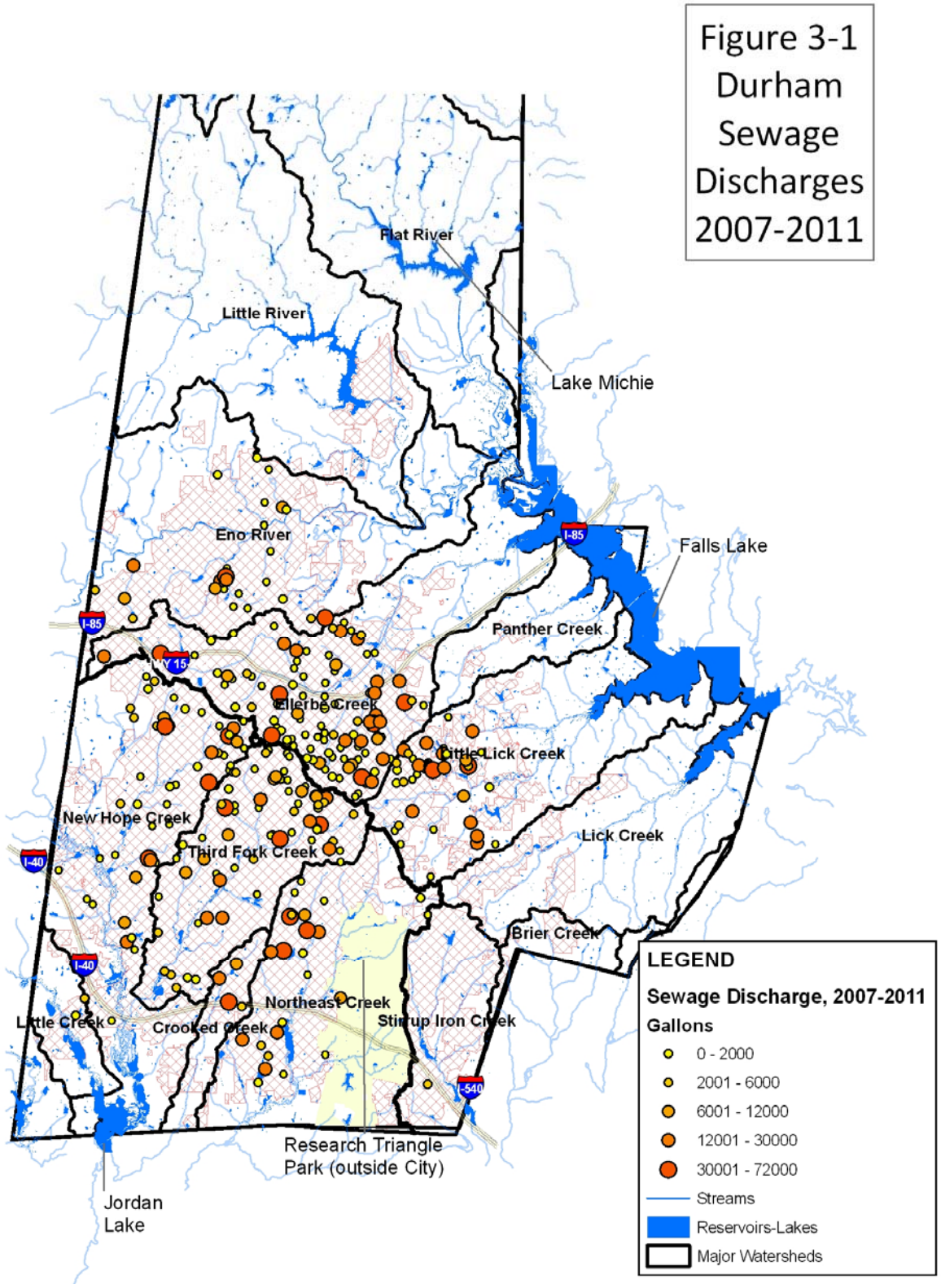
W&S and SWS coordinated a policy to improve communication on the location of discharges. This policy states that when SWS staff identify a sewage discharge they will remain on-site to direct a W&S supervisor to the location.

By 2001, this cooperation had led to many improvements including reducing response times and setting up pumps and check dams downstream where possible (these contain, collect, and return sewage to the collection system). In 2003 a further improvement was implemented when SWS staff began providing technical assistance in identifying the extent of contamination using field analytical kits to detect ammonia and detergents as indicators of sewage (previously W&S maintenance supervisors used visual observation).

Procedures developed by the City for discharges from the City owned collection system have subsequently been applied in enforcement and mitigation for sewage discharges from private sewer laterals, pump stations, and systems.

Figure 3-1 shows sewage-related discharges for the period 2007 through November, 2011. During this period, stormwater staff investigated 362 discharges related to sewage. Approximately half of these investigations involved discharges from private service lines, discharge of commercial wash waters, failing septic systems, discharging sand filter systems, failure of pumping station serving businesses, and other private discharge of wastewaters. Areas of much older development tend to have more frequent discharges, as indicated by higher density of points on the map. In these areas, aging public and private infrastructure requires repair more frequently. Outfall screening in these areas may be effective at guiding repair and maintenance efforts.

Figure 3-1: Sewage Discharge Investigations 2007-2010[11]



[11] In Figure 3-1 the volume of discharges is measured in gallons.

3.1.1.7 Special Studies

3.1.1.7.1 Wet Weather Stormwater Quality Modeling – Monitoring and evaluation to characterize stormwater runoff was initiated in 1993. Consultants selected seven sites with relatively small drainage catchments and collected samples. These sites represented a range of land uses including industrial; commercial; and low, medium, and high density residential development. City staff completed the monitoring for this study in 1999. Results were summarized in the City's application for permit renewal submitted in 1999. The data have been used as a basis for control strategies for nitrogen loading to the Neuse River Basin.

3.1.1.7.2 Residential Wastewater Treatment and Disposal Study - In addition to hotspot monitoring, the City has conducted special studies of on-site residential wastewater treatment and disposal systems to gauge their significance. In 1999 and 2000 the City sampled effluent from septic sand filter systems. These systems treat residential sewage using a conventional septic tank combined with filtration through 18 inches of sand and dispose of any treated effluent that does not percolate into the Triassic clays soils of the area by discharging to surface drainage. As shown in Figure 3-1, in 2007 City Stormwater staff investigated 84 discharges related to sewage, commercial wash waters, failing septic systems, discharging sand filter systems, and other wastewaters.

A follow-up study was conducted in 2007 and 2008 showing that many systems had been eliminated but that effluent from the remaining systems had declined.[12]

3.1.1.7.3 On-site Wastewater - The first special study to characterize effluent from discharging residential wastewater systems was conducted in 1999. Records on the location of these systems were poor, and systems were just beginning to be identified and either connected to the sanitary sewer system or issued NPDES permits as discharging systems. Monitored systems were located both in the City and in the County. System performance on bacteria and BOD ranged from very good to virtually no treatment. However, in even the best operating systems nitrogen concentrations were high in filtered effluent.

A follow-up study was conducted in 2008, this time also monitoring phosphorous. Many systems monitored in 1999 had been connected to sanitary sewer. Overall performance appeared worse, but this finding was not statistically significant.

[12] Woolfolk, et. al. 2008.

3.1.1.7.4 Bacteria Source Tracking – After state regulators initiated development of a fecal coliform bacteria TMDL for Northeast Creek, City staff conducted intensive monitoring in tributaries to identify and eliminate sources. Development in this watershed is predominantly post-WWII. Intensive illicit discharge detection and elimination, including sewer rehabilitation, resulted in significantly reducing fecal bacteria concentrations. After this IDDE work had been completed, City staff conducted a Bacteria Source Tracking Study in Northeast Creek to identify the remaining sources.

Bacteria found in humans, domestic animals and wildlife have different exposures to antibiotics; some drugs are used exclusively in humans and others only in animal husbandry or veterinary medicine. The antibiotic resistance signature of each general type of source can be used as a basis for comparison. Bacteria in samples collected from streams can be compared to a library of antibiotic-resistance signatures for local sources to determine whether bacteria are likely to come from humans, pets, livestock, or wild animals such as urban wildlife.

In 2004 City staff collected 62 samples of scat from domestic animals, wildlife, and human sources in the Northeast Creek watershed. City staff also collected 22 stream samples under both base flow and storm flow conditions at two locations. Consultants tested bacteria in each sample for resistance to a range of antibiotics, and determined that the remaining sources were primarily pets and wildlife.

3.1.1.7.5 Northeast Creek Metals Study – The field component of this study was completed in April 2011. A final report was completed in August 2011. The purpose of the study was to provide supplemental aqueous and sediment metals and sediment polycyclic aromatic hydrocarbons (PAH) data to support the development of the Northeast Creek Watershed Management Plan. Results of this study indicated aqueous cadmium, nickel, and zinc were not a problem in Northeast Creek, although zinc is listed as a contaminant of concern on the state list of impaired waters (303(d) list). This study confirmed the inclusion of copper on the state's list of impaired waters and supports the evaluation of copper removal in the watershed implementation plan. One PAH evaluated during this study, debenzo(a,h)anthracene, exceeded toxicity benchmarks twice and may need to be addressed in the watershed implementation plan.

The City has significantly expanded its efforts to protect water quality. From the discussion of the water quality monitoring program components in the previous paragraphs, it is evident that this program has expanded significantly

in scope and type of monitoring, in the number of sites and watersheds monitored, and in the frequency of sample collection.

3.1.2 Erosion and Sedimentation Control - Under the 1984 Memorandum of Understanding between the City and County (also discussed in 3.1.3 below), Durham County developed and implemented a Sedimentation and Erosion Control Program that created the County Sedimentation Control Office (under the County Engineering Department). Minimum requirements for this locally delegated program were established by the state's Sediment and Erosion Control Law. A model ordinance and design manual have been developed and periodically updated by the North Carolina Division of Land Quality. Under the state law, Durham County is authorized to regulate private development throughout the county, including within the City of Durham, while the Division of Land Quality is responsible for reviewing E&S plans and enforcing requirements on publicly funded projects.

North Carolina requires an approved erosion control plan for sites that disturb one or more acres. Initially this standard was used in Durham. Over time, standards in Durham have been revised and enhanced. In 2002 local requirements were revised to require permits for sites that disturb 12,000 square feet. Local sedimentation and erosion requirements were again recodified with the adoption of a City-County Unified Development Ordinance which came into effect on January 1, 2006.

Substantial revisions were adopted in 2009 to implement recommendations of the EEUDO Steering Committee and additional requirements under SL 2009-486. The threshold for requiring an engineered ESC plan was reduced from one acre to 20,000 square feet of land disturbance. Ground cover must be established more quickly, and sediment basins and traps must be designed to achieve 70% settling efficiency, and be able to handle a 25-year storm without overtopping failure.

Current requirements are provided in Appendix D of the SMP. These include procedural requirements in Section 3.8 of the UDO, slope protection standards in Section 8.8, Sedimentation and Erosion Control implementation requirements in 12.10, violations in Section 15.1, and enforcement and penalties in Section 15.5 of the UDO. Readers may find it easier to use the "smart" version of the UDO that is accessible from the City's website; extensive hyperlinks between sections and to definitions make the online version very accessible.

Current applicability requirements are summarized in Table 3-2 below. Permits are always required for sites that disturb more than 12,000 square feet and approved plans are always required for sites greater than 20,000 sq. ft. Permits and plans may be required for sites that disturb less than 12,000 feet on a case-by-case basis when the potential for off-site damage exists.

Table 3-2: Sediment and Erosion Ordinance Application

	Less than 12,000 sq. ft	12,000 square feet to 20,000 sq. ft.	More than 20,000 sq. ft.
Plan	MR	MR (**R***)	**R**
Permit	MR	**R**	**R**
Plan to District			**R**

Table Key:
MR - May be required when off-site damage is occurring, if the potential for significant off-site damage exists, or if a parent, subsidiary, and/or other affiliate of the applicant, has engaged in the activities enumerated in Sec. 3.8.7.
R - Required
R* - Required in Lake Michie/Little River Critical Area (M/LR-A), Lake Michie/Little River Basin/ Protected Area (M/LR-B), Falls and Jordan Critical Area (F/J-A) and Eno Critical Area (E-A). (see Figure 3-2 for map.)

As indicated in the Site Inspection protocol in Appendix D of the SMP, each active project is field inspected at least once during each calendar month. Compliance issues, heavy rains, project size/complexity, and citizen concerns serve to trigger additional inspections. Historically, 10-15% of projects are inspected multiple times each month. Enforcement options include stop work orders, revocation of permits, civil penalties of up to $5,000 per violation, criminal penalties, and remediation of damage.

3.1.3 Water Supply Watershed Program - The City has a number of programs related to post-construction protection of water quality. The oldest is the Water Supply Watershed Protection (WSWS) program. Local WSWS are more stringent than state minimum requirements and are independently applicable from other development requirements and stormwater performance standards. Independent applicability means that the most stringent applicable standard applies.

In 1984, Durham City and Durham County coordinated the development and implementation of a Water Quality Protection and Sediment and Erosion Control Program. This program was implemented through a Memorandum of Understanding (MOU) between the two jurisdictions. Under this agreement, the City operates the water quality protection portion for both jurisdictions;

the County operates the sediment and erosion control program for both jurisdictions.

The initial water quality program was applied to all areas of the state within designated water supply areas with a focus on industrial uses and treatment of runoff from the one-half inch storm. In 1994 a substantially modified program was implemented; the focus changed to a combination of post-construction stormwater treatment and impervious cover limits to address the impacts of new development plus protection of riparian buffers in designated water supply watershed areas. These requirements were re-codified with the adoption of a City-County Unified Development Ordinance (UDO) on January 1, 2006. The requirements are now found in the Environmental Protection Standards Chapter of the UDO, Chapter 8, which is provided in Appendix C. Water Supply Watershed Overlay Zoning, density limits, and stormwater treatment requirements are in Section 8.7. In 2010, separate WSWS buffer standards were consolidated with general riparian buffers in Section 8.5. Reservoir buffers are in Section 8.6.

There are five major surface water supplies in Durham County. Nearly half the City is covered by water supply watershed overlay zoning districts. The overlay zoning districts are shown on Figure 3-2. Table 3-3 summarizes the density thresholds for stormwater treatment, the impervious limits, and the requirements for protecting riparian buffers. Each water supply source has two zones, an inner area designated as a critical area (denoted by an “A” in the Overlay Zone identifier) and an outer area (denoted by a “B” in the identifier). For Falls Lake and Jordan Lake the “A” zone is shown in dark blue while the “B” zone is shown in aqua.

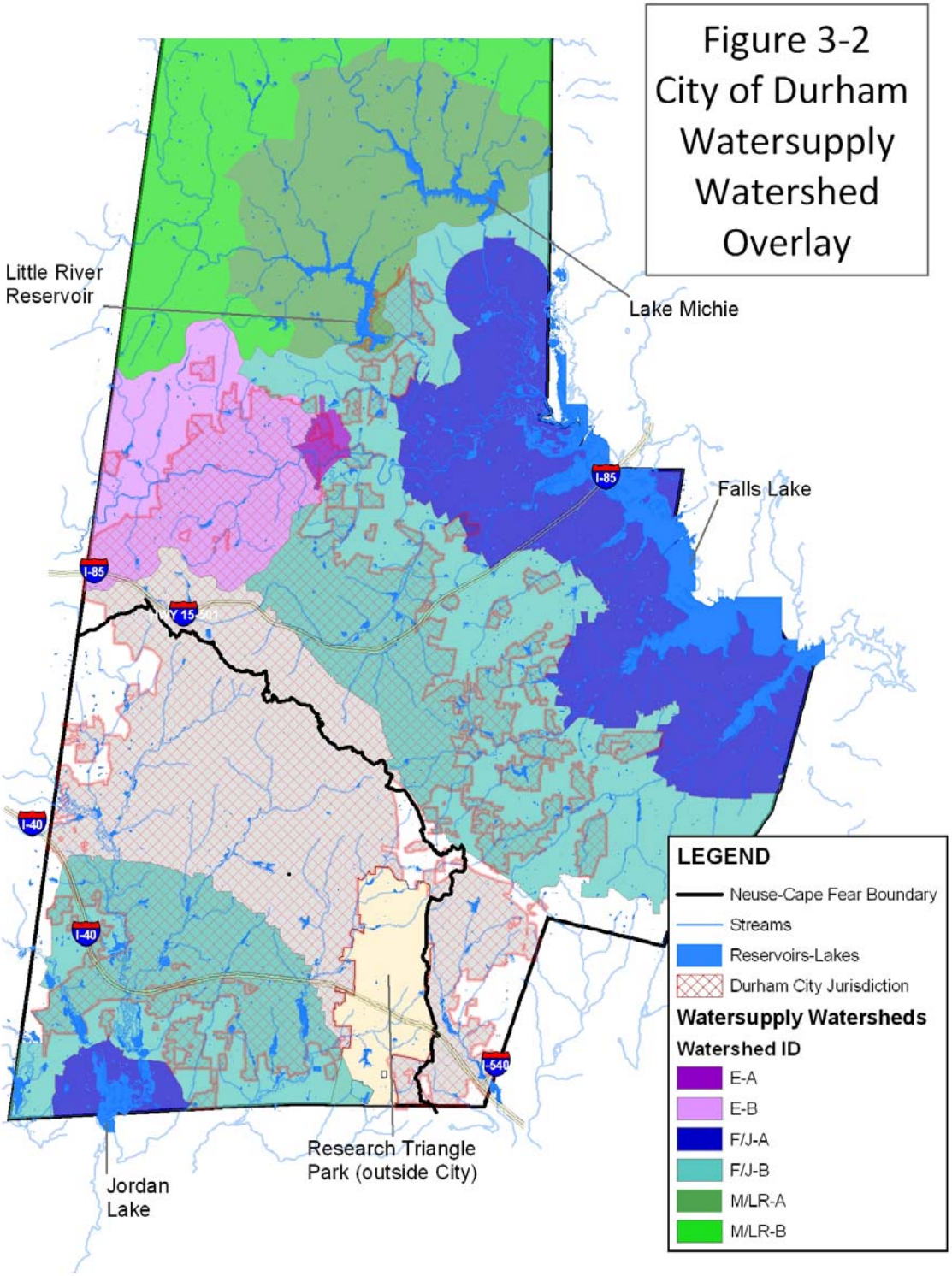
In Figure 3-2, Lake Michie/Little River Critical Area is designated as M/LR-A; Lake Michie/Little River Basin/Protected Area as M/LR-B; Falls and Jordan Critical Area as F/J-A; Eno Critical Area as E-A; and Eno Protected Area as E-B. Table 3-2 below summarizes requirements for these areas.

Within protected areas, certain uses are prohibited and others are controlled through special use permits. Forested buffers of 250 feet to 1,000 feet are required for the permanent pool of major reservoirs. Riparian buffer widths that must remain forested in WSWS overlay zones are typically wider than the minimum required buffer width of 50 feet applicable to each side of perennial and intermittent streams throughout Durham. As shown in Table 3-3, perennial streams require 150 feet forested buffers in “A” zones and 100 feet buffers in the outer “B” zones. Intermittent streams are protected by forested buffers of at least 50 feet.

Low density development with imperious maximums as low as 6 percent is allowed in the “A” zones. In some watershed areas, higher density is allowed with treatment of stormwater runoff. Impervious limits are supplemented with

minimum lot sizes that vary with between the rural and suburban development tiers. Treatment must be sized for runoff from one inch of rainfall. It must also be designed to remove 85% total suspended solids in accordance with the NC BMP Design Guide or equivalent guide. Continued operation and maintenance of the stormwater treatment devices is provided through an operation and maintenance agreement and a financial surety instrument between the property owner and the City.

Figure 3-2: Water Supply Watershed Overlay for the City of Durham[13]



[13] The water supply watershed overlays in the legend are further explained in Table 3-2 on the next page.

Table 3-3: Summary of the Current Water Supply Watershed Requirements

Overlay Zone	Low Density Option Impervious Surface Limit	High Density Option Impervious Surface Limit (requires treatment of stormwater runoff)	Perennial Stream Buffer Width	Intermittent Stream Buffer Width	Reservoir Permanent Pool
F/J-A	Within one-half mile of the normal pool: 6% Between one-half and one mile from the normal pool: 9%	Not permitted in the Rural Tier 40%, for all areas not in the Rural Tier and with uses as allowed in Sec. 4.11.4 Nonresidential Land Use Restrictions, intensities greater than 25% shall require a Major Special Use Permit, Special Use Permit	150 feet	100 feet	250[1] feet
F/J-B, E-B	24%	70%	100 feet	50 feet (High Density Option: 100 feet)	
E-A	24%	Not permitted	150 feet	50 feet	
M/LR-A	6%	Not permitted	150 feet	50 feet	
M/LR-B	6%	Not permitted	150 feet	50 feet	

[1] On nonresidential uses, the Falls/Jordan buffer width shall extend to 1,000 feet.

3.1.4 UDO Environmental Protection Standards - In 2001 the City and County adopted an environmental protection ordinance that included what were, at the time, leading edge protection measures. In 2006 the City and County adopted a Unified Development Ordinance (UDO) that incorporated these provisions with some slightly modified requirements.

The Durham City-County Planning Department established the Environmental Enhancements to the UDO (EEUDO) Steering Committee in 2008 to facilitate evolution of the protection standards based on current science and policy. The EEUDO Steering Committee has recommended enhancements in the areas of erosion and sediment controls, buffers, wetlands, and water quality protection. Updated information is available on the City's web site.[14] Some of these enhancements have been included in ordinance revisions discussed below.

The Environmental Protection Standards are found in Chapter 8 of the UDO which may be found in Appendix C of this SMP. Current standards require tree coverage and tree protection, establish floodplain and flood damage protection standards, Riparian Buffer Protection Standards, Water Supply

[14] This site is available at: http://www.durhamnc.gov/departments/planning/udo_environmental_enhancements.cfm.

Reservoir Buffers (discussed in 3.1.3 above), Steep Slope Protection Standards, wetlands protections Standards, and Protection Standards for the Durham County Inventory of Important Natural Areas, Plants, and Wildlife, as modified by more current information from the North Carolina Heritage Program.

Tree protection requirements were enhanced in 2010. Generally in suburban areas, the UDO requires tree coverage of 20% to 25% for residential development and 10% to 15% for commercial. Street tree requirements have been added in other tiers. The City's tree preservation requirements and its active urban forestry program have resulting in Durham being designated a "Tree City" for many years running.

The UDO Environmental Protection Standards require protection of a riparian buffer extending 50 feet from the top of the bank on either side of perennial and intermittent streams. In 2010 riparian buffer protection requirements were revised to include detailed requirements necessary to comply with Jordan Lake NSW Strategy buffer rules, and during these revisions WSWS buffer protection standards were consolidated with general riparian buffers. Procedures and implementation provisions vary between Jordan and Neuse watersheds. Changes adopted in 2010 include:

- Protection buffering of wetlands that are adjacent to or within 50 feet of surface waters in the stream buffers;
- Requiring diffuse flow from man-made ditches or conveyances prior to water entering a stream buffer;
- Revision of the table of allowed uses within stream buffers; and
- Procedural changes for permitting, exemptions, variances, mitigation, stream determinations, and enforcement, and
- Apply the ten-foot no-build zone (setback) currently required for stream buffers to wetland buffers.

The UDO provides that perennial and intermittent streams are present if the feature is shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). The UDO also allows the City to make a determination that surface waters are not present based on an onsite determination by qualified personnel consistent with the provisions of 15A NCAC 02B .0233(3)(a).

The UDO riparian buffer protections continue to exceed minimum state standards in various ways, such as being wider in WSWS overlay zones, extending riparian buffer protections to wetlands that are within stream corridors, and providing 25-ft protected buffers around one acre or larger

isolated jurisdictional wetlands when they are not otherwise subject to riparian buffers.

In addition to slope protection standards applicable during grading and construction as part of Sedimentation and Erosion Control Standards, the Environmental Protection Standards also include limitations of development of steep slopes that exceed 25% slope and meet other criteria.

Significant changes have been made to UDO Chapter 8, Environmental Protection Standards in 2009 and 2010, requiring updates to Appendix C of the SMP.

3.1.5 Peak Flow Requirements - In 1997, the City adopted a stormwater ordinance that requires applicants for land development to evaluate peak pre-construction and post-construction runoff for 2-year and 10-year rain events. If peak discharge will increase by more than 10% after construction, the applicant must evaluate downstream channel and culvert capacity to ensure they are adequate to prevent flooding or ponding at culvert entrances (ratio of headwater to depth less than or equal to one). If downstream capacity is inadequate, the applicant has to provide on-site detention to manage peak flows to predevelopment conditions.

3.1.6 State Nutrient Management Strategies – The City of Durham is currently subject to three sets of state rules, listed chronologically:

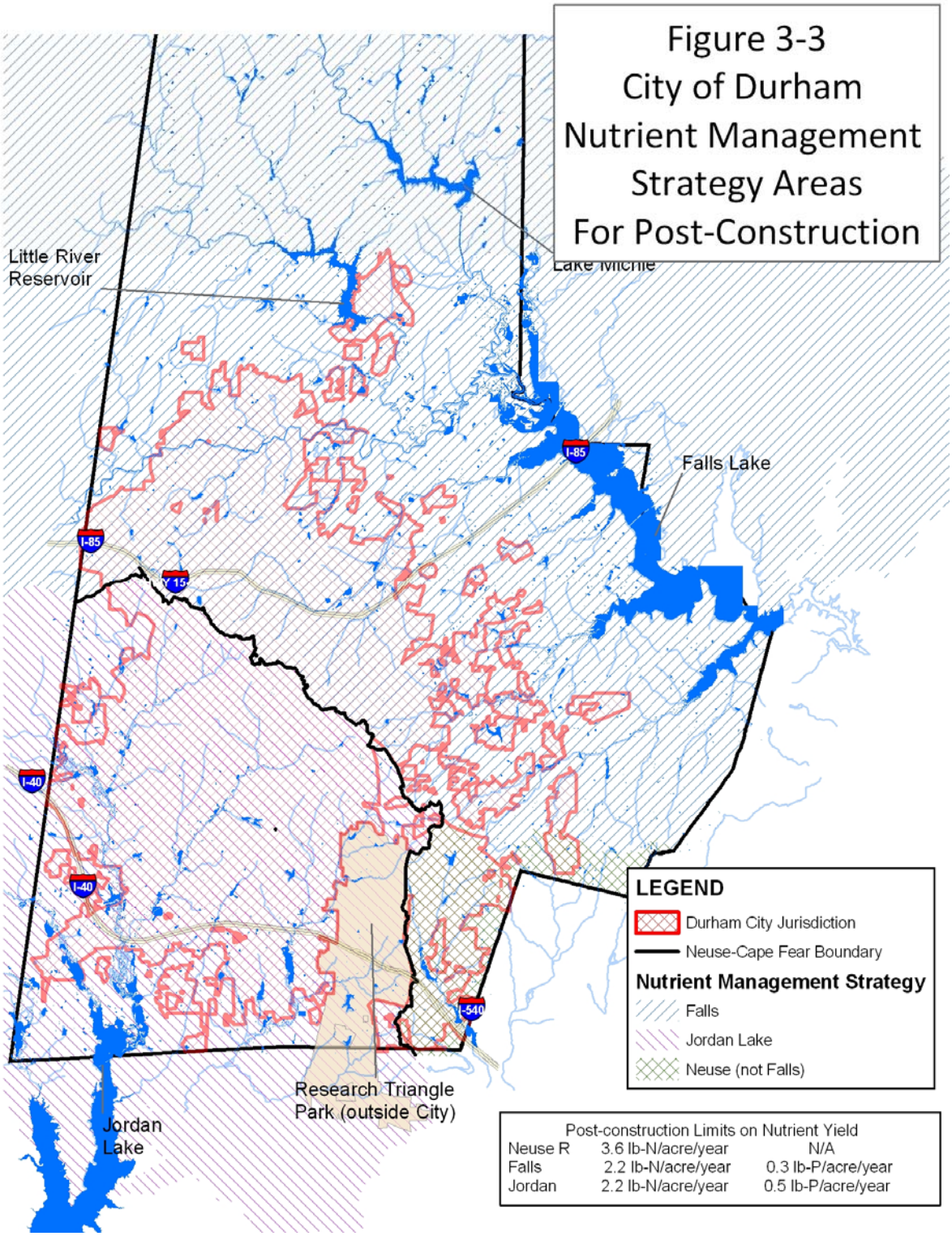
- Neuse River Nutrient Sensitive Water Strategy
- Jordan Lake Nutrient Sensitive Water Strategy
- Falls Lake Nutrient Sensitive Water Strategy

Figure 3-3 provides a map showing the areas where each rule is applicable. A black line curving though the center of the map divides the Neuse River Basin from the Cape Fear River Basin. On the Cape Fear River side of this line, Durham drains to Jordan Lake. On the Neuse River Basin side of the line, most of Durham drains to Falls Lake, but an area in the southeast of the map does not. Post-construction loading limits (yield) for the three nutrient management strategies are set at levels equal to that of undeveloped land minus the reduction required by the NSW Strategy. For the three strategies, the loading limits are:

NSW Strategy	Nitrogen Limit	Phosphorous Limit
Neuse River estuary	3.6 lb-N/acre/year,	no limit
Falls Lake	2.2 lb-N/acre/year,	0.3 lb-P/acre/year
Jordan Lake	2.2 lb-N/acre/year,	0.8 lb-P/acre/year

The nutrient reduction goals, schedules, implementation requirements vary between the three sets of rules or NSW Strategies. The Falls Lake watershed is

Figure 3-3: City of Durham Nutrient Management Strategy Areas for Post-Construction Controls



located within the Neuse River Basin; the Falls Lake Nutrient Management Strategy's post-construction requirements replaced those of the Neuse rules within the Falls Lake watershed. The Falls Lake NSW Strategy did not include separate buffer rules but left the Neuse buffer rules in place.

The Neuse NSW Strategy was adopted in 1996 to address fish kills in the Neuse River estuary below New Bern, North Carolina. Neuse rules have been in place the longest, and are fully implemented. The Neuse NSW strategy includes a stormwater rule requiring public education, illicit discharge identification and elimination, identification of retrofit opportunities, and limits on post-construction nitrogen loading for new development. The Neuse stormwater rule applies to specific, listed local governments in the Neuse watershed.

The Jordan Lake and Falls Lake NSW Strategies became effective in 2009 and 2010, respectively. The Jordan Lake and Falls Lake NSW rules require large to very large reductions. The rule sections are complex, requiring local governments to adopt several different types of local ordinances, providing schedules that allow for capacity building, staged implementation, and re-examination of needed reductions at milestones.

In 2010 local governments adopted buffer protection ordinances for Jordan Lake that had been approved by North Carolina. Durham and other local governments have submitted post-construction ordinances for both Jordan and Falls NSW rules with ordinance adoption and implementation required in 2012 after state approval. The Jordan and Falls Strategies include requirements that all local governments in the watershed reduce nutrient loading from existing developed areas. Strategy requirements are being phased-in to allow local governments to build capacity.

The City began implementing post-construction limits on nitrogen loading in 2004 under the Neuse rules. These requirements are implemented through a city ordinance as performance standards, rather than through the Planning Department's Unified Development Ordinance.

In 2009 when the City adopted Phase II post-construction requirements under the NPDES requirements, the Neuse River performance standards for nitrogen were made applicable throughout the City, including in the Jordan Lake watershed. In 2010 as rulemaking for Jordan Lake and Falls Lake progressed, the City adopted more stringent nitrogen requirements and added phosphorous requirements. The 2010 revisions limit average annual nitrogen yield (loading) to 2.2 pounds per acre per year, and phosphorous to 0.5 pounds per acre per year, with the latter midway between phosphorous limits under the Falls and Jordan NSW Strategies.

The 2010 revisions are interim measures intended to keep development going forward from increasing loading to the lake. The City has submitted a draft ordinance for state review that includes the detailed provisions necessary to implement the Jordan and Falls NSW post-construction regulations. The Jordan and Falls Strategies require local governments to adopt and implement approved post-construction ordinances in 2012.

The City submits a separate annual report on its Neuse Stormwater Management Plan. That report is required to summarize public education activities, new development controls, illicit discharge detection and elimination efforts, and to identify likely retrofit locations. An example from the New Development section of that report is provided in Appendix G for the period October 1, 2007 to September 30, 2008.

The Jordan Lake and Falls Lake NSW rules will require submission of several additional annual reports for state review.

3.1.7 Land Use Planning - Land use planning and land development practices play a critical role in controlling sources of pollution. Source control is generally accepted to be much more cost-effective and reliable than treatment. The City of Durham has been very fortunate to be well ahead of many other municipalities in land use planning. Land development is reviewed by a combined City-County Planning Department. Zoning and subdivisions ordinances have been updated and combined into a City-County Unified Development Ordinance (UDO). In addition, the City and County have developed a long-range Comprehensive Plan to guide where and how private development should occur and how the City and County should provide public facilities and services to support future growth. There are also plans for open space and trails.

The City-County UDO uses zoning to direct where various types of development and certain uses may be located. The UDO uses urban, suburban and rural tiers to provide a general framework for consistent and appropriate development. The UDO provides for appropriate zoning and design standards within these areas. For example, zoning for heavy and light industry limits where such potential sources of pollution may be located. The UDO also designates overlay zoning for downtown and compact neighborhood areas to guide where development density is encouraged in order to foster smart growth and facilitate mass transit. The UDO uses water supply watershed overlay zoning to provide additional protections and limitations to protect sensitive waters.

In addition to zoning restriction, Article 5 of the UDO requires major or minor special use permits that provide an additional level of review and approval. Special use permits are required for asphalt plants, concrete plants, hazardous

and low-level nuclear disposal and storage facilities, recycling centers, and other waste related industries. In areas zoned for light industry, special use permits are required for automobile wrecking, junk, and salvage yards. Special use permits are required for campgrounds and RV camps, marinas, and many other uses. Article 5 Section 5.3 requires convenience stores with gas sales; wrecking, junk, and salvage yards; and vehicle service, including limited uses vehicle service, provide a spill prevention and counter measures plan with the site plan. The article also requires that vehicle repair, servicing, and maintenance be conducted within an enclosed structure so that potentially polluting activities would be shielded from rainfall and runoff.

The Environmental Protection Standards in Article 8 of the UDO discussed in 3.1.4 provide additional protections.

Other resources that affect land use planning include the Comprehensive Plan[15] and the City's engineering standards (contained in the Reference Guide for Development[16]). The Comprehensive Plan focuses on the ultimate needs of the community rather than the pressing concerns of today. Chapter 7 of the Plan focuses on conservation and the environment. The City's engineering standards provide additional opportunities to address specific sources. For example, section 7 requires dumpster pads for food service establishments and that all establishments utilizing compactors have a drain connected to the sanitary sewer (areas beyond the pad must be sloped to drain away from stormwater inlets).

3.1.8 Sustainability – Durham City and County together created a Sustainability Manager position to address multiple sustainability issues. This position will assist in implementing the Greenhouse Gas Reduction Plan adopted by the City www.durhamnc.gov/ghg, and will assist city management in developing policies that promote use of products that are recycled, recyclable, bio-degradable, non-toxic, and energy efficient.

3.1.9 Threatened and Endangered Species -There are no waters either in the City of Durham or immediately downstream from the City that have been designated as critical habitat for aquatic animal species listed as threatened or endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service under the provisions of the Endangered Species Act, 16 U.S.C. 153 1-1 544 and subsequent modifications.[17]

[15] This plan is available online at: http://www.durhamnc.gov/departments/planning/comp_plan/.
[16] This guide is available online at: http://www.durhamnc.gov/departments/works/handbook/.
[17] While no area within Durham contains critical habitat, there are areas designated as critical habitat in the Flat River in Durham County and in the Eno River in Orange County. There are also species of concern in these two water bodies, possibly in areas near or within City limits. There are also sensitive species in upper New Hope Creek. The City will need to revisit this issue if annexation substantially changes city boundaries.

3.2 State Programs

The following sections discuss the state programs that may affect the implementation of the SMP Plan.

3.2.1 NC Division of Land Resources, Land Quality Section - As mandated by state law, erosion and sediment control requirements for publicly funded projects are enforced by the Land Quality Section of the North Carolina Division of Land Resources. This section reviews and approves erosion and sediment control plans. City SWS conducts independent investigations of such projects under its illicit discharge ordinance and has carried out enforcement actions under it authorities.

3.2.2 NC Division of Water Quality: Neuse Buffers, Industrial Stormwater Requirements - State regulations protecting riparian buffers on streams and other waters within the Neuse River Basin are enforced by the North Carolina Division of Water Quality. The City requires development projects that propose to impact riparian buffers in the Neuse River Basin to provide a letter from the state authorizing such impacts.

3.2.3 NC Division of Waste Management - The North Carolina Division of Waste Management is responsible for solid waste, groundwater contamination from leaking underground storage tanks, dry cleaners, Superfund clean ups, etc. When the City finds contaminated groundwater entering the drainage system, it coordinates with the staff in the Raleigh Regional Office of the Division of Waste Management.

Section 4.0

Permitting Information

4.1 Responsible Party Contact List

The position responsible for the overall implementation of the SMP, including the coordination of all program activities, is the Stormwater Manager. The Stormwater Services Division and Engineering Division were combined in 2007 under a single manager that serves both as Stormwater Manager and as Engineering Manager under the Director of Public Works. Contact information for the Stormwater Manager is provided below:

Name:	Ed Venable, PE
Position:	Engineering and Stormwater Manager
Address:	City of Durham 101 City Hall Plaza Durham, NC 27701
Telephone:	(919) 560-4326
Fax:	(919) 560-4316
E-mail:	ed.venable@durhamnc.gov

4.2 Organizational Chart

Organization is discussed in greater detail in Section 7.1. An overall organization chart for the City is provided in Figure 7-3, while an organization chart for Public Works is presented in Figure 7-4.

The City of Durham's Storm Water Services (SWS) will have responsibility for many of the activities indicated in the SMP Plan. SWS is contained within the Engineering and Stormwater Services Division of the Department of Public Works of the City of Durham. The Water Quality Manager for Storm Water Services will be responsible for compiling data for annual reports. This will include obtaining data from various departments, divisions, and work units throughout the city to track and report on progress to fulfill the measurable goals listed in Section 7.

An example list of key individual contacts is provided in **Appendix I**. An updated list will be provided in each annual report.

4.3 Signing Official

The signing official for the SMP Plan and the annual reports is the Director of the Public Works Department (the Storm Water Services Division is part of this Department). Contact information is provided below:

Name:	Marvin G. Williams
Position:	Director of Public Works
Address:	City of Durham 101 City Hall Plaza Durham, NC 27701
E-mail:	Marvin.Williams@durhamnc.gov

4.4 Duly Authorized Representative

Appendix H provides a copy of the authorizing action taken by the Durham City Council.

Section 5.0

Co-Permitting Information

5.1 Co-Permittees

No co-permittees are involved in this SMP Plan.

5.2 Legal Agreements

This section is not applicable to the City of Durham.

5.3 Responsible Parties

This section is not applicable to the City of Durham.

Section 6.0

Reliance on Other Government Entity

6.1 Name of Entity

Previous versions of the SMP have indicated that this section is not applicable. As indicated in NCS000249, and explicitly acknowledged in the permit and Section 7.5 of this SMP Plan, construction site runoff within the City of Durham is regulated by three other entities: Durham County Erosion and Sediment Control Program (which handles construction projects by entities that do not have the power of eminent domain such as private projects - most types of construction), North Carolina Department of Transportation (which handles state road projects), and the North Carolina Division of Land Quality (which handles projects by entities with eminent domain authority or that are publicly funded). The City does respond to citizen concerns, conducting independent investigation and enforcement of City stormwater pollution control ordinance requirements. See Section 7.5 for further details.

The City of Durham operates its own Public Education and Outreach Program. The City is also a founding member of the Clean Water Education Partnership, for which it is the second largest source of funding, and City stormwater staff members actively participate in selection of themes, messages, and target markets for mass media education.

6.2 Measure Implemented

7-5 is implemented primarily by Durham County Erosion and Sediment Control Program, North Carolina Department of Transportation, and North Carolina Division of Land Quality

7-1(e) is implemented through participation in the Clean Water Education Partnership.

6.3 Contact Information

Durham County Erosion and Sediment Control Program
Chris Roberts, PE
Division Manager, Stormwater & Erosion Control Division
Engineering Department
120 E. Parrish Street
Durham, NC 27701
croberts@durhamcountync.gov
(919) 560-0740

North Carolina Department of Transportation
NCDOT
Roadside Environmental Unit

1557 Mail Service Center
Raleigh, NC 27699-1557
Ted Sherrod, PE, CPESC
tsherrod@dot.state.nc.us
(919) 733-2920 ext. 46

North Carolina Division of Land Quality
Sediment Emergencies Call 1-866-STOPMUD
John Holley, Jr., Regional Engineer
1628 Mail Service Center
Raleigh, NC 27699-1626
john.holley@ncdenr.gov
(919) 791-4200

Clean Water Education Partnership
P.O. Box 12276
Research Triangle Park, NC 27709
cwep@tjcog.org
(919) 558-9343

6.4 Legal Agreements

The Durham County Erosion and Sediment Control Program originally operated its program within the City of Durham under an authorizing resolution adopted in 1984. In 2005 the City Council and County Board of Commissioners adopted a Unified Development Ordinance (UDO) that incorporated provisions of the County S&E Ordinance. Under the UDO, construction site plan review, site inspection and enforcement continue to be handled by Durham County Erosion and Sediment Control. Applicable sections of the UDO are provided in Appendix D, which will be updated as changes are adopted.

The agreement establishing the the Clean Water Education Partnership Partnership is provided in Appendix N.

6.5 Recognition of Contributions

Although the City does not rely on other entities to implement this SMP, the City acknowledges the time, energy, and hard work of the many watershed and stream watch organizations within its boundaries. Notably these include the Ellerbe Creek Watershed Association, Eno River Association, Friends of New Hope Creek, Friends of South Ellerbe Creek as well as the many smaller neighborhood/stream watch organizations such as the Old North Durham Neighborhood Association and Friends of Northeast Creek. These organizations conduct numerous projects entirely on their own. Many also work with the City on specific projects to conserve sensitive land, restore and protect water quality, and preserve the City's natural resources.

The City of Durham also wishes to acknowledge the ongoing work and accomplishments of many other entities at work within the City. These groups include the Durham County Health Department, Durham County Engineering, and the other groups listed below.

The City has been pleased to work with the North Carolina Ecosystem Enhancement Program to help facilitate projects it has undertaken within the City that include stream restoration, buffer enhancement/restoration, and treatment of stormwater flows from existing development.

The Durham Soil and Water Conservation District has long been active in water quality protection, initially working to prevent soil loss related to agricultural practices. The District conducts water quality education programs and for many years has hosted an "Environmental Field Day" at the West Point on the Eno City Park for fifth graders in Durham County. This event is supported and has participation from many resource agencies, including the City's Water Management Department and Stormwater Services Division. The District also completed one of the first urban stream restoration demonstration projects in North Carolina on a small section of Goose Creek with very limited funding. The District continues to conduct valuable programs and projects within Durham, both on its own and in partnership with the City.

The City has also been privileged to work with researchers and staff at North Carolina Central University, North Carolina State University, Duke University, and the University of North Carolina in Chapel Hill. The City has funded research both directly and through participation in the stormwater section of the NC Urban Water Consortium.

These entities are making significant contributions toward protecting water quality (which is the goal of the City's Municipal NPDES permit). They also perform activities in the areas of stream restoration, public involvement (such as stream clean-ups), and public education. The City may serve as a grant partner or otherwise support and participate in the work of these entities, but these groups also undertake work independent of City participation.

As discussed in Section 7, the City is committed to undertaking its own efforts to implement the SMP and does not intend to rely on entities other than those acknowledged in the permit in Part II (E) and discussed above and in Section 7. The City expects that annual reports under the NPDES permit and SMP may include activities performed by other entities and groups in partnership with the City. In order to provide a more complete picture of efforts to restore and protect water quality within the City, annual reports may also include information on significant achievements and contributions made independent of City involvement. Such information is intended to be supplemental.

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Section 7.0
Stormwater Management Program (SMP) Plan

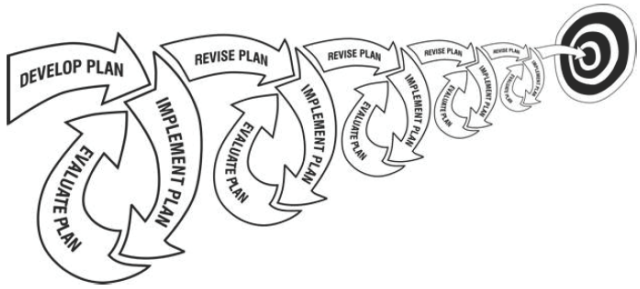
The goals of this SMP are to:

- Reduce the discharge of pollutants from the MS4 to the maximum extent practicable;
- Protect water quality; and
- Satisfy the appropriate requirements of the Clean Water Act-NPDES Program.

This SMP Plan details the proposed program elements to be implemented under the City's NPDES municipal storm water permit, NCS000249. The City's permit incorporates the six minimum control measures now required under the NPDES Phase II program. It also includes other provisions applicable to Phase I programs. This SMP includes the best management practices (BMPs) that will be used to fulfill requirements, the measurable goals for each BMP, the implementation schedule (and frequency, if applicable) for each BMP, and the person or positions responsible for implementation.

Annual reports will summarize the City's progress in implementing the BMPs in the SMP Plan, provide interim assessment of the effectiveness of components of the SMP, and, if necessary, propose adjustments or changes. Under federal Phase I stormwater regulations, municipal permittees are required to assess and evaluate the effectiveness of their SMP over time and revise or enhance best management practices until water quality standards are achieved. This iterative process, shown in Figure 7-1[21], is sometimes referred to as adaptive management or continual process improvement. This process includes the steps of developing a plan, implementing it, evaluating its effectiveness, and then repeating the whole process until the desired water quality goals are met. The City of Durham's stormwater program has undergone considerable evolution and will continue to do so under the current SMP Plan.

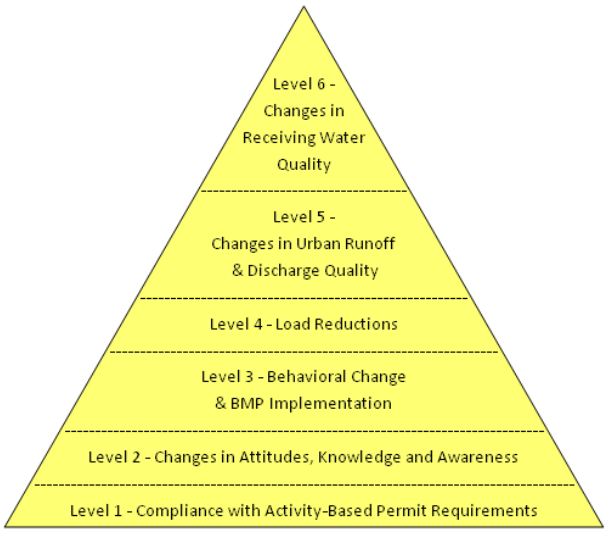
Figure 7-1: The Iterative Process of Stormwater Management



[21] California Stormwater Quality Association (2007). Municipal Stormwater Program Effectiveness Guide. California: CASQA.

Figure 7-2[22] shows the many different outcome levels at which effectiveness can be assessed. While the ultimate goal is to restore and protect water quality in receiving waters, it is recognized that for many pollutants knowledge regarding sources of the pollutant and how that pollutant moves through the environment is incomplete. Adaptive management provides the opportunity to begin management based on what we know, recognizing that much more information will be needed in order to achieve restoration.

Figure 7-2: Classification of Outcome Levels



Assessing changes and establishing statistical trends in receiving water quality parameters based on monthly monitoring data is a long-term activity that requires many years of data. The City began regular monthly ambient water quality monitoring in January 2004. Since monthly monitoring began, the area has experienced two severe droughts. Such variable climatic conditions may require a larger than usual dataset in order to assess trends.

In general, outcomes higher on the pyramid in Figure 7-2 require much longer time-horizons for implementation and assessment. The City has developed the capability of assessing changes in receiving water quality as discussed in Section 3.1.1 and Section 7.9 of this SMP, and in the annual WQAMPs; however, the primary focus of assessment under this SMP will be on levels lower in the pyramid. Compliance with this SMP focuses on Level 1 assessment. Through membership in the Clean Water Education Partnership, the City will evaluate progress at Level 2 on the pyramid. Progress at Level 3 is documented at the individual site level. During the term of the permit the City will periodically report on higher outcome levels as information is available.

[22] Ibid.

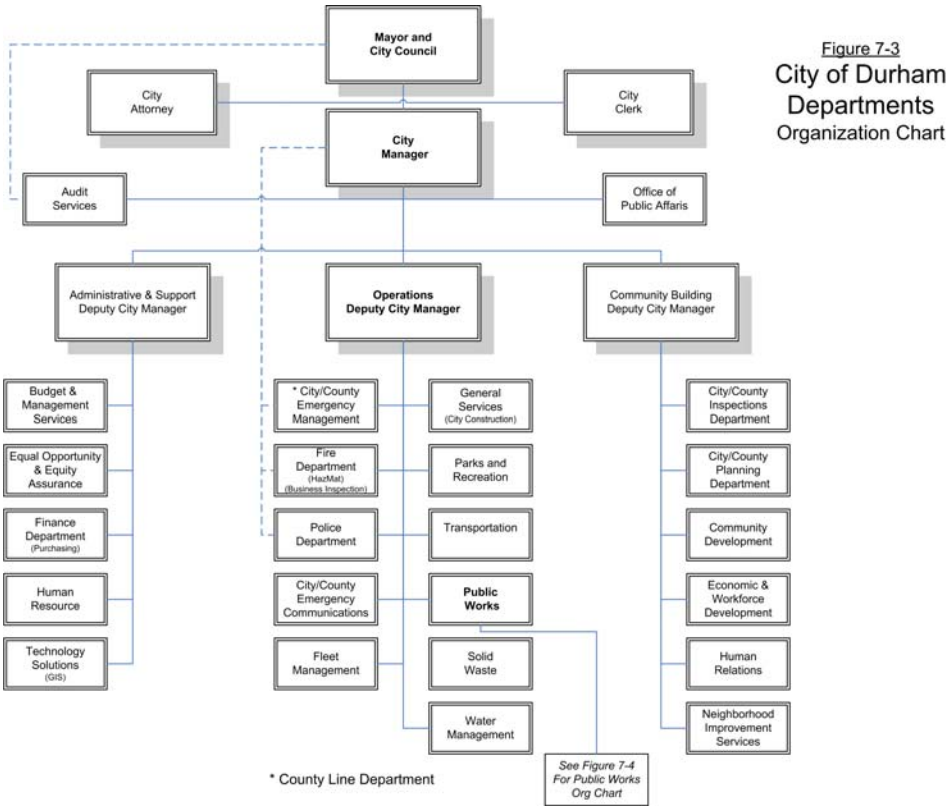
7.1 Program Implementation

This section describes the general organizational structure of the City. It also provides an introduction to departments that play significant roles in carrying out this SMP and summarizes their general responsibilities. In addition, management responsibilities for coordination and the tools that will be used to support these duties are outlined.

7.1.1 General Organization - The City operates under a Council-Manager form of government. Budget authority rests with the City Council which is comprised of seven members. The City has 2,384 full-time employee positions authorized in the FY12 budget. The City provides police and fire protection, water and sewer services, solid waste collection and recycling, public works, neighborhood improvement services, transit and parking services, and administrative services. The City also engages in community development, economic and work force development, and human relation activities. Planning, building inspections and zoning enforcement are handled by combined City-County Planning and City-County Inspections Departments. Public Works handles inspection of roads, water and wastewater utility lines, stormwater conveyances, and stormwater management facilities.

An overall City organizational chart is provided in Figure 7-3 showing the departments and reporting paths within the City.

Figure 7-3: City Departments Organization Chart (as of 9/15/2011)



7.1.2 Departments and Positions Responsible for SMP Implementation - NPDES permit NCS000249 includes requirements that apply to and impact many different departments within City government and require coordination with several departments within County government. City of Durham departments that contribute to the goals of the SMP include Public Works, General Services, Water Management, Parks and Recreation, Fire, Technology Solutions, Solid Waste, and Neighborhood Improvement Services. City and County combined departments that contribute to the goals of the SMP include the Planning and Inspection Departments. County departments involved include the Engineering (Sediment and Erosion Control), Emergency Management, and Public Health. Each of these groups and the role they play in implementing the SMP Plan is summarized in the sections below.

7.1.2.1 Public Works Department - The Stormwater Manager, working under the Director of Public Works, is responsible for implementation and coordination of the activities discussed in this SMP. Responsibility for gathering information and coordinating annual reporting, as well as implementation of key aspects of the SMP, rests with work units within the Public Works Department. An organizational chart for the stormwater related functions within the Public Works Department is provided in Figure 7-4, updated in September 2011. An example table listing contact names associated with key roles is provided in Appendix I of this SMP; this list will be updated in annual reports. Divisions and work groups within the Public Works Department are further outlined below.

7.1.2.1.1 Engineering and Stormwater Services Division - In 2007 the Stormwater Services Division was consolidated with the Engineering Division.[23] Work groups within the Engineering and Stormwater Services Division are responsible for stormwater related planning, engineering, water quality monitoring, illicit discharge control, outfall inspection, industrial inspection, education and outreach, public involvement, utility mapping, utility billing, engineering inspections of conveyances, engineering evaluation of stormwater treatment practices, and BMP operation and maintenance inspections.

The major workgroups within the Engineering and Stormwater Services Division and their responsibilities are summarized below.

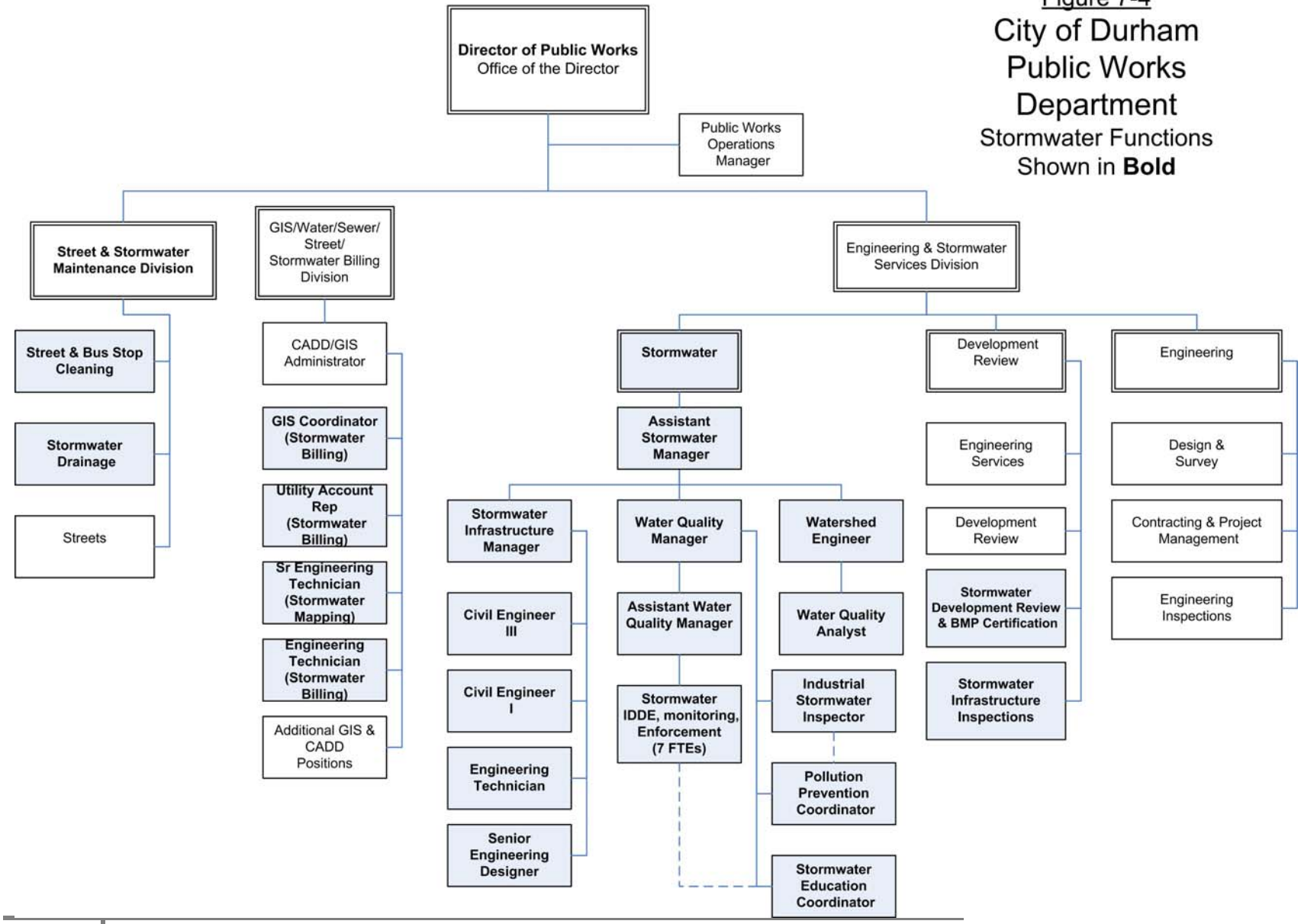
Stormwater Infrastructure Group - This group is part of the Engineering and Stormwater Services Division of the Public Works Department. Its major responsibilities include: drainage investigations; small drainage projects (design, right of entry agreements, easements, and

[23] The manager of the new Engineering and Stormwater Services Division now serves as both Stormwater Manager and Engineering Manager.

Figure 7-4

City of Durham Public Works Department

Stormwater Functions Shown in **Bold**



construction supervision); stormwater conveyance capital improvements projects (design contracting, property acquisition, contract bidding, construction contract administration, and inspections); National Floodplain Insurance Program technical support for flood plain management (floodplain information requests, review of map revision requests, 'no rise' determinations); coordination with CADD/GIS Work Group on GIS mapping of infrastructure; and coordination with Stormwater Maintenance on maintenance repairs.

Water Quality Group - This group is part of the Engineering and Stormwater Services Division of the Public Works Department. The major responsibilities of this group in relation to the SMP are: illicit discharge, detection, and elimination programs (pollution reporting hotline, complaint response, outfall inspection and screening, investigation of high bacteria found in stream monitoring, enforcement); industrial inspections; water quality monitoring programs (ambient stream monitoring, biological assessment stream monitoring, operation of certified benthic laboratory, outfall screening, special studies); public education and outreach support; public involvement support; watershed planning support; program management support; TMDL support; and coordinating preparation/revision of the SMP and annual reports.

Development Review - This group is part of the Engineering and Stormwater Services Division of the Public Works Department. Its major responsibilities include: review of land development plans and construction drawings for conformance with engineering design and performance requirements for streets, water distribution systems, and wastewater collection systems. A subunit is responsible for reviewing stormwater collection and treatment design, field evaluation of stormwater treatment systems prior to acceptance, on-going operation and maintenance inspection of existing stormwater treatment systems and management of watershed planning contracts. The Stormwater Review subunit operates two certification programs, one to certify professional engineers in submitting Certified As-Built Drawings for newly completed BMPs prior to acceptance by the City, and the other to certify individuals in conducting required Annual Inspections and submitting Annual BMP Maintenance Certifications.

Engineering Inspections - This group is part of the Engineering and Stormwater Services Division of the Public Works Department. The major responsibilities of this group are: construction inspections of streets, water, sewer, and stormwater conveyance systems for new development and redevelopment.

Engineering Design - This group is part of the Engineering and Stormwater Services Division of the Public Works Department. This

group's major responsibilities related to the SMP are: design, property acquisition, construction contract bidding, construction contract administration, and inspections for City streets, water, and sewer projects.

7.1.2.1.2 Streets and Stormwater Maintenance Division - In 2008 the Street Sweeping Division, which is funded by the City stormwater utility, was moved from the Solid Waste Department to the Public Works Department. The Street and Stormwater Maintenance Division of the Public Works Department is now responsible for the inspection and maintenance of MS4 inlets and pipes. The Street Sweeping Division maintains gutters and cleans inlet grates.

The major workgroups within the Streets and Stormwater Maintenance Division and their responsibilities are summarized below.

Stormwater/Drainage Maintenance - This group is part of the Streets and Stormwater Maintenance Division of the Public Works Department. Its major responsibilities in relation to the SMP are: construction of minor drainage maintenance repairs referred from the Stormwater Infrastructure Group; conducting routine inspection of self-cleaning inlet basins and video inspection of downstream pipe systems; using flush and vacuum trucks to clean inlet basins, manholes, and pipes; and using the CATV truck to inspect the pipe systems. A subunit is responsible for removing fallen trees, debris and other materials entering streams that could block flow and cause flooding.

Street & Bus Stop Cleaning – This group performs street sweeping of downtown and residential streets (using regenerative-air sweepers), manual roadside litter collection, dead animal pick-up, and manual cleaning of bus stops.

7.1.2.1.3 CADD/GIS Work Group - This group is also a part of the Public Works Department. It includes Stormwater Utility Billing and Stormwater GIS Mapping of infrastructure functions. This group's responsibilities include: obtaining annual satellite imagery to aid in maintaining current maps of parcel impervious surface; using survey grade GPS instruments to update the GIS map of stormwater conveyances; GIS mapping of stormwater detention and treatment facilities; contracting for city aerial photography, topography, planimetrics mapping, GIS mapping of streets, water utilities and sewer utilities, and related city mapping programs.

7.1.2.2 General Services Department – The General Services Department is responsible for project design; property acquisition; construction; contract bidding; construction contract administration; inspections of most

city construction projects including buildings, parks, and trails (exceptions are public works and utilities projects related to water system, sewer system, sidewalks and streets). This group is also responsible for maintenance of landscaping and right-of-way.

7.1.2.3 Water Management Department – The Water Management Department operates and maintains the water distribution system and the sanitary sewer collection system. It also coordinates with SWS on controlling sanitary sewer overflows; operates pretreatment programs for major industries typically coordinating with Stormwater Services industrial inspection; provides water supply and wastewater treatment (including planning, management and operation of two water treatment plants and two wastewater treatment plants (advanced treatment for nutrient removal); operates and maintains the water distribution system; maintains utility easements for water distribution and wastewater collection; operates an industrial pretreatment program, a cross-connection control program, and a water conservation program (rain barrels, shower head replacement, toilet replacement rebate).

7.1.2.4 Parks and Recreation Department – The Parks and Recreation Department maintains park trails and greenways. The group also operates programs at City parks and trails (including two dog parks). This group has partnered with the Stormwater Services Division to operate pet waste stations in parks and along trails.

7.1.2.5 Fire Department (Spill Response Program) – The Fire Department has a HAZMAT (HAZardous MATerials) Team that assists with containment of spills. The Fire Prevention Bureau supervised by the Fire Marshall inspects all commercial buildings, including industrial sites, regarding materials storage and fire safety.

7.1.2.6 Technology Solutions Department – The Technology Solutions Department manages computer systems, servers, and networks. Their duties include managing the Geographic Information System (GIS), enterprise database, and various other databases. (Note that Stormwater Services develops and maintains additional geodatabases.

7.1.2.7 City Attorney's Office – The City Attorney's Office handles stormwater- related legal matters, including permit review, assistance with ordinance development, support of enforcement efforts, and review of contracts and agreements.

7.1.2.8 Solid Waste Department – The Solid Waste Department provides curbside solid waste and recycling collection to City resident. In 2008, the department began providing free bulky item and white goods collection. The department provides support for City-sponsored stream clean ups in

the spring and fall, as well as year-round support for Adopt-A-Stream and Adopt-A-Street programs. A Solid Waste code enforcement officer handles solid waste containers placed in the right-of-way for collection. The department also operates the City's Household Hazardous Waste Collection Center, open five days per week and funded by the Stormwater Utility. The department also operates a swap shop to further promote recycling.

7.1.2.9 Neighborhood Improvement Services – Neighborhood Improvement Services (NIS) handles enforcement of ordinance code pertaining to litter, junk and debris, and abandoned vehicles, as well as minimum housing requirements. NIS also addresses illegal sit-outs and illegal dumping related to rental housing. NIS sponsors an annual Landlord Training Workshop for property owners and property management companies; at this workshop Stormwater Services and Water Management teach modules on owner/manager responsibilities regarding response to sewage discharges and responsibility for tenant activities that result in stormwater pollution.

In addition to the departments and/or divisions that play key roles in implementing this SMP, staff throughout the City also have substantive roles. For example, City employees in all divisions and departments use City fueling stations and are therefore responsible for following procedures in fueling vehicles, reporting spills, and reporting pollution.

The City has also partnered with the County in implementing some programs that have key roles in implementing the SMP. These areas are summarized below.

7.1.2.10 City/County Planning Department – This department implements a Unified Development Ordinance (UDO)[24]. Its responsibilities include zoning, subdivision, comprehensive planning, and local area planning. It also manages reviews by the Joint City/County Planning Commission, the City's Development Review Board (DRB), the Board of adjustment (BOA), and City Council. In addition, the department also coordinates the site plan acceptance review process to ensure completeness. It reviews development applications for conformity with UDO requirements that protect County-wide riparian and wetland buffers, water supply watershed riparian and reservoir buffers, water supply overlay zoning density limits, including lot-by-lot impervious limits for low-density development. It distributes plans to the Transportation Division, the Engineering and Stormwater Division, and the City/County Sediment and Erosion Control Program for review of requirements related to roads, stormwater conveyance and treatment, water and sewer utilities, and construction site runoff. The Planning Department provides overall

[24] This is also discussed in Section 3.1.2-3.1.4.

coordination of the review process. The Planning Department enforces the UDO requirements that protect vegetated riparian buffers.

7.1.2.11 City/County Inspection Department – This department is responsible for building permits and inspections. It also takes care of zoning inspection and enforcement. Zoning enforcement staff coordinate with SWS on pollution prevention at automotive service facilities.

Other areas of the SMP are handled entirely by the county or at a county level. Such programs include sediment and erosion control and some emergency response activities. These are further discussed below.

7.1.2.12 Durham County Sediment and Erosion Control – This group is part of the Durham County Engineering Department. It administers a locally delegated program under the City/County Unified Development Ordinance adopted by both City Council and Durham County Commissioners.[25] Responsibilities of the group include reviewing local construction erosion and sedimentation control plans, issuing land disturbance permits, and conducting regular monthly inspection of construction sites.

7.1.2.13 Durham County Emergency Management – This group is responsible for county emergency management programs and handling chemical spills (including coordinating spill response, clean up, and reporting).

7.1.2.14 Durham County Health Department – This group permits and inspects septic systems. It also inspects restaurants and often coordinates with the City of Durham Stormwater Services Division to resolve violations involving improper grease handling.

7.1.3 Funding – Funding for the City's stormwater program is provided through a stormwater utility. Utility fees are based on the amount of impervious surface on a property. This is true of both residential[26] and non-residential development. Revenues are also derived from review fees for land development projects that require stormwater management facilities. The City's annual NPDES reports include revenues and expenditures for the Stormwater Utility, positions funded by the utility, and budget for the approved Stormwater Capital Improvement Program.

[25] This is discussed at length in Section 3.1.3. The UDO portion referenced is available in Appendix D.
[26] Fees for residential development are divided into two tiers. The lower tier is for those residential units with less than 2,000 square feet of impervious surface; all other residences with more impervious areas are assigned to the second tier.

Within stormwater services, budget needs are managed and coordinated by the Assistant Stormwater Manager based on input from the work groups within the division. The Assistant Stormwater Manager compiles the needs and initiatives from all the groups across the Public Works Department and then works with its director to develop the overall budget request for the Public Works Department. This budget then is sent to the City Manager's Office and the City Council for further approvals.

7.1.4 Tracking SMP Plan Goals – The Public Works Department tracks major departmental goals, accomplishments, and performance in a work plan database that already tracks many of the measurable goals that have been included in the SMP Plan. Objectives, performance goals, and specific work initiatives are established at the beginning of each fiscal year and entered into the work plan spreadsheet. Individuals from each work group or division, typically managers and supervisors, are assigned reporting responsibility to update the statistics for their group in the work plan quarterly. Some additional statistics are tracked monthly within divisions and work groups.

Working under the Assistant Stormwater Manager, the Water Quality Manager is responsible for reviewing quarterly performance and progress reports from other departments. The Water Quality Manager also tracks progress of measurable goals, compiles data for annual reports, and compiles data received from other divisions within the Public Works.

7.2 Public Education and Outreach on Storm Water Impacts

The City of Durham has been conducting a Public Education and Outreach Program for more than fifteen years. The program works to increase awareness by educating the public and specific target audiences about the impacts of their behaviors on water quality. Efforts to change awareness are accompanied by information about actions that members of the public can take to reduce pollutants entering receiving waters. The program uses many tools and approaches to reach a variety of audiences.

The target pollutants, their sources, and target audiences of public education and outreach efforts are further described below. Further information about how these were chosen is available in Appendix J.

Additional discussion of target pollutants and audiences that may be specific to a particular watershed will be provided in water quality recover plans (see Section 7.10) that are updated annually and that report on watershed specific outreach; these are provided as attachments to the City's annual reports. Watershed specific discussion is also provided in the watershed plans the City is developing or updating.

7.2.1 Target Pollutants - Target pollutants for stormwater education include: fecal coliform bacteria, nitrogen, phosphorus, low DO, turbidity, BOD, hydrocarbons/PAHs, thermal pollution, and hydrologic modification. These pollutants and their sources will be addressed through education and outreach to the target audiences listed below. Zinc and copper appear to be associated with a limited number of industrial sites and will be addressed through city industrial monitoring and inspection together with state permitting.

7.2.2 Target Pollutant Sources – Target pollutant sources include:

7.2.2.1 Illicit Discharges – Illicit discharges both generally and specifically including improper cleaning, improper storage, and improper disposal of pollutants;

7.2.2.2 Sewage – Sewage from private and public components of the gravity sewer collection system that may include overflows and blockages caused by *food wastes and cooking grease* from problem restaurants and from residents of the City;

7.2.2.3 Vehicle Maintenance - Petroleum products and automotive fluids from owner-maintenance of vehicles and from automotive service facilities;

7.2.2.4 Construction Sites – Sediment and/or erosion from construction sites;

7.2.2.5 Landscape Maintenance and Lawn Care – Landscape maintenance and lawn care including use of herbicides, insecticides and other pesticides along with improper yard waste disposal; and

7.2.2.6 Atmospheric Deposition – Broad efforts to improve air quality, reduce emissions of greenhouse gasses, and reduce dependence on petroleum will have water quality benefits.

7.2.3 Target Audiences – Based on the identified target pollutants and their sources, the target audience of this program are:

7.2.3.1 General Public – The general public may be educated to recognize and report illicit discharges. The general public has been selected because of the widespread impacts of routine human activities and the general lack of awareness of the impacts of stormwater runoff.

7.2.3.2 Homeowners - Desired behaviors (or behavior changes) from educating this audience include activities involving lawn maintenance and stormwater runoff.

7.2.3.2.1 Lawn Maintenance –Desired lawn maintenance behaviors include having soil tested before applying fertilizers, reading instructions on any chemicals (including fertilizers, pesticides, and herbicides) before applying them to a lawn or garden, not applying lawn chemicals before it rains, minimizing fertilizer usage (especially "weed-and-feed" fertilizer), using slow-release organic forms of nitrogen fertilizer, using a composting lawnmower that can help reduce fertilizer usage, using integrated pest management rather than broad spectrum pesticides on a regular basis, and keeping leaves and grass clippings out of the street gutter by properly disposing of or composting them. It also includes items such as having lawns aerated, encouraging practices that help establish deep root systems for lawns, and putting rain gardens (all of which will help encourage water infiltration).

In addition, homeowners that live next to a stream will be encouraged to not mow stream banks. We also would like them to establish vegetative buffers and plant trees along stream edges that will provide shade, help anchor soil in stream banks, filter nutrients from shallow groundwater, and provide a source of leaf packs that will help keep the food chain stabilized in the river or stream.

7.2.3.2.2 Rooftop Runoff – We would like to encourage homeowners to disconnect rooftop drains from the MS4 by

directing them to lawns (which might include rain gardens) or connecting them to larger rain barrels or cisterns. In addition, homeowners could regularly clean organic debris from their gutters (this helps keep bacteria and organic matter from entering our streams). Homeowners can also plant trees that will shade driveways and other paved surfaces that can lead to hot water flashes with a rain event.

7.2.3.2.3 Other Activities – Homeowners should dispose of grease properly to keep it from entering and clogging the sanitary sewer system, properly dispose of household hazardous waste, keep lids on garbage bins tightly closed to keep out animals, wind, and rain that could cause litter or "garbage juice."

7.2.3.3 Vehicle Owners – Vehicle owners will be encouraged to properly dispose of any wastes from home maintenance, regularly maintain vehicles so that they don't leak fluids, and to wash their vehicles in such a manner that the run-off doesn't enter storm drains.

7.2.3.4 Pet Owners – Should pick up after, and properly dispose of, their pet's wastes.

7.2.3.5 Businesses – Target business sectors will include:

7.2.3.5.1 Automotive Maintenance Facilities – With this group we want to advance the proper usage, storage, and disposal of automotive fluids and other wastes such as tires. We will also educate this group about their responsibilities regarding spill cleanups and notification of the correct officials.

7.2.3.5.2 Rental Property Owners and Managers – We hope to leverage this group to educate their tenants through information distribution. In addition, we will educate property owners and managers about their responsibilities for repairing and maintaining sewer service lines and remediating sewage discharges.

7.2.3.5.3 Landscape Professionals – This group can be educated about proper choice and application of lawn chemicals such as pesticides, herbicides, and fertilizers. This group would also be an ideal way to help encourage proper vegetative buffers and stream bank maintenance.

7.2.3.5.4 Restaurants – Restaurant employees will be educated about proper grease disposal and other equipment cleaning procedures.

7.2.3.6 Students/Young People - Some long-held practices, activities and behaviors have been shown to contribute to water quality degradation. Younger people are less resistant to changing their behavior and can help initiate such changes in the rest of society.

Not all of the audiences identified above will be addressed each year. However, each audience will be addressed at least once during the permit period. Furthermore, Stormwater Services intends to be reactive to new information and to regulatory programs (including state rules, TMDLs, and NSW management plan requirements) and will review existing programs and initiate new outreach activities as they are needed. The following Sections explain the BMPs that will be implemented to meet these requirements, the audience and pollution sources that will be targeted, outreach strategy, and measures of success.

In addition to its own efforts, the City has been an active participant in the Clean Water Educational Partnership (CWEP). The City participates in the selection of target pollutants, sources, and audiences for CWEP efforts, but it has less control over those efforts.

7.2.3 BMPs Summary – Table 7.1 identifies the BMPs and the measurable goals associated with each that the City will implement to fulfill its public education and outreach requirements.

The semi-annual Waterways newsletter, articles in City newsletters, newspaper articles, and brochures use print to disseminate information on specific pollutants, behaviors that help eliminate pollutants, and general stormwater issues. The website uses electronic means to provide a variety of information both to specific target audiences as well as to the general public. The media campaign is designed for a wider audience using more general messages aimed at pollution prevention measures and increased volunteer participation.

Workshops and presentations focus on a relatively small audience but are an effective tool for addressing specific topics including targeted pollution sources. Workshops are also effective at gaining volunteer participation. The business outreach program targets specific audiences and selected pollution sources that are of primary concern in Durham.

Table 7-1: BMP Summary Table for the Public Education and Outreach Program[27]

BMP	Measurable Goals	Frequency	Responsible Position
Develop a list of (a) Target Pollutants and (b) Target Audiences	Target pollutants and audiences are discussed in Sections 7.2.1 and 7.2.2 of this SMP Plan.	completed	Water Quality Manager
(c) Informational Website	The City promotes and maintains the Stormwater Services Website: www.durhamnc.gov/stormwater. This contains biannual newsletters; annual reports to citizens on water quality; information about pollution prevention; BMP maintenance, stormwater technology, and practices; and inform about how to contact staff.	ongoing	Pollution Prevention Coordinator
	The City also financially supports, contributes material to, and promotes the Clean Water Education Partnership website www.NCcleanwater.org	ongoing	Public Education Coordinator
(d) Develop and Distribute Public Education Materials	Acquire or develop and distribute public education materials to identified target groups.	ongoing	Pollution Prevention Coordinator
	Develop and distribute information to target business sectors.	one sector target each year	Pollution Prevention Coordinator
	Educate homeowners about target pollutants and stormwater issues (through Waterways and Citizens Newsletters).	2 issues per year	Public Education Coordinator
(e) Media Campaign	Document campaign reach and frequency for each type of media like radio and TV (including those elements implemented locally or through a cooperative agreement).	year 1, 2, 3 & 5	Public Education Coordinator
(f) Promote and Maintain Hotline/Help line	Promote stormwater hotline – see giveaways, newsletters, etc.	periodically each year	Public Education Coordinator
	Maintain a stormwater pollution reporting hotline (see Section 7.4 IDDE).	Ongoing	Water Quality Manager

[27] The letters in the left hand column of this table reference the associated table of BMPS for Public Outreach in the City's NPDES Permit NCS000249. This table starts on page 3 of the permit.

Table 7-1: BMP Summary Table for the Public Education and Outreach Program[27]

BMP	Measurable Goals	Frequency	Responsible Position
(g) Implement Public Education and Outreach Program: Group One	Develop utility bill inserts about stormwater issues. (e.g. Waterways and Citizens Newsletters)	2 newsletters per year	Public Education Coordinator
	In addition, the City will complete outreach through one or more of the following activities each year (the type will depend upon the target audience): articles or advertisements in local newspapers; targeted mailing; kiosks and signage; and displays at point-of-sale.	2 articles in City newsletters	Public Education Coordinator
		targeted mailing to one business sector per year	Industrial Inspector and Pollution Prevention Coordinator
(g) Implement Public Education and Outreach Program: Group Two	Participate in community events and festivals through a table-top display.	six events per year	Public Education Coordinator
	Maintain a speaker's bureau that gives presentations to civic organizations, business and neighborhood groups.	five presentations per year	
	Organize stream cleanups (Earth Day in spring, Big Sweep in fall; adopt-a-stream program)	two times per year	Public Education Coordinator; WQ staff
(g)Implement Public Education and Outreach Program: Group Three	Provides press releases to promote news coverage of pollution and stormwater issues; creates informational ads or articles for local newspapers. Frequency is for combination of press releases, ads, and articles	ongoing; three per year	Public Education Coordinator
	Provides outreach through informational workshops.	2 per year	Public Education Coordinator
	Outreach to classrooms and school groups. City will report number of presentations and total number of students present	25 per year	
	Distribute promotional giveaways and specialty items including pens, rubber ducks, rain gauges, etc. with the Hotline number printed on them.	six events per year	Public Education Coordinator
(h) Provide Public Education	Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.	provided in items (a) - (g) above	Public Education Coordinator/ Pollution Prevention Coordinator

The City has a position of Public Education Coordinator and a separate position of Pollution Prevention Coordinator. The Pollution Prevention Coordinator will address target business types as well as City employees not already covered by facility-based training. The Public Education Coordinator work will target city residential issues related to home and yard maintenance, DIY vehicle maintenance, etc. targeting educators, homeowners and other city residents, landlords, property management companies, neighborhood groups, etc. through various media.

Experience has shown that a variety of public outreach methods are required to reach the various audiences involved. The following sections provide more detailed information about some of the public education and outreach efforts of Stormwater Services than is provided in the summaries in Table 7-1.

7.2.3.1 Informational Website - The City maintains an extensive website[28] that it continues to develop. In addition, the City has been funding and actively supporting development of the Clean Water Education Partnership website[29] that provides additional information on pollution prevention practices.

The City website has pages devoted to announcements, SCM maintenance, SCM design/plan review, drainage problems, flooding, floodplain information, utility fee information, water quality, and watershed master planning projects such as the current project for Ellerbe Creek. Information on how to contact key staff in designated areas is also available. Further, there is a web page devoted to stormwater education that provides information on Project WET workshops for educators, adopt-a-stream programs, pollution prevention for individuals and businesses. The *Waterways* newsletter is also posted twice a year on this site. A page devoted to stormwater water quality provides access to the annual 'State of Our Streams' report to citizens and also provides information on various ways to report pollution.

During the permit term, the City expects to add slide shows or very short videos to provide supplemental education messages regarding pollution reporting and pollution prevention.

7.2.3.2 Printed Brochures, Newsletters, and Guidance Documents – The City will use printed materials such as the "Clean Water Guide for Homeowners" to reach audiences associated with target specific pollution sources. Specific audiences include the general public and subgroups of

[28] Available online at: www.durhamnc.gov/stormwater.
[29] Available online at: www.NCcleanwater.org.

the general public such as homeowners, those who complete their own vehicle maintenance, and pet owners. Materials will also target commercial activities including yard maintenance companies, rental property managers, automotive service facilities, mobile washers, and restaurants. A guidance document has been prepared for homeowners' associations, pond management companies, and others who own or maintain structural stormwater control measures (SCMs).

Brochures will be distributed at public events and during responses to citizen requests for investigations. Brochures will also be developed to increase public involvement as described further below. A biannual newsletter will be used to provide information concerning program activities and specific measures for protecting water quality. The newsletter will be distributed by mail in utility bills that reach nearly every household in the City.

Primary distribution of materials targeting commercial groups will be either at a trade group meeting or by targeted mailing. Each group will be targeted at least once during the remainder of the permit. If a target audience continues to create stormwater issues, a second round of outreach may be completed. Besides mailings, the City also has information available on its website and informational videos available for loan on industrial pollution prevention.

Many handouts the City has developed are in English and Spanish. The City has also developed a Spanish translation of its Stormwater Pollution Ordinance to facilitate communication about its requirements. The City has funded bilingual information needs and plans to continue to do so.

7.2.3.3 Media Campaign – The City has used several strategies for media campaigns. The City itself has funded local radio and TV public service announcements to reach specific target audiences. The City also works with media outlets to advertise community events.

The City has also participated in (and was a founding member of) the Clean Water Education Partnership (CWEP). CWEP is a consortium of local governments and state agencies that develop and fund an annual mass media public education campaign. The initial CWEP media campaign was based on the City recommendation to use or adapt video and printed materials developed in Puget Sound public service announcements. Campaigns have since evolved; now an awareness ad is paired with an ad that promotes changes in behavior in the selected target audience. The City will continue to conduct media outreach as indicated in the table above. It may elect to do so through participation in CWEP's annual media campaign that uses both television and radio spots to reach a wide audience. After the behavior and target audience have been selected,

appropriate media outlets will be selected, with the mix of radio and television varying. Statistics from the campaigns will be included in annual reports as the information is available from CWEP. The number of spots and the number of impressions will be reported.

7.2.3.4 Hotline/Helpline – The City has been maintaining a pollution reporting hotline (560-SWIM) since 1998 (this is discussed further in Section 7.4, IDDE). The City regularly promotes the hotline in articles, newsletters, and on giveaways as described in following sections.

7.2.3.5 Additional Outreach – In addition to work accomplished through CWEP, the City will use many programs of its own to communicate with the general public. Examples of this include "Info Corner" ads in local papers, twice annual "Waterways" newsletter utility bill inserts, and short articles and messages in other newsletters. City staff provides press releases to promote news coverage of pollution and stormwater issues. The City will also occasionally pay for informational ads in local newspapers if they become necessary.

At local festivals, trade shows, health fairs, etc. the City staff will use a commercial exhibitor table-top display to educate the public about water pollution, stormwater runoff, and the City's Stormwater Services Division. Examples of such events include Earth Day Festival, IBM Earth Day, and Centerfest, and Latino Fest. As a member of the Upper Neuse River Basin Association, the city provides educational materials and support to help staff the UNRBA booth at the Eno Festival. Such community events are also used to distribute targeted message brochures, promotional giveaways promoting the hotline, or other messages.

A Speakers Bureau makes presentations to clubs, churches, colleges, homeowners associations, scout groups, and other civic groups as requested. The City will also conduct workshops and classroom outreach annually. Examples of this include working with Project WET to train educators to better leverage existing resources. At community events the City will track statistics about the exposure of the general public to stormwater information and include these statistics in the annual reports.

During the term of the permit the City may undertake supplemental activities such as participating in school science fairs and field days, or using the City's cable channel to display messages, play informational videos, highlight projects and the work of the Stormwater Services, provide information about water quality in Durham's waters, or explain how citizens can make a difference. Frequency statistics from such activities would also be included in annual reports as they were available.

7.3 Public Involvement and Participation

At the City's request, the Durham Environmental Affairs Board has solicited membership and participation in a Citizen Advisory Committee to review the SMP Plan and to provide citizen input on future development of the City's stormwater programs. The City will continue active engagement of citizens in stream cleanups, Adopt-A-Stream, Adopt-A-Street and other participatory programs. It will also continue to seek ways of engaging residents in reporting pollution problems.

Table 7.2 contains a summary of the BMPs used to involve citizens in the stormwater management process and involve them in protecting our local water quality.

Table 7-2: BMP Summary Table for the Public Involvement & Participation Program[30]

BMP	Measurable Goals	Frequency	Responsible Position
(a) Administer a Public Involvement Program	Develop and implement a Public Involvement Program, as presented in (b) through (e) below.	development completed; implement–ation is ongoing	Water Quality Manager/ Public Education Coordinator
(b) Allow the Public an Opportunity to Comment on the SMP	The initial SMP was reviewed via the Stormwater Citizens Participation Group (CPG).	completed	Water Quality Manager
	Three meetings of the CPG have been held to review the draft SMP and receive comments. Additional meetings were held to receive input on the first two WQRPs.	completed	
	The City will work with the EAB to review future revisions and additions to the SMP and annual WQMAPs and WQRPs.	as needed	
	The final SMP and annual reports will be posted on the City's website.	annually	Pollution Prevention Coordinator
(c) Organize a Volunteer Community Involvement Program	Organize/sponsor volunteer stream cleanup campaigns that promote citizen participation such as Earth Day cleanups and Big Sweep cleanups.	2 major events per year	Public Education Coordinator
	Work with citizens to label storm drains.	ongoing	
	Sponsor an adopt-a-stream program.	ongoing	

[30] The letters in the left hand column of this table reference the associated table of BMPS for Public Involvement and Participation in the City's NPDES Permit NCS000249. This table starts on page 5 of the permit.

Table 7-2: BMP Summary Table for the Public Involvement & Participation Program[30]

BMP	Measurable Goals	Frequency	Responsible Position
	Sponsor an adopt-a-street program.	ongoing	Executive Director, KDB; Public Education Coordinator
(d) Establish a Mechanism for Public Involvement	The City-County Environmental Affairs Board (EAB) generally meets eleven times per year and currently serves as the primary mechanism for stakeholder input. Public meetings are also held for each watershed plan to solicit input from City residents and other stakeholders.	ongoing	Assistant Stormwater Manager
(e) Maintain a Hotline	The City will continue to maintain a stormwater pollution reporting hotline per Section 7.4, IDDE; the hotline will be promoted as indicated in Table 7-1(f) & Section 7.2.	ongoing	Water Quality Manager

The City/County Environmental Affairs Board (EAB) was asked to assist with providing public input. The EAB formed the Citizen's Participation Group (CPG), a sub-committee of interested citizens. The CPG met a number of times to consider and comment on the SMP, and to provide input on development of Water Quality Recovery Plans (WQRPs). Participating in the CPGs declined, and the EAB became more engaged in water quality and stormwater issues. Staff currently review stormwater issues such as annual updates to the WQRPs with the EAB.

The City sponsors volunteer stream cleanups as part of annual spring Earth Day Festival, and Fall Big Sweep campaigns. Volunteer community Adopt-A-Street programs are organized by Keep Durham Beautiful (KDB), an independent nonprofit organization. Operational support for KDB is provided by the City of Durham and Durham County. KDB is housed in the City's City of Durham General Services Department. KDB supports Adopt-A-Street and other litter clean-ups across the community. It also supports beautification projects and events and education for both community and school children (currently K-3). KDB provides information to the Public Education Coordinator for reporting in annual reports.

In addition to the above, the City operates a green business recognition program that recognizes efforts in stormwater pollution prevention and other areas. This program is undergoing revision. The revised program will be added to the City's SMP.

7.4 Illicit Discharge Detection and Elimination

Durham is an historic community with development dating all the way back to the 1800s. The National Urban Runoff Program clearly shows much poorer water quality being associated with areas of older development for any given land use. Construction built before World War II was generally not subject to building codes, was not inspected, and, in some cases, construction used materials that would not be allowed today. Weathering, settling, and wear-and-tear have gradually resulted in aging infrastructure throughout the country. According to the EPA (1993), for many pollutants, stormwater contributes a small portion of the total mass discharged from a storm drain system. The City has found many illicit discharges in the parts of the City that have older infrastructure. An effective IDDE program is therefore essential to the success of the SMP.

The City began developing and implementing its IDDE program in 1994. Since then it has continued to refine its implementation by using multiple strategies, indicators, and techniques that have proven successful over time (as discussed in Section 3.1.1). This program has been developed to meet the following objectives:

- Detect and eliminate illicit discharges, including preventable spills and illegal dumping to the Permittee's MS4;
- Address significant contributors of pollutants to the MS4;
- Implement appropriate enforcement procedures and actions;
- Develop a map showing the permittee's major MS4 outfalls to state waters receiving discharges; and
- Inform employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

The City will continue to maintain and develop the IDDE program discussed in Section 3.1.1.5 and detailed below. The IDDE program will focus on identifying significant contributors of nitrogen, fecal coliform bacteria, and other target pollutants. The City will revise its program as cost-effective new tools become available and as information is gathered through water quality monitoring. The table below summarizes the BMPs to be implemented. Text sections that follow the table provide additional discussion of the BMPs intended to meet this requirement.

Table 7-3: BMP Summary Table for the IDDE Program[31]

BMP	Measurable Goals	Frequency	Responsible Position
(a) Develop and Implement an IDDE Program	Develop and implement an IDDE program including provisions for program assessment and evaluation.	development completed; implementation ongoing	Water Quality Manager
(b) Maintain Appropriate Legal Authorities	Review experience with enforcement of Stormwater Pollution Control Ordinance and evaluate need for minor adjustments.	annually	Water Quality Manager
(c) Maintain a Storm Water System Inventory	Continue to maintain and update map and inventory data of drainage system components (including receiving streams and major outfalls) utilizing a GIS database.	ongoing	CADD/GIS Administrator
	Document procedures used to identify, locate, and update GIS drainage system maps in areas of new development.	completed	CADD/GIS Administrator
	Identify and map additional smaller outfalls during dry weather screening.	ongoing activity	Water Quality Specialist
(d) Develop an Inventory of Major Outfalls that Discharge to Waters of the State	Replace existing maps of major outfalls by modifying GIS maps to identify major outfalls.	ongoing activity	Water Quality Specialist
	Maintain inventory of major outfalls including attribute information on location, identification number, size and type of structure, apparent condition of structure, and dry-weather flow	Ongoing as part of dry weather screening	Water Quality Specialist
	For each major outfall include attribute information indicating the SIC code or description best reflecting principal products or services: • for those commercial or industrial facilities identified as an illicit discharge under the IDDE Program; and	ongoing activity	Water Quality Specialist

[31] The letters in the left hand column of this table reference the associated table of BMPS for the IDDE Program in the City's NPDES Permit NCS000249. This table starts on page 6 of the permit.

Table 7-3: BMP Summary Table for the IDDE Program

BMP	Measurable Goals	Frequency	Responsible Position
(d) continued	For each major outfall include attribute information indicating the SIC code or description best reflecting principal products or services: • for each industrial facility, and each commercial facility with an industrial activity permitted to discharge stormwater	ongoing activity	Industrial inspector
(e) Inspection/ Detection Program to Detect Dry Weather Flows at MS4 Outfalls in Targeted Areas	Update and document procedures for evaluating dry weather flows and for tracing the sources of illicit discharges.	ongoing activity	Water Quality Specialist
	Inspect outfalls routinely and record: GPS location; size and condition of structure; and need for maintenance. Test any dry-weather flows for evidence of contamination; track and identify sources of contamination. (Areas shall be targeted for inspection based on stream monitoring results and watershed planning activities.)		
	Review data from water quality monitoring and previous outfall screening seasons to target hotspots.	annually	Water Quality Manager
	Eliminate illicit discharges identified in outfall screening through education and enforcement proceedings that remove the pollutants source(/s) or report the discharge to NCDWQ to be properly permitted (as appropriate). Continue administration of the Storm Water Pollution Control Ordinance.	ongoing	Water Quality Manager

Table 7-3: BMP Summary Table for the IDDE Program

BMP	Measurable Goals	Frequency	Responsible Position
(f) Training of Municipal Employees Involved in IDDE	Conduct training for municipal staff involved with detecting and reporting illicit discharges. Training will cover IDDE procedures, instrument calibration, safety, GPS usage, and source tracking. It will also include mentoring, shadowing, review of guidance manuals, and review of City procedures.	ongoing	Water Quality Specialist
(h) Maintain Public Reporting Mechanisms	Continue to maintain pollution reporting hotline (560-SWIM) and other means for public reporting of illicit discharges. Average response time shall be less than 1.5 working days. Continue to refine procedures as needed.	ongoing	Water Quality Specialist
	Regularly publicize mechanisms for the public to report illicit discharges as discussed in Section 7.2.	ongoing	Public Education Coordinator
(i) Establish Procedures to Identify and Eliminate Failed Septic System and Sanitary Sewer Overflows	Procedures are in place to identify and report failed septic systems located within the City to Durham County Department of Environmental Health. These procedures are reviewed annually.	ongoing	Water Quality Manager
	Procedures are in place to identify and report sanitary sewer overflows and sewer leaks to the systems operators; periodically coordinate with Durham City Water Management and Durham County Engineering to review.	ongoing	Water Quality Manager
Conduct Assessment & Evaluation of IDDE Program	Review status of ongoing investigations and identify resources to complete enforcement cases; evaluate response time and timeliness of NOVs.	monthly	Water Quality Specialist

Table 7-3: BMP Summary Table for the IDDE Program

BMP	Measurable Goals	Frequency	Responsible Position
	Conduct annual program assessment and evaluation including illicit discharges by watershed and breakdown of investigations by how they were initiated (e.g. call to hotline, inspection by staff).	annually	Water Quality Manager
	Review water quality data, information from previous outfall screening seasons, and enforcement history to determine target area(/s) for the coming year.	annually	Water Quality Manager

7.4.1 Illicit Discharge Detection and Elimination - The City will continue to investigate means of identifying, locating, and characterizing illicit discharges to improve control and elimination. Strategies, indicators, and techniques the City will use are summarized below.

7.4.1.1 Procedures for Locating Priority Areas - Techniques used to identify priority areas with a higher potential for illicit connections and discharges include: stormwater system inspection and dry weather screening (discussed in Section 3.1.1.5); water quality monitoring (discussed in Section 3.1.1); tracking fecal coliform bacteria sources (discussed in Section 3.1.1.7.4); inspecting industrial and commercial facilities, focusing on facilities with the highest potential for illicit connections and discharges (discussed in Sections 7.7 and 7.8); public education, outreach and involvement (discussed in Sections 7.2 and 7.3); and GIS mapping of land uses, water quality index, sanitary sewer systems, and MS4 (discussed in Sections 7.1.2.1.3).

7.4.1.2 Procedures for Inspecting Outfalls and Screening Dry Weather Flows - Outfall inspection and screening activities will be performed in accordance to the City's *Dry Weather Outfall Screening SOP*. Once the targeted outfall is located, the condition of the outfall is noted. Screeners then evaluate the outfall and surrounding area for physical indicators of illicit discharges. Physical measurements are made in any flows or pooled water associated with the outfall. If any physical parameter is measured outside of a predetermined acceptable range, in-situ indicator field tests are employed to identify potential contaminants.

7.4.1.3 Procedures for Tracing the Source of an Illicit Discharge – If physical indicators of an illicit discharge are observed at the outfall, or the in-situ indicator field tests indicate the presence of contaminants, tracing of the contaminant to its source commences. Investigators may use GIS maps and other supporting information to evaluate the upstream drainage network and/or identify probable sources of the illicit discharge. Investigators will perform in-situ indicator field tests at accessible sample points upstream direction until the discharge can be identified. Dye testing will be used as needed to identify or confirm connections.

7.4.1.4 Procedures for Removing the Source of the Illicit Discharge - Once the source of an illicit discharge has been identified, a water quality investigation file is assigned to the discharge. This investigation file documents the investigation history and any associated enforcement action. Evidence may be collected which may include photo documentation, sample collection, and/or personal interviews. All water quality investigations follow the City's Guidelines and Procedures for Completing an Enforcement Action. Documentation of any investigation will be performed according the City's *Water Quality Investigation Complaint Form SOP*. Procedure dictates that the discharge is tracked to its source and a responsible party is identified. A Notice of Violation (NOV) is issued to the responsible party that outlines the appropriate Stormwater Management and Pollution Control Ordinance violation(s). The NOV also outlines the required remedial actions and any applicable civil penalties that apply to the cited violations. Enforcement of indicated remedial actions are outlined in Article V of the *Guidelines for Enforcement of the Stormwater Management and Pollution Control Ordinance*.

7.4.2 Storm Water System Inventory – SWS has identified and mapped the inlets and outlets of the City's storm water system (all pipes 12 inches and larger) as well as receiving waters as a component of its original NPDES permit application. Stormwater system inventory data and maps are currently maintained in a GIS database and will continue to be updated and maintained as part of the NPDES permit program.

7.4.3 Regulatory Mechanism - The City rewrote its Stormwater Pollution Control Ordinance in 2006 to clarify prohibited discharges, require certain pollution prevention measures, and provide for escalated enforcement when necessary to achieve compliance. The City's Municipal Code was reorganized in 2008, and the ordinance is now found at Chapter 70, Article V, Section 70-492 through 70-542. A copy of the ordinance is contained in Appendix B. Allowable and prohibited discharges are consistent with permit provisions in Part 1, 9(a) and 9(b) of the City's permit. The ordinance covers discharges to any part of the drainage system whether they are public or private. The ordinance also requires businesses engaged in certain activities to implement pollution prevention practices to reduce the likelihood of spills and other

pollution sources. The ordinance includes right-of-entry procedures that provide for collection of evidence. The ordinance has multiple options for escalated enforcement and provides adequate authority to control non-stormwater discharges to the drainage system.

7.4.4 Ordinance Administration and Enforcement - Detailed administration and enforcement procedures have been developed for the Storm Water Pollution Control Ordinance, including guidelines for issuing a notice of violation (NOV). The City has developed a set of digital example files for NOVs that include commentary and guidance. The City has also developed a spreadsheet to automate computation of proposed penalties for common violations. Proposed penalties are provided with the NOV. The ordinance provides that the accused may request an explanatory meeting to discuss the City's evidence and to provide additional evidence, including mitigating or exculpatory information. The accused may also submit written evidence or information. Penalties may be waived in part or completely based on information and evidence provided.

The City has updated and revised its written enforcement procedures guidance based on the renumbering of City Code that occurred in 2008 and the experience gained over the first five years of enforcement. The City will continue to enforce this ordinance.

7.4.1 Assessment and Evaluation of IDDE Program - Stream monitoring is used to guide IDDE efforts. Once a year, an assessment of local water quality is used to determine whether changes in stream monitoring position, type, or frequency are warranted to better support the IDDE program. Assessment is also used to consider whether changes are warranted in the pollution prevention provisions of the City's Stormwater Pollution Control Ordinance (either to alleviate undue hardship or to include additional measures for target business).

In addition, Stormwater Services (SWS) conducts monthly self-assessment of numerous performance indicators for the IDDE program. On a quarterly basis SWS reports key performance statistics on workload, productivity, and outcomes (typically including efficiency and effectiveness) to Public Works and City management in the Department's Work Plan.

7.5 Construction Site Stormwater Runoff Control

North Carolina has a well established program to address the impacts of construction site runoff that predates requirements in municipal stormwater permits. As summarized in the City's permit the objectives of controlling runoff from construction sites are to:

- Reduce pollutants in stormwater runoff from construction activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development.
- Provide procedures for public input, sanctions to ensure compliance, requirements for construction site operators to implement appropriate erosion and sediment control practices, reviews of site plans that incorporate consideration of potential water quality impacts, and provides procedures for site inspection and enforcement of control measures.

As indicated in the City's permit, construction site runoff within the City of Durham is regulated primarily by three other entities:

- Durham County Erosion and Sediment Control Program: construction projects by entities that do not have the power of eminent domain (private projects, covers most construction).
- North Carolina Department of Transportation: state road projects.
- North Carolina Division of Land Quality: projects by entities with eminent domain authority or that are publicly funded

North Carolina requires an erosion control plan is required for sites that disturb more than one acre under the North Carolina Erosion Control Law. As discussed in Section 3.1.2 and 3.1.4 above, projects under jurisdiction of the Durham County Erosion and Sediment Control Program are subject to more stringent requirements in the City-County UDO, which requires a permit for sites that disturb 12,000 square feet or more, and an engineered erosion and sedimentation control plan for sites that disturb more than 20,000 square feet.

7.5.1 Durham County Erosion and Sediment Control Program - The City of Durham relies on the Durham County Erosion and Sediment Control Program to enforce sediment and erosion measures for privately funded construction projects. The County program is delegated, reviewed, and authorized by the North Carolina Division of Land Quality. It effectively meets the requirements of the Construction Site Runoff Controls by permitting and controlling development activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development. Permits and plans may also be required for any other land-disturbing activity when off-site damage is occurring or if the potential for

significant off-site damage exists. Additionally, a plan and permit may be required when the applicant (or a parent, subsidiary, or other affiliate of the applicant) has previously conducted land-disturbing activity without a required permit or has engaged in the other activities enumerated in Section 3.8.7 of the UDO.

The County program implements provisions of a Unified Development Ordinance (UDO) adopted by both the City of Durham and the County of Durham. The Erosion and Sedimentation Control requirements of the UDO were revised and enhanced in 2009; current requirements and a summary of the recent changes is provided in Appendix D. As provided in Section 3.8.1 of the UDO, the ordinance is enforced by the Durham County Sedimentation and Erosion Control Officer throughout Durham County, including within the City of Durham. (The exception is certain practices that are not subject to local approvals under state law. For example: mining, forestry, agriculture, government funded development projects, projects by entities with eminent domain authority.) This program includes procedures for public input, sanctions to ensure compliance, requirements for construction site operators to implement appropriate erosion and sediment control practices, review of site plans that incorporate consideration of potential water quality impacts, and procedures for site inspection and enforcement of control measures.

The private land development projects regulated by the Durham County Sedimentation and Erosion Control Program constitute the majority of construction projects in the City. The program endeavors to inspect each project at least once per month (described in Appendix E). The program includes staff training, workshops to train contractors, architects and engineers, and review of program elements to evaluate effectiveness and consider the need for modified requirements and procedures. The program recently increased fees, tightened requirements for temporary seeding following grading, and announced phasing requirements as outlined in the state's newly revised Sediment Control Design Manual. Design criteria for sediment basins now encourage the use of surface skimmers or baffles to improve the performance of sediment basins.

7.5.2 North Carolina Department of Transportation - The City of Durham relies on the North Carolina Department of Transportation (NCDOT) to comply with sediment and erosion control requirements for state road construction projects within the City. The NCDOT effectively meets the requirements of the construction site controls by self-permitting, self-inspection, and controlling the impacts from land disturbing activities disturbing one or more acres and those activities of less than one acre that are part of a larger common plan of development.

7.5.3 North Carolina Division of Land Quality - The NCDLQ effectively meets the sediment and erosion control requirements by permitting and

controlling development activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development within the City of Durham. In addition to other reporting mechanisms, the Division continues to promote its “Stop Mud" hotline for reporting.

The submission of a proposed Erosion and Sedimentation Control Plan to the Division of Land Resources or to a delegated local program is considered equivalent to submission of a Notice of Intent for coverage under the General Permit. General permit coverage begins upon issuance of approval for the Sediment and Erosion Plan. The Durham County Erosion and Sediment Control Program provides copies of the General Permit to applicants that have projects disturbing one acre or more. Sites that disturb more than one acre are subject to provisions of the state’s general permit for construction activity (NCG010000) unless the project has obtained other NPDES stormwater permit coverage for construction activities.

The above three entities have primary responsibility for plan review, permitting, and site inspection. However, SWS conducts independent investigation of construction activity based on water quality monitoring, staff observations, and citizen complaints and concerns (the City continues to promote reporting to the City’s hotline for all water quality reporting). The City will continue to investigate and selectively to conduct independent enforcement where a construction site discharges sediment to the MS4, causes water quality violations, or otherwise fails to comply with the provisions of NCG010000 in a manner that significantly threatens water quality. Investigations will continue to be tracked in the City’s investigations database. Trends will continue to be reported in annual reports.

7.6 Post-Construction Storm Water Management in New Development and Redevelopment

Permit NCS000249 requires the City to develop, implement, and enforce a program of post-construction stormwater runoff controls for new development. The objectives of the program include:

- Managing stormwater runoff from new development/redevelopment that drains to the MS4 and disturbs an acre or more of land surface (including projects less than an acre that are part of a larger common plan of development or sale).
- Providing a mechanism to require long-term operation and maintenance of structural Stormwater Control Measures (SCMs)..
- Ensuring controls are in place to minimize water quality impacts.

The permit recognizes limits on the City's jurisdiction. The City is not required to apply post-construction site runoff controls to entities that are exempt from permittee's jurisdiction, including entities exempted under N.C.C.S. 1 13A-5.

The table below summarizes the BMPs to be implemented and maintained during the remainder of the permit to meet the objectives of the Post-Construction Storm Water Management Program. Text sections that follow the table further explain the management measure intended to meet this requirement.

Table 7-4: BMP Summary Table for the Post-Construction Stormwater Management Program[32]

Management Measure	Measurable Goals	Frequency	Responsible Position
(a) Post-Construction Stormwater Management Program	Develop and adopt by ordinance revisions to the City's existing post-construction ordinances that require stormwater controls on new development and redevelopment in all areas of the City.	Ordinance effective March 17, 2009; revisions effective June 15, 2010	Assistant Stormwater Services Manager

[32] The letters in the left hand column of this table reference the associated table of management measures for the Post Construction Stormwater Management Program in the City's NPDES Permit NCS000249. This table starts on page 9 of the permit.

Table 7-4: BMP Summary Table for the Post-Construction Stormwater Management Program[32]

Management Measure	Measurable Goals	Frequency	Responsible Position
(b) Stormwater Management Strategies which Include BMPs Appropriate for the MS4	Develop strategies that include a combination of structural and/or non-structural SCMs implemented in concurrence with (a) above.	Ongoing	Development Review Manager
	Provide a mechanism to require long-term operation and maintenance of structural SCMs.	Ongoing (Recorded Agreement for each SCM requires long-term O&M).	Development Review Manager
	Require annual inspection reports of permitted structural BMPs performed by a qualified professional.[33]	Ongoing (Refer to Appendix Q: BMC Program).	Assistant Stormwater Services Manager
(c) Establish Nutrient Sensitive Waters (NSW) Protection Measures (for Programs with Development or Redevelopment Draining to NSW Waters)	City has been implementing an approved NSW Urban Stormwater Management Program in the Neuse River Basin.	Ongoing since 2004	Assistant Stormwater Services Manager
	The City's Phase II post-construction ordinance adopted in 2009, extended nitrogen control through the City, was modified in 2010 lowering the limit on nitrogen export and adding a limit on phosphorous export.	Ordinance was adopted 2009, nutrient provisions revised 2010	Assistant Stormwater Services Manager
	Pending availability of Staff training in nutrient application or develop and implement a nutrient application program for both inorganic fertilizer and organic nutrients to reduce nutrient loading to waters of the State.	Awaiting notice from DWQ of training programs.	Facilities Operations Manager, Department of General Services;
(d) Establish a Program Under the Post-Construction Minimum Control Measure for Fecal Coliform Bacteria	Continue coordinating with Durham County Environmental Health through communicating results of water quality assessments and IDDE work. Coordinate and encourage control of the known sources of fecal coliform bacteria to the maximum extent practicable. The City will review and revise procedures annually.	ongoing	Water Quality Manager

[33] A qualified professional means an individual trained and/or certified in the design, operation, inspection and maintenance aspects of the SCMs being inspected. For example, an NCPE or RLA who has also been trained and certified by NC State for SCM Inspection and Maintenance. . For a more comprehensive discussion of this facet of SCM operation and maintenance, please see Appendix Q: BMC Program

Table 7-4: BMP Summary Table for the Post-Construction Stormwater Management Program[32]

Management Measure	Measurable Goals	Frequency	Responsible Position
(e) Restrictions and Covenants	The City will use recorded plats and recorded Operation and Maintenance Agreements to indicate restrictions that convey with a property as one way of ensuring that development projects will continue to be operated and maintained consistent with approved plans. Recorded conservations easements will also be used to protect property.	ongoing	Development Review Manager
(f) Operation and Maintenance	The City will require an operation and maintenance plan for each structural SCM required by the program. The plan will direct and guide property owners and other responsible parties in operation and maintenance practices, including schedules, to ensure the continuing long-term effectiveness of the SCM.	Ongoing (refer to Appendix P: BCE Program and Appendix Q: BMC Program for details).	Development Review Manager
	The City will require an operation and maintenance agreement with property owner(/s). The agreement will require owner(/s) to have each structural SCM inspected annually by a certified inspector and then submit a maintenance inspection report to the City.	ongoing	Development Review Manager
	The City will conduct annual quality assurance inspections selectively on a portion of each certified inspector's reports.	Ongoing (Please see Appendix Q: BMC Program for details).	Development Review Manager
(g) Setbacks for Built-upon Areas	The City will continue to enforce 50 foot minimum riparian buffer requirements throughout the City along with any wider, more restrictive buffer requirements in water supply watershed areas (UDO 8.5). [UDO Section 8.5 requires that land development applications protect 50-foot vegetated buffers from the top of bank for perennial streams, intermittent streams, and naturally occurring ponds and lakes.	ongoing	Senior Planner, City/County Department of Planning
(h) Educational materials and training for developers	City Engineering and Stormwater Services development plans reviewers will continue to conduct workshops for engineers, architects, and developers at least twice a year. The workshops will include design/review examples, updates on new engineering standards and revised ordinance requirements, operation and maintenance plan elements, etc.	A minimum of two workshops are conducted annually	Development Review Manager

7.6.1 Post Construction Runoff – Prior to adoption of a Phase II post-construction ordinance in 2009, the City of Durham had been implementing state-mandated programs that require and enforce post-construction management of storm water discharges. Water supply watershed protection requirements (discussed in Section 3.1.2) meet or exceed requirements of 15A NCAC 2B.0215 and 2B.0216. The City's Neuse River Stormwater Ordinance (discussed in Section 3.1.6) complied with 15A NCAC 2B.0235. Together, the Water Supply Overlay and Neuse Stormwater ordinance covered approximately 60% of the City, as shown in Figure 7-5 below.

Effective March 17, 2009 the City adopted by ordinance "Stormwater Performance Standards for Development" in order to comply with the post-construction requirements of the City's permit. This ordinance replaced the Neuse requirements and peak flow requirements with a comprehensive ordinance applicable throughout the city.

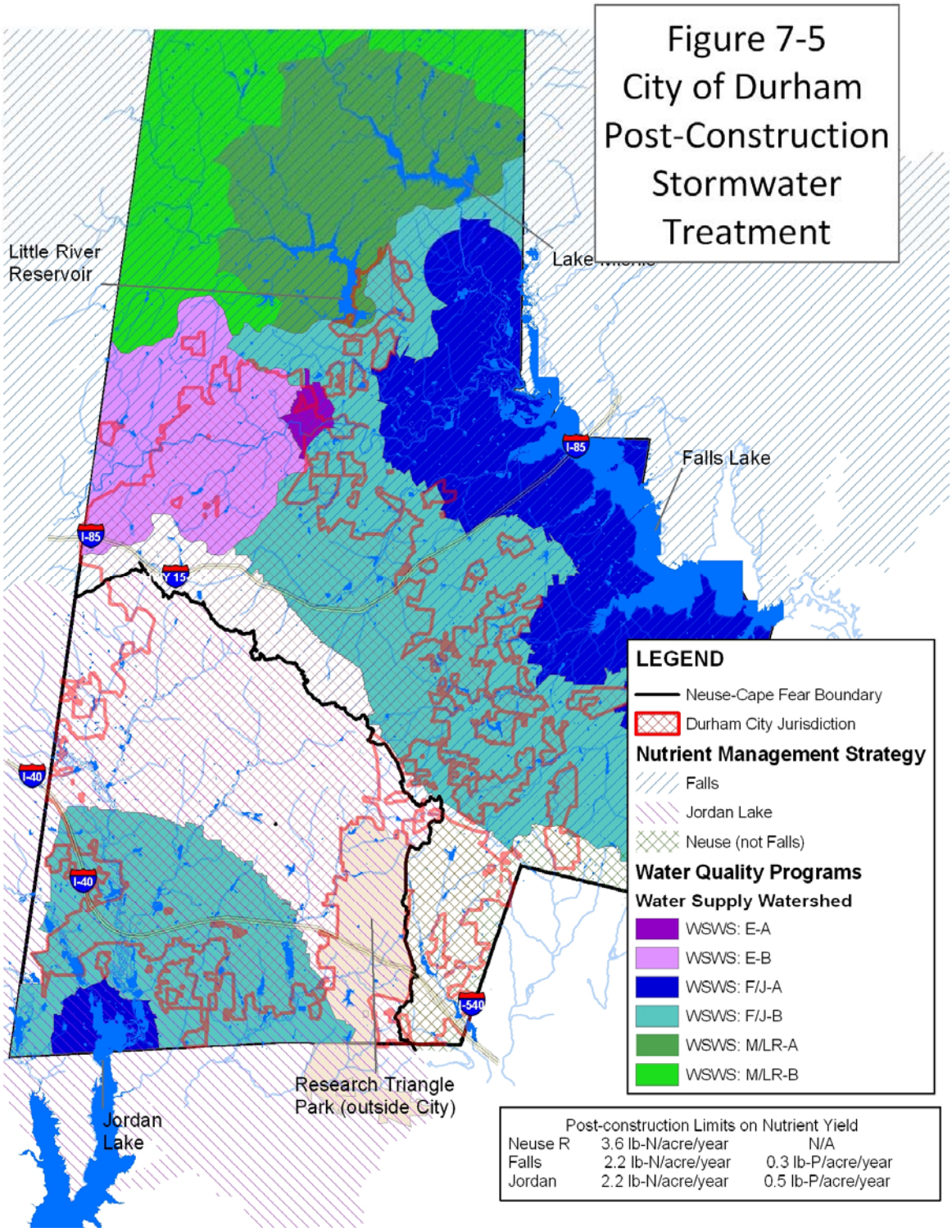
Effective June 15, 2010, the City Council adopted revisions to the Stormwater Performance Standards for Development to enhance protection of water quality. **Appendix F** provides the Stormwater Performance Standards for Development approved June 15, 2010, together with an ordinance history and a section-by-section summary of the changes made in the 2010 revisions.

Water Supply Overlay ordinance provisions include density limits and other provisions, and remain as independently applicable requirements. While the water supply watershed protection ordinance also includes water quality treatment, the treatment provisions are less stringent than those of the Stormwater Performance Standards for Development.

The City's Stormwater Performance Standards for Development include significant enhancements. The 2010 standards include limits on nitrogen export of 2.2 pounds-N per acre per year and phosphorous limits of 0.5 pounds-P per acre per year. These are interim standards. The City has submitted a draft ordinance for state review and approval that will be adopted in 2012 implementing the post-construction requirements of the Jordan Lake and Falls Lake Nutrient Sensitive Waters Strategies. A new accounting tool will be available for calculating nitrogen and phosphorous loading from development sites.

Under the current Stormwater Performance Standards for Development, low density development below 16% impervious cover (IC) must provide treatment for stormwater that is conveyed through piped system (not including driveway and road culverts) rather than vegetated conveyances.

Figure 7-5: City of Durham Post-Construction Stormwater Treatment



The June 15, 2010 revisions modified options available for compliance, and added provisions regarding SCM selection in watersheds subject to bacteria TMDLs. A full copy of the ordinance is provided in **Appendix F**.

The Stormwater Performance Standards for Development apply to recreational and residential single-family and duplex projects that disturb one acre or more and to all other projects that disturb one-half acre or more, including commercial, institutional and multifamily residential development. Under the ordinance, development includes both new development and re-development. It also includes smaller projects that are part of a larger "common plan of development." The plan of common development provisions include a temporal component based on cumulative soil disturbance thresholds, with various effective dates in the definitions to account for carryovers from prior ordinances.

The City will implement this ordinance and will continue to enforce a program to manage post-construction storm water discharges to the MS4.

In lieu of the 30 foot setback provided in the state's Phase II program, subdivisions and site plans will be required to protect 50-foot buffers on all perennial and intermittent surface waters. A surface water will be considered present if the feature is shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). Relief from this requirement may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 2B .0233 (3)(a). (See 15A NCAC 2H .0126(11) for exceptions to 15A NCAC 2H .0126(10)(e)(i)(A)(III) and 15A NCAC 2H .0126(10)(e)(i)(B)(IV).)

7.6.1.1 Regulatory Mechanism - The City of Durham has adopted a post-construction ordinance, and will implement and enforce a program to manage post-construction storm water discharges to the MS4.

7.6.2 Impervious Surface Limits - Impervious surface limits will be shown on recorded plats and enforced by City-County Zoning. Building inspections require foundation surveys and final surveys to ensure compliance. If building lots exceed allowed impervious cover during development of a subdivision, plat revisions are required to balance impervious cover.

7.6.3 Structural SCMs - In addition to the water supply watershed requirements discussed in the previous Section, the City of Durham currently requires the submission of a Stormwater Impact Analysis for all land development activities. If the impervious cover proposed in the plan would increase the peak runoff rate during the 1- year event, detention of the 1-yr

event will be required. If an increase in the 2- and 10-yr peak runoff rates is proposed, detention and/or offsite drainage improvements may be required at the discretion of the Department Director or his/her designee. In the instance of infill developments, detention of the 100-yr event may be required to mitigate against increases in yard or structural flooding immediately downstream of the proposed development.

7.6.3.1 Operation and Maintenance - All structural SCMs used to meet these requirements shall have a Stormwater Facility Agreement and Covenants (SFAC) to ensure adequate long-term operation. This SFAC will be recorded with the Durham County Register of Deeds Office. In addition, a qualified professional must inspect all structural BMPs at least annually and a report of the inspection must be submitted to Durham Stormwater Services. Please see Appendix Q: BMC Program for annual SCM inspection requirements

7.6.4 Current Non-Structural SCMs - The City of Durham has adopted Natural Resource Protection Standards as part of the Durham City/County Zoning Ordinance (Section 11). These standards specifically address floodplain protection, stream buffer protection, steep slope protection, and wetlands protection. The City of Durham also has zoning ordinances to direct growth to identified areas. Durham has a large area located in highly developed (WS-IV classification) watersheds and currently has water supply watershed rules contained within its zoning ordinances. Also, the City's Park and Recreation Department and Planning Department manage a program for maintaining and increasing open space. This program concentrates on preserving environmentally sensitive and natural resource areas within the City including wetlands and riparian buffers.

7.6.5 Onsite Wastewater Systems - The City does not evaluate permit applications or inspect installation of onsite wastewater systems. These functions are conducted by the Durham County Environmental Health Department, or in the case of large discharges, the NC Department of Environmental Health. Spray irrigation systems are permitted by the NC Division of Water Quality. The City of Durham will continue to work with the Durham County Health Department's existing oversight program for onsite wastewater treatment systems for domestic wastewater to identify sources of fecal coliform bacteria. The City of Durham will continue to work with the Division of Water Quality (Raleigh Regional Office) to identify and eliminate discharging sand filter systems. The City has extended sanitary sewer systems to areas within the City served by failing or discharging onsite disposal systems. A 2008 evaluation of sand filter systems the City sampled in 1999 found that most had been connected to city sewer. The City does not encourage on-site systems for new development.

7.6.5 Nutrient Sensitive Waters – As discussed above in Section 3.1.6, the City of Durham is currently subject to three sets of state NSW rules, listed chronologically:

- Neuse River Nutrient Sensitive Water Strategy
- Jordan Lake Nutrient Sensitive Water Strategy
- Falls Lake Nutrient Sensitive Water Strategy

Figure 3-3 provides a map showing the areas where each rule is applicable. The City has been implementing post-construction requirements for the Neuse River NSW since 2004. Citywide nitrogen limits were included in the 2009 post-construction ordinance. The ordinance was revised again in 2010 to implement interim nutrient loading limits for nitrogen and phosphorous in advance of rule deadlines for Falls Lake and Jordan Lake. The City is using the Tar-Pam calculation procedures to assess phosphorous loading until a new accounting tool is available.

In 2011, the City submitted a draft post-construction ordinance for state review and approval that includes procedures and conditions necessary to comply with the Falls Lake NSW rules and the Jordan Lake NSW rules. The City will adopted the approved post-construction ordinance in 2012.

7.6.6 Evaluation –Stormwater Services will track approved site plans for acres of low density and high density development, nitrogen and phosphorous loads under pre-development and post-development conditions. SWS will also track selected design characteristics for the structural SCM's installed. Over the longer term, the success of the Post-Construction Stormwater Management Program will be evaluated through the use of water quality monitoring data collected by SWS, NCDWQ, academic collaborators, and others. This data collection will include water quality data from upstream and downstream of structural SCMs. In addition, the collection of in-stream stormwater monitoring data in select watersheds will be used to identify pollutant concentrations and, potentially, pollutant loads. The data from these monitoring activities will be carefully evaluated to assess the pollutant removal effectiveness of the structural BMPs as well as the overall effectiveness of these SCMs at protecting in-stream water quality conditions.

Durham Stormwater Services will continue to evaluate the effectiveness of the Stormwater Facility Agreement and Covenants process to ensure the proper operation of SCMs. Based on the data and information collected, the Post-Construction Storm Water Management Program will be thoroughly evaluated and revised as necessary to effectively minimize negative water quality impacts from development and re-development activities. Where necessary, ordinances will be changed to improve their effectiveness at protecting water quality.

7.7 Pollution Prevention/Good Housekeeping for Municipal Operations

Permit NCS000249 requires the City to operate and to maintain the City's MS4. In addition, it requires the City to develop and implement a program of management practices that prevent or reduce stormwater pollution from municipal facilities, activities, and operations. Municipalities conduct numerous activities that can pose a threat to water quality if proper practices and procedures are not in place. Such activities include: vehicle and equipment maintenance, materials handling and storage, spill cleanup, landscape maintenance, road maintenance, infrastructure maintenance, and building maintenance.

Pollution prevention and good housekeeping programs are an important factor in the improvement of stormwater quality. Municipal maintenance facilities can be significant sources of pollution if not managed properly. Other municipal activities, such as waste collection, offer significant opportunities to prevent pollution and recycle materials. Recycling, household hazardous waste and oil collection, and street sweeping are examples of some of the procedures that might help prevent pollution.

The table below summarizes the BMPs to be implemented and maintained during the remainder of the permit to meet pollution prevention and good housekeeping requirements. Text sections that follow the table further explain the BMPs intended to meet this requirement.

Table 7-5: BMP Summary Table for Pollution Prevention/Good Housekeeping for Municipal Operations[34]

BMP	Measurable Goals	Frequency	Responsible Position
(a)(1) Develop an Operation and Maintenance Program	Conduct annual field assessment of City owned structural stormwater treatment BMPs to verify conditions, operational issues, and maintenance needs.	See "7.7.1 Inspection and Maintenance" below.	Senior Engineering Technician
	Continue ongoing street cleaning program, using vacuum street sweepers, to remove debris and pollutants from City streets, gutters, and catch basin tops.	varies with weather, typically: residential streets 6 times/yr; downtown streets 2 times/month	Supervisor, Street Cleaning /Public Works Operations Center

[34] The letters in the left hand column of this table reference the associated table of BMPS for the Pollution Prevention and Good Housekeeping for Municipal Operations in the City's NPDES Permit NCS000249. This table starts on page 14 of the permit.

Table 7-5: BMP Summary Table for Pollution Prevention/Good Housekeeping for Municipal Operations[34]

BMP	Measurable Goals	Frequency	Responsible Position
(a)(2) Develop a Residential Stewardship Program	Operate household hazardous waste/ used motor oil collection.	four days per week except holidays	Solid Waste Disposal Manager, contract operator
	Operate solid waste curbside pickup, curbside white goods pickup, curbside recycling pickup, and yard waste (fee for service) collection programs.	Bi-weekly pick up of roll-out carts for solid waste and for curbside recycling	Director of Solid Waste Department
(b) Develop Site Stormwater Pollution Prevention Plan (SWPPP) for Municipal Facilities	Develop and implement Site Pollution Prevention Plan for Municipal Facilities owned and operated by the permittee with the potential for generating polluted stormwater runoff that has the ultimate goal of preventing or reducing pollutant runoff.	six facilities have NPDES permits and SWPPPs; two additional priority facilities have SWPPPs	varies by facility: responsible position will be listed in annual reports; (initial training and on-going technical assistance is provided by SWS Industrial Inspector and Pollution Prevention Coordinator)
	Conduct staff training of the team responsible for implementing the SWPPP.	annually	
(c) Develop and Maintain an Inventory of Facilities and Operations	Maintain an inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff.	Appendix L list will be reviewed and updated annually	Industrial Inspector and Pollution Prevention Coordinator
(d) Inspection and Evaluation of Facilities and Operations	Conduct inspections at facilities owned and operated by the permittee for potential sources of polluted runoff. Evaluate the sources, document deficiencies, plan corrective actions, implement appropriate controls, and document the accomplishment of corrective actions.	Conduct at least annually for facilities with SWPPPs, at least twice annually for facilities developing SWPPPs.	Facility Superintendent and Industrial Inspector
(e) Inspection and Evaluation of the MS4 and Associated Structural BMPs	Maintain a map and GIS inventory of the MS4 drainage system, associated MS4 structural BMPs, significant private drainage systems, and associated private structural BMPs.	drainage system map has been developed; 647 BMPs have been mapped, update is ongoing	CADD/GIS Administrator

Table 7-5: BMP Summary Table for Pollution Prevention/Good Housekeeping for Municipal Operations[34]

BMP	Measurable Goals	Frequency	Responsible Position
(e) Continued	Inspect and clean MS4 catch basins and other inlets, remove sediment and debris. Inspect accessible pipes from inlet end. Refer possible illicit discharges for investigation.	by year 3, inspect 10% of inlets per year	Street Maintenance Superintendent
	Inspect major outfalls for condition and maintenance needs during illicit discharge dry weather screening. Refer MS4 outfalls to stormwater maintenance. All outfalls and outlets will be inspected and screened in industrial and automotive maintenance areas.	by year 3, 20% of major outfalls per year	Water Quality Specialist
	Review inspection and maintenance reports on private structural stormwater management facilities. Conduct field assessments to verify conditions, compliance with design, operational issues and maintenance needs.	Please refer to Appendix Q – BMC Program.	Senior Engineering Technician
(f) Conduct Staff Training	For staff members not otherwise required to have training under NPDES Industrial permit, conduct training in municipal pollution prevention and good housekeeping procedures.	new employee training (NET) is in place; general pollution prevention training will be completed in year three, work unit specific training will developed by end of permit cycle	Industrial Inspector and Pollution Prevention Coordinator
(g) Review of Municipality Owned or Operated Regulated Industrial Activities	Conduct annual review of the industrial activities with a Phase I NPDES stormwater permit owned and operated by the permittee. Review will include the following aspects: the Stormwater Pollution Prevention Plan where one is required, the timeliness of any monitoring reports required by the Phase I permit, and the results of inspections and subsequent follow-up actions at the facilities.	annually	Industrial inspector
(h) Spill Response Procedures	Spill response procedures have been included in SWPPPs. Review and revise other spill response procedures and policies.	Spill plan has been completed	Industrial inspector

Table 7-5: BMP Summary Table for Pollution Prevention/Good Housekeeping for Municipal Operations[35]

BMP	Measurable Goals	Frequency	Responsible Position
(i) Prevent or Minimize Contamination of Stormwater Runoff from All Areas Used for Vehicle and Equipment Cleaning	All facilities currently engaged in cleaning of heavy vehicles and equipment are covered under NPDES industrial stormwater permits.	Completed	Industrial Permittee, see Appendix L
	Evaluate other facilities, practices, and measures related to vehicle washing. City vehicles are directed to commercial facilities under contract to the City.	Ongoing	Water Quality Manager
	The City is evaluating options for emergency vehicles that must remain at designated locations to provide response times. Options include contract washing, blocking a drain or gutter during cleaning activities, and properly disposing of any ponded water prior to removing the drain block.	Ongoing	Fire Chief

7.7.1 Inspection and Maintenance - Inspection and maintenance responsibilities extend across several work units and several programs. Street cleaning crews clean street gutters and catch basins tops. One stormwater maintenance crew responds to complaints, inspecting and cleaning inlets and pipes. Another stormwater maintenance crew conducts proactive inspection of inlets and 'self-cleaning' catch basin sumps, using pole cameras and CATV crawlers to inspect pipes for clogs. Vactor trucks are used to remove accumulated sediment as needed. A stormwater GIS team inspects, measures and maps new and missing stormwater inlets, pipes, stormwater management facilities, and other stormwater structures. Stormwater quality personnel inspect outfalls (most of which are private) and screen any dry weather flows for pollutants. Under operation and maintenance agreements, privately owned BMPs are to submit inspection and maintenance reports annually. A SWS senior engineering inspector reviews the reports, conducts follow-up inspections, and inspects facilities that have not submitted reports.

City-owned BMPs are now inspected annually. As of June 2011 there were nine completed SCMs, eight of which require maintenance. Ten additional SCMs accepted by the City after that date have not yet been inspected, but they have a one-year maintenance contract provided by the vendor. It is anticipated that the City will contract out needed maintenance services at least for several years while the City-owned SCMs become more numerous.

[35] The letters in the left hand column of this table reference the associated table of BMPS for the Pollution Prevention and Good Housekeeping for Municipal Operations in the City's NPDES Permit NCS000249. This table starts on page 14 of the permit.

7.7.2 Facilities - Typical municipal activities, operations, and facilities are outlined in Appendix L. This document provides an inventory of facilities and operations owned and/or operated by the City of Durham with the potential for generating polluted stormwater runoff. Appendix L lists the five City operated facilities with NPDES Industrial Stormwater Permits and a sixth privately operated facility on City property with permit coverage. Additional priority facilities have developed and are implementing Stormwater Pollution Prevention Plans (SWPPPs). Appendix L lists facilities that will be evaluated during the coming year by SWS.

Each listed facility is responsible for developing and implementing a SWPPP with technical assistance from SWS. Technical assistance includes providing suitable example SWPPPs, tables of candidate BMPs, example logs for daily inspections, logs for documenting staff training sessions, videos for use in training sessions, and other materials. The SWS Industrial Inspector also reviews draft SWPPPs, conducts initial staff training in pollution prevention techniques (along with the Pollution Prevention Coordinator), and conducts frequent inspection during initial development and early implementation of the SWPPP to identify needed changes. After the initial stage (that includes SWPPP development, revision, and implementation) the Industrial Inspector and/or Pollution Prevention Coordinator provides training materials to SWPPP managers. The Industrial Inspector will conduct inspections at least twice a year to follow progress. Upon request, SWS offers assistance with annual training, training on monitoring methods and instrument calibration, and assistance with revision of SWPPPs.

Facility personnel are responsible for maintaining and implementing the SWPPPs. Each SWPPP indicates the management measures that will be implemented and the personnel responsible for implementation. Personnel associated with each facility are responsible for visual and analytical monitoring, submitting reports to state regulators, reviewing the effectiveness of the management measures, and revising the management practices. Facility personnel are also responsible for maintaining inspection logs, training logs, and other SWPPP documents.

The general permits have recently been revised to require phased increases in monitoring and management when monitoring indicates that stormwater runoff exceeds thresholds. SWS tracks issuance of permits and pending changes in general permits in order to alert permit holders.

7.7.3 Operations and Activities - Typical municipal activities and operations that may not be located at a specific facility are also reviewed in Appendix L. To reach a wider range of these activities, SWS presents a pollution prevention training module to all new city employees as part of the City's 4 day New Employee Training (NET). A module is also taught as part of the police academy graduate induction. Some types of work present unique challenges

with respect to pollution prevention. The City will evaluate specific work activities and, where appropriate, custom training materials will be developed. These might include photographs of good practices for refresher trainings within specific work groups.

7.8 Program to Monitor and Control Pollutants to Municipal Systems

The target facilities of the program designed to monitor and control pollutants in storm water discharges to the permittee's MS4 are: hazardous waste treatment, storage, disposal facilities; recovery facilities; industrial facilities subject to Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); and industrial facilities that the Permittee determines are contributing or have a potential to contribute a substantial pollutant load to the municipal storm sewer system.

The City of Durham has developed and implemented an industrial facilities inspections program during previous permit terms. The City places particular emphasis on inspecting facilities that report releases (Section 313 of Title III of SARA) and that do not have NPDES permits. The City typically also identifies a ubiquitous business sector on which effort is focused. These have included auto salvage yards and facilities with numerous inoperable vehicles, mobile auto maintenance operations, and vehicle service facilities.

The City's Stormwater Pollution Control Ordinance (Durham City Code Chapter 70, Article V) mandates certain pollution prevention practices. For example, Section 70-515 includes pollution prevention requirements for automotive activities, requiring vehicle maintenance to take place in a covered bay, and automotive fluids stored outside to be to have secondary containment and to be stored under a covered area. Section 70-516 requires facilities that have more than ten junk, salvage or unlicensed vehicles to develop and implement a SWPPP. Section 70-517 provides requirements for storage of hazardous substances.

The table below summarizes the BMPs to be implemented and maintained during the remainder of the permit to meet requirements to monitor and control pollutants entering the municipal system.

Table 7-6: BMP Summary Table for Monitoring and Control of Pollutants Entering the MS4[36]

BMP	Measurable Goals	Frequency	Responsible Position
(a) Maintain an Inventory of Industrial Sites	The City maintains an inventory of significant industrial facilities including those: that are permitted for hazardous waste treatment, disposal, and recovery (currently are none in the City); that have reported releases under section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); with an industrial activity permitted in accordance with 40 CFR 122.26 to discharge storm water to the permittee's MS4; with selected activities similar to those permitted under 40 CFR 122.26 that have been identified as having an illicit discharge under the City's IDDE ordinance; that have potential for continued violations (whether commercial or industrial).	update lists annually	Industrial Inspector
	The City also reviews pretreatment data and conducts mailings to determine additional facilities that may need to be included as industrial sites.	mailings conducted annually	Industrial Inspector
(b) Inspection Program	Identify priorities and inspection procedures. The City has a well developed inspection program for evaluating industrial facilities identified above.	completed; review priorities at least every two years	Industrial Inspector
(c) Establish and Implement Evaluation Measures	For facilities identified above, the City will continue to implement appropriate measures to evaluate pollutants in the permittee's storm water discharges; such measures include facility inspection, review of SWPPPs, review of facility self-inspection logs, and review existing facility monitoring data.	inspect all facilities once per permit cycle; inspect selected priority	Industrial Inspector

[36] The letters in the left hand column of this table reference the associated table of BMPS for the Program to Monitor and Evaluate Storm Water Discharges to Municipal Systems in the City's NPDES Permit NCS000249. This table starts on page 16 of the permit.

Table 7-6: BMP Summary Table for Monitoring and Control of Pollutants Entering the MS4[36]

BMP	Measurable Goals	Frequency	Responsible Position
	For facilities permitted by state or federal authorities, the City has established procedures for reporting deficiencies and non-compliance to the permitting agency. Where compliance with an existing federal or state industrial stormwater permit does not result in adequate control of pollutants to the MS4, the City will recommend and document the need for revised permit conditions to the permit issuing authority.	facilities annually	
(d) Establish and Implement Additional Measures to Evaluate Commercial and Industrial Facilities Discharging to the City's MS4	The City's industrial inspection program has a strong working relationship with the NCDWQ regional office, county officials, zoning inspectors, and other city staff. The City reviews monitoring results, locates monitoring stations to isolate sources, and reviews facility monitoring data. When indicated, the City implements additional monitoring where determined appropriate.	dry weather flows will be sampled when observed	Industrial Inspector
		each year at least one ambient monitoring station will be located to monitor the impacts of a single facility	Monitoring supervisor

7.9 Water Quality Assessment and Monitoring

7.9.1 Goals - The City of Durham Water Quality Monitoring and Assessment Program has several goals. They are:

- To evaluate the water quality impacts of urban stormwater on area streams,
- To identify illicit discharges to area streams,
- To assess the quality of streams within the City of Durham,
- To produce monitoring data that is comparable to data collected by the state, and
- To assess compliance with state water quality programs, including Total Maximum Daily Loads (TMDLs) and nutrient management strategies.

Information gained from this program may be used to help identify and eliminate sources of pollution, track short-term and long-term trends, and, where possible, gauge the effectiveness of stormwater management efforts and programs.

In order to meet these objectives, the City of Durham currently conducts chemical, biological, and flow monitoring of the streams within its borders (the City modeled its stream monitoring after the NC Division of Water Quality ambient monitoring program). The methodology, frequency, and locations of monitoring vary based upon the type of monitoring. These different types of monitoring allow the City of Durham both the opportunity to evaluate streams independently of the State and to verify results obtained by the State. One goal of the program is to produce data that is compatible with State data in the event that it is desirable or necessary to combine data for decision-making purposes.

Stormwater Services (SWS) reevaluates the monitoring program annually, generally at the end of the calendar year. Monitoring sites are reviewed to determine if any sites need to be added or eliminated. New potential stations are evaluated in the field to ensure safety and accessibility. All staff of the Water Quality unit of Stormwater Services work to ensure that scheduled monitoring is completed.

Special studies are conducted by stormwater staff as needed. They may include either or both ambient chemistry and benthic monitoring. In the past, these studies have been conducted to support state monitoring results, provide additional information to the state decision making processes, and to collaborate on new methods of determining sources of pollution. Special studies may be generated throughout the Stormwater Services Division of Public Works.

The following sections discuss Ambient Chemistry and Biological monitoring separately.

7.9.2 Ambient Stream Monitoring – Ambient monitoring data is currently used in the City of Durham to assess compliance with benchmarks and standards, to assess impairment, to identify sources and hotspots for targeting illicit discharge control efforts, and to support watershed planning.

Quarterly monitoring was initiated in 1991 to assess water quality at thirteen sites in Ellerbe Creek and Third Fork Creek (the City's two most developed watersheds). Samples were collected by staff in what is now the Water Management Department. Five to six water quality indicators - including fecal bacteria, chemical and physical parameters - were evaluated at each site. Stormwater Services assumed responsibility for this program in 2000 and expanded it to include testing more water quality parameters, more monitoring sites, and monitoring those sites more frequently. In 2004, the program was significantly revised to include quality assurance samples, monitoring sites monthly, and testing a few additional water quality parameters.

Since 2004 the City has reviewed the program annually; monitoring stations and the water quality parameters tested are adjusted as needed. Changes are implemented in January when conditions are the least variable.
The number of sites monitored has varied. In 2007 monthly ambient stream monitoring was conducted at 36 sites in and around Durham. In 2011 the City began field-filtering samples to be able to measure dissolved metals in a manner consistent with anticipated changes in state water quality standards; to accommodate the increased time required, the number of sites monitored has been reduced.

An early focus of the ambient monitoring program was supporting the identification and elimination of illegal discharges to surface waters. Current water quality monitoring efforts place greater emphasis on assessing long-term water quality trends in pollutant concentration and pollutant loads in order to gauge overall program success. Monitoring on a regular monthly schedule began in the 2004 calendar year.

All laboratory analysis is completed by laboratories certified by NCDWQ. In addition, a Quality Assurance Project Plan (QAPP) has been developed for the City's monitoring programs. Lists of parameters, sites and protocols for the ambient monitoring program are described in the NPDES Annual Report.

7.9.3 Biological Assessment Monitoring – The City does not monitor for all potential pollutants that could be present in the City's urban streams. Instead, the city has followed EPA guidance and North Carolina's lead in using biological assessments to evaluate the effects of pollution. An advantage of

this type of monitoring is that the aquatic community lives in the water and it serves as an indicator of overall health, integrating the effects of short-term and longer term stressors. The benthic macroinvertebrate community should reflect the impacts of a variety of conditions including pollutants, rapid variation in water temperature, and modifications to a streams flow referred to as hydromodification.

The City initiated its biological monitoring program in 1999 with an initial focus on mayflies, stoneflies, and caddisflies. These are pollution sensitive aquatic-dependant benthic macroinvertebrates collectively referred to as EPTs (the abbreviation EPT is derived from the first letter of taxonomic families). Within a few years the City expanded the program to provide taxonomic identification of other aquatic organisms. This was done to more fully characterize water quality conditions and to be able to detect smaller changes in conditions. These programs continued to evolve and expand. For example, in 2000 the City began using equipment to more efficiently collect midges.

Other improvements include members of the City's staff becoming certified in 2001 through the North Carolina 401 Program to collect benthic macroinvertebrates.[37] In 2002 the City added equipment to collect midges. In 2008 the City macroinvertebrate laboratory underwent laboratory certification testing and evaluation to become only the second certified laboratory operated by a local government in North Carolina. The City submitted application for annual renewal and was recertified in November 2011.

The City has had to make adjustments in the way it uses data from monitoring of benthic macroinvertebrates. The City's urban streams are much smaller than those monitored by the NCDWQ. To complicate things further, the City is located almost entirely in the Durham Triassic Basin, a sedimentary rift basin characterized by tight clay soils that inhibit groundwater recharge and lead to naturally low base stream flows, especially during summer. Durham Triassic Basin streams also tend to lack habitat diversity[38]. The size of streams, low base stream flows, and lack of habitat diversity all contribute to reduced diversity of aquatic life, an effect magnified in the smaller urban watersheds in Durham. NCDWQ has not established benchmarks for benthic macroinvertebrate communities in Triassic Basin streams. There are no comparable undeveloped Triassic Basin watersheds in the region that can provide true reference streams.

The City therefore relies on the North Carolina Biotic Index (NCBI) – which is based on the pollution tolerance of the organisms found to assess water quality. The NCBI is likely to be somewhat less sensitive to habitat than are

[37] Four staff members are currently certified.

[38] Streams in the Triassic Basin tend to lack rock, gravel and other porous materials commonly found in the hyporheic zone and consequently have reduced diversity of sediment sizing and lower habitat diversity. All of this contributes to reduced diversity of aquatic life.

taxonomic or ecological diversity ratings. (Note: lower NCBI = better water quality).

7.9.4 Field Screening - Field screening monitoring programs include the illicit discharge detection program, the outfall screening program, stream forensics studies, and responses to sewer spills. Each of these programs requires rapid analysis of surface water to determine if a particular analyte or parameter is present and to what degree. However, the methods used for monitoring are similar. Small samples of water are collected and analyzed in the field to determine water quality conditions.

The Stormwater Services staff utilize a CHEMETRICS field chemistry kit to provide support for real time pollution tracking. The use of the CHEMETRICS field screening methods is described in the Stormwater Services QAPP. On a case-by-case basis, there may be a need for detailed or precise measurements such as those provided by a chemistry laboratory. When these cases arise, grab samples may be collected per the QAPP and delivered to the South Durham WRF.

Field screening methods are performed on an as needed basis. Thus frequency and site location cannot be specified in advance. Frequency may consist of before and after monitoring to characterize the problem and resolution. More frequent analysis may be needed if an ongoing problem has been identified. Similarly, monitoring locations may vary. Monitoring locations may include outfalls or other discharge pipes, ditches, storm sewers and surface waters. In the case of outfall screening or illicit discharge detection, documentation of frequency and locations will be provided in the Stormwater Services water quality investigations database.

7.9.6 Quality Assurance - Stormwater Services is committed to producing quality data for a variety of planning and assessment uses. As such, the development of an Ambient Monitoring QAPP and maintenance of the Standard Operating Procedures for Benthic Macroinvertebrates are high priorities. As previously mentioned, the Stormwater Services Quality Assurance Monitoring Program plan is currently under revision to development a QAPP using the EPA format. The QAPP describes, in detail, the sampling process design, sampling methods, sample handling and custody, analytical methods, and instrument testing, inspection, maintenance, and calibration.

7.9.7 Record Keeping - A variety of forms are retained by Stormwater Services describing various aspects of monitoring. Field sheets, chain of custody forms, and hard copies of the laboratory summary sheets are retained by Stormwater Services for all ambient monitoring. Similar forms and sheets are retained for special studies (although file folders will be labeled separately). For benthic macroinvertebrate sampling, field sheets and invertebrate identification sheets are retained for each site. All data recorded

on the field sheets will be maintained in a spatially referenced electronic database.

Laboratory log books, bench sheets, and QA documentation will be retained at the South Durham WRF per the laboratory QAPP.

Stormwater Services will retain ambient and biological records on-site for a minimum of 5-years. Records may be maintained off-site for up to 12 years. Monitoring data is stored in one of several Microsoft Access® databases. Data entry is verified monthly to correct transcription errors.

7.9.8 Data Evaluation and Assessment - Stormwater Services has performed several data evaluations and assessments in the past. These have been reported in previous annual NPDES reports and summarized in the State of Our Streams report since 2004. EPA guidance on data quality assessments suggests a review of the objectives, sampling design, and preliminary data as the first steps of a statistical data review.

Stormwater Services utilizes a systematic planning process when evaluating monitoring for the coming year. In most cases, the sampling design will provide adequate data for the data evaluation. Special studies may require a post-monitoring review to ensure that objectives are met. As described in Section 7.9.7, databases are verified on a regular basis to ensure that analytical or statistical comparisons use proper and correct data.

In general, EPA guidance[39] recommends validation of data, calculating basic statistics, and generating graphs. Stormwater Services routinely evaluates water quality data to determine representativeness and feasibility. This includes preparing time-series graphs, determining measures of central tendency, and evaluating distributions at each site and over all sites. However, there are specific evaluations that are performed quarterly or annually to assess water quality conditions. These specific evaluations are further described below.

Table 7-7. Assessments and Evaluations Conducted using Ambient Chemistry, Biological and Special Studies Data

Evaluation type	Description	Frequency
Comparison to WQ standards	NC water quality standards and EPA criterion continuous concentrations (CCC) are compared to ambient chemistry data to determine the frequency the standard or CCC is exceeded.	Annually
NC Biotic Index and WQ Rating	A NC Biotic Index (Biotic Rating and Water Quality Rating) is calculated for each location monitored using the DWQ	Annually

[39] Ibid.

Evaluation type	Description	Frequency
	methodology.	
Comparison of sites	To determine if any sites have unusually higher or lower concentrations of a variety of constituents, graphical exploratory data analyses is performed, typically using box and whisker plots.	Annually
Water Quality Index	Stormwater Services created a Water Quality Index (WQI) unique to Durham that summarizes water chemistry information into one easily understood number. Parameters used to determine the WQI include dissolved oxygen, turbidity, fecal coliform bacteria, total nitrogen, total phosphorus, 5-day biochemical oxygen demand, dissolved copper and dissolved zinc.	Quarterly, Annually, or Biennially
Nutrient Loads	Calendar year nutrient loads are calculated at locations with co-located continuous discharge monitoring and regular water quality monitoring. Load calculations consider the unique characteristics of each location.	2 to 3 years
Analysis of Trends	Long-term, monotonic trends are calculated at sites with a minimum of five seasonal cycles of water quality data. Stormwater Services performs these analyses irregularly, generally when evaluating a specific watershed response.	3 to 5 years

Evaluations and assessments are described in a number of documents that are attached to the NPDES Annual Report.

7.9.9 Reporting - Stormwater Services provides regular updates of water quality to the public and to NC DWQ. There are two primary methods of reporting annual water quality assessments.

The first method of communicating information about water quality is the annual State of Our Streams report. The State of Our Streams report summarizes the water quality index, fecal coliform bacteria, and water clarity in a simplified format. These reports, which are available on the Stormwater Services website, also include other information regarding water quality protection efforts made by the City of Durham. The State of Our Streams reports are available from 2004 onward.

The second method of communicating information about water quality is through the NPDES Annual Report. Several different matrices are generated for the report that focus on higher reporting implementation efforts (although

there is some overlap with the State of Our Streams report in terms of water quality reporting). A summary table, such as that provided in Appendix N, is provided for monitoring results in each annual NPDES report. These tables have also been provided in past annual NPDES reports.

7.10 Water Quality Recovery Programs

For each Total Maximum Daily Load (TMDL) developed by the NC Division of Water Quality and approved by EPA that provides a Waste Load Allocation (WLA) to the City's MS4, the City must develop a Water Quality Recovery Program that indicates how the City will monitor, manage, and control the TMDL pollutant (to the maximum extent practicable and to the extent authorized by law). A TMDL Monitoring Plan must be developed within 36 months of the issuance of the permit, or by June 30, 2010 for existing approved TMDLs. For TMDLS subsequently approved by the EPA, the City will have 36 months to develop a TMDL Monitoring Plan.

In coordination with NCDWQ, the North Carolina Phase I communities developed a general outline of those items that should be included in the Water Quality Recovery Programs (WQRPs), which includes descriptions of SCMs and a schedule of activities. After development, such Water Quality Recovery Programs are incorporated into this SMP by reference. Following any review and comment by the Division on a water quality recovery program or ancillary monitoring plan, the City will incorporate any necessary and appropriate changes into the program and/or monitoring plan. Water quality recovery programs are updated annually and are included in the NPDES Annual Report.

The City has developed WQRPs based on the general outline for Third Fork Creek and for Northeast Creek. These are updated annually and the updates submitted as attachments to the City's Annual Reports.

Section 8.0
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Section 9.0 -

City of Durham Stormwater Management Plan Appendices

9.1 Table of Contents

A. State of Our Streams Report, (2007, 2008, 2009 & 2010 reports included as separate documents)
B. City of Durham Stormwater Pollution Control Ordinance
C. City/County UDO Environmental Protection Standards (Chapter 8) 2011
D. City/County UDO Sedimentation and Erosion Control Ordinance (Sections 3.8, 12.10, 15.1, 15.5 revised 2009)
E. Sedimentation and Erosion Control Site Inspection Protocol
F. City of Durham Stormwater Performance Standards for Development, revised June 15, 2010
G. Neuse New Development BMP Summary, example from the City of Durham Neuse Annual Report (excepts related to land development and BMPs, example)
H. Authorization of Director of Public Works as Signing Official
I. Key Position Contacts, updated 2011
J. Target Pollutants, Sources & Audiences
K. Draft of revised 'City Of Durham Stormwater Performance Standards For Development,' submitted for regulatory review on August 9, 2011
L. Inventory of Municipal Facilities, Activities and Operations, revised
M. reserved
N. Agreement Establishing The Clean Water Education Partnership
O. Water Quality Recovery Program Template (also see WQRP updates in each annual report)
P. BMP Certifying Engineer (BCE) Program
Q. BMP Maintenance Certifier (BMC) Program

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APPENDIX A

STATE OF OUR STREAMS REPORT

Based on Monitoring
For 2007

State of Our Streams Reports for 2004, 2005, 2006, 2007, 2008 and 2009 may be found on the City's Stormwater web page under Water Quality or directly using the following link:

http://www.durhamnc.gov/departments/works/stormwater_water_quality.cfm.

These reports are intended to make water quality information accessible by the public. A copy of the latest such report will be included as an appendix to the SWMP Annual Report beginning with the 2009-2010 NPDES Annual Report.

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APPENDIX B
City of Durham
Code of Ordinances
STORMWATER POLLUTION CONTROL ORDINANCE
Chapter 70, Article V

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CHAPTER 70, ARTICLE V
STORMWATER MANAGEMENT AND POLLUTION CONTROL

DIVISION 1. GENERALLY

Sec. 70-492. Purpose.

The purpose of this article is to further the health, safety and general welfare and convenience of the public through:

(1) Regulating the use, placement, storage, and management of pollutants in order to prevent pollution of stormwater;
(2) Limiting pollution of stormwater in the public and private drainage system so as to limit pollution of the waters of the state and restore, protect, and maintain better water quality and the benefits that come from better water quality;
(3) Prohibiting illicit discharges and illicit connections to the public and private drainage system that increase pollution;
(4) Protecting the conveyance capacity of the drainage system by controlling blockages, and the emission or disposal of substances or effluents, including sediment, that are injurious to the drainage system;
(5) Complying with the city's National Pollutant Discharge Elimination System permit issued under the authority of section 402(p) of the clean water act and implementing regulations at 40 CFR 122.26;
(6) Establishing inspection, surveillance, monitoring, and enforcement and penalty procedures to the maximum extent authorized under law to achieve the above-described objectives, and to ensure compliance with this article; and
(7) Authorizing fees necessary to conduct inspections and monitoring of the stormwater system.

(Ord. No. 13342, § 1(23-140), 11-20-2006)

Sec. 70-493. Definitions.

(a) The acronyms used herein are:

TABLE INSET:

BMP	Best Management Practice
NPDES	National Pollutant Discharge Elimination System
MS4	Municipal Separate Storm Sewer System
NCDENR	North Carolina Department of Environment and Natural Resources
NOI	Notice of Intent
SWPPP	Stormwater Pollution Prevention Plan
USEPA	United States Environmental Protection Agency

(b) In this article, the following terms and phrases shall be defined as indicated unless the surrounding context indicates such definition is clearly erroneous. The definitions shall apply whether the term is used in the singular or in the plural, and whether or not the term is capitalized.

Best management practice (BMP) means government-approved controls, including both nonstructural and structural measures that are designed to reduce

the flow of stormwater runoff, or to reduce the amount or concentration of pollutants that enter stormwater and/or the drainage system. Examples of nonstructural BMPs include inspections for leaks and spills, general maintenance and good house keeping practices to prevent pollution, education, and on-site maintenance of a spill cleanup kit. Examples of structural BMPs are facilities such as a roofed shed or elevated storage area to keep precipitation or runoff from reaching raw material storage areas, bioretention cells, and retention and detention ponds.

Clean Water Act means the Federal Water Pollution Control Act (33 USC 1251 et seq.) and any subsequent amendments thereto.

Director, unless otherwise specified, means the director of the department of public works of the city or any successor department in which stormwater services is located, and includes any individual to whom the director delegates responsibilities under this article.

Discharge means any release, spill, leak, pumping, flow, escape, dumping, deposit, or disposal of any gas, liquid, semi-solid, or solid substance.

Drainage system means the system of natural and constructed conveyances for collecting and transporting stormwater, whether publicly or privately owned. It includes lakes, ponds, rivers, perennial and intermittent streams, connected wetlands, open ditches, catch basins and other inlets, pipes, sewers, drains, culverts, and, in addition, created stormwater management facilities that provide partial treatment by passive means such as wet detention ponds, detention basins, and stormwater wetlands. The MS4 and waters of the state within the city are components included within the drainage system, among other components.

Guidelines means the written guidelines of the stormwater services division, or any successor division responsible for stormwater management, approved by the director.

Hazardous substance means materials or mixtures containing materials which pose a physical, environmental, health or safety hazard by virtue of their ignitable, reactive, corrosive, highly irritating or sensitizing, carcinogenic or toxic properties. Hazardous substances include, but are not limited to, those designated pursuant to 33 USC 1321(b)(2)(A), and those listed or defined in 29 CFR 1910.1200, 40 CFR 116, and 40 CFR 261 subpart B.

Illicit connection means any drain, junction, or conveyance, whether on the surface or subsurface, that can discharge nonstormwater discharges, such as sewage, process wastewater, or wash water, to the MS4 or to watercourses. Illicit connections include, but are not limited to, interior floor drains, whether or not previously allowed under the building code.

Illicit discharge *generally* means any discharge to the drainage system that is not composed entirely of stormwater, unless specifically allowed as an authorized discharge in section 70-513.

Municipal separate storm sewer system (MS4) means the system of constructed conveyances, including municipal streets, catch basins, curbs, gutters, pipes and ditches owned and operated by the municipality and designed or used for collecting and conveying stormwater, and which is not intended to be used to convey sewage or other wastewaters. In the city, the MS4 generally includes that part of the storm sewer system within street rights-of-way or on other city owned property.

National Pollution Discharge Elimination System (NPDES) permit means a permit that authorizes the discharge of pollutants to waters of the United States

issued under the clean water act 33 USC 1242 by the USEPA, or issued by the NCDENR under authority delegated by USEPA.

Nonstormwater discharge means any discharge to or pollution of the drainage system that is not entirely from a form of natural precipitation.

Notice of intent or ***NOI*** means the notice of intent that is required by the NPDES stormwater multisector general permit issued by USEPA, or the notice of intent required by an NPDES general permit issued by the NCDENR.

Person means any individual, partnership, co-partnership, LLC, firm, company, corporation, unincorporated association, organization, joint stock company, trust, estate, institution, governmental entity or any other entity that owns a property, conducts a business, or controls management or activities.

Pollutant means a substance that alters the chemical, physical, biological, thermal, or radiological integrity of water in a manner that may cause or contribute to the impairment of waters of the state based on the water quality classifications assigned under 15A NCAC 2B.0300. Pollutants include, but are not limited to: paints, varnishes, and solvents; gasoline and other petroleum fuels; oil and other automotive fluids; detergents; food waste, including cooking oil and grease; nonhazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, floatables; insecticides, fungicides, herbicides and other pesticides; fertilizers; soot, slag, and ash; hazardous substances and wastes; inadequately treated sewage, animal wastes, fecal coliform, Escheria coli and pathogens; dissolved and particulate metals; hot water; wastes and residues that result from constructing a building or structure (including, but not limited to, sediments, slurries, and concrete rinsates); eroded soils, sediments and particulate matter; and noxious or offensive matter of any kind.

Pollution *and* ***polluted*** means containing pollutants.

Repeat violation means a violation occurring on the same property, or a violation by a person that has committed a previous violation, or by an entity in which a previous person who has committed a violation is part owner or in partial control. A violation for the purposes of determining a repeat violation includes, but is not limited to, violations in which the violator has been notified of the violation by any governmental entity, whether or not any action, remedy, or penalty has occurred as the result of such violation.

Responsible means having direct or indirect control over the occurrence of an action, incident, or condition. Responsibility includes the ability to control what occurs on property through ownership of property, or through ownership, control, or management of a business, organization, or other entity whose activities occur on property and cause in part or in whole the action, incident, or condition. Causation may be through deliberate action or through negligence, omission, or inattention.

Stormwater means any surface flow, runoff, and drainage consisting entirely of water from any form of precipitation, and resulting from such precipitation.

Stormwater pollution prevention plan or ***SWPPP*** means a government-approved plan identifying actual or potential pollutants that could enter the drainage system at a site, and which describes the best management practices that will be employed to reduce pollutant discharges to the drainage system.

Wastewater means any water or other liquid, other than uncontaminated stormwater, discharged from a facility after use. Examples include water used for washing, flushing, cleaning, or in a manufacturing process.

Watercourse means the open channel and open water components of the drainage system and includes lakes, ponds, rivers, perennial and intermittent streams, connected wetlands, open ditches, and stormwater management facilities such as wet detention ponds, detention basins, and stormwater wetlands.

Waters of the state , as defined in G.S. 143-212(6), means any stream, river, brook, swamp, lake, sound, tidal estuary, bay, creek, reservoir, waterway, or other body or accumulation of water, whether surface or underground, public or private, or natural or artificial, that is contained in, flows through, or borders upon any portion of this state, including any portion of the Atlantic Ocean over which the state has jurisdiction.

(Ord. No. 13342, § 1(23-141), 11-20-2006)

Secs. 70-494--70-510. Reserved.

DIVISION 2. PROHIBITIONS AND REQUIREMENTS

Sec. 70-511. Illicit discharges; containment of spills and discharges; plans to prevent discharges.

(a) *Prohibition.* The discharge, emission, disposal, pouring, or pumping, directly or indirectly, to the drainage system of any liquid, solid, gas, or other substance, other than stormwater, is an illicit discharge and is prohibited, except as allowed in section 70-513. This prohibition also includes airborne emissions where such emissions deposit pollutants into the drainage system.

(b) *Containment of discharges and spills; notice.* Persons responsible for property where an illicit discharge or a spill that may enter the drainage system has occurred shall immediately take appropriate and timely action to contain the discharge or spill. Such person shall notify the director within one working day and comply with all other legally required reporting requirements.

(c) *Plans to prevent illicit discharges.*

(1) Where the location or manner of storage of pollutants on property may cause a significant illicit discharge, or where an illicit discharge has previously occurred on property, the director may require that a responsible person for such property:

a. Develop and maintain BMPs meeting guidelines;

b. Apply for and follow a local permit; and

c. Develop, submit for approval, and follow an SWPPP.

(2) In determining whether to impose such additional requirements the director shall consider:

a. The history of the property;

b. The likelihood of illicit discharges without additional measures; and

c. The impact of such discharges.

(3) A permit or plan required under this section is a regulatory requirement and not a penalty.

(Ord. No. 13342, § 1(23-142), 11-20-2006)

Sec. 70-512. Illicit connections.

(a) *Prohibition.* Construction, creation, or maintenance of an illicit connection is prohibited, except that maintenance during a grace period may be allowed as described in subsection (c) of this section.

(b) *Examples of illicit connections.* Examples of illicit connections include, but are not limited to, pipes or ditches that carry process wastewater or wash water to the

MS4 or to watercourses, including but not limited to indoor drains whether or not previously allowed under the building code.

(c) *Removal; grace period.* Illicit connections that were legal prior to passage of the ordinance from which this article is derived may continue to exist until June 1, 2007, at which point they must be removed. However, where the connection has the potential to discharge hazardous substances, the connection shall be removed immediately unless an extension is granted. The director may allow an extension of up to three months for removal of such illicit connection upon a showing of substantial hardship and minimal risk to the public from the delay.

(Ord. No. 13342, § 1(23-143), 11-20-2006)

Sec. 70-513. Authorized nonstormwater discharges.

The following discharges are not considered illicit discharges prohibited under this article:

(1) *NPDES authorized.* Discharges specifically authorized from a property by an NPDES individual or general permit, a discharge waiver, or a waste discharge order, provided that the discharger demonstrates full compliance with all requirements of the permit, waiver, or order in accordance with section 70-514.

(2) *Flushing.* Discharges of treated potable water used to flush and clean-up a sewage spill where sewage and flush water are collected and returned to the sanitary sewer system, and discharges from water line flushing that have been dechlorinated.

(3) *Emergency firefighting or spill removal.* Discharges from emergency firefighting activities, or emergency remediation of a spill of a hazardous substances authorized by a federal, state, or local government on-scene coordinator, and other discharges specifically allowed in writing by the director as necessary to protect public health and safety.

(4) *Dye testing.* Dye testing using suitable dyes, if verbal notification is given to the director prior to the test.

(5) *Specific listed activities.* Certain conditionally exempt discharges listed in this subsection, provided they are not found to be significant contributors of pollutants. The director may determine in writing that any such discharge from any property is no longer exempt if there is evidence of significant pollution from such discharge.

a. Water line flushing;
b. Landscape irrigation;
c. Diverted stream flows;
d. Rising groundwaters;
e. Groundwater infiltration;
f. Uncontaminated pumped groundwater;
g. Discharges from potable water sources;
h. Foundation drains;
i. Air conditioning condensate (commercial/residential);
j. Irrigation waters (does not include reclaimed water as described in 15A NCAC 2H .0200);
k. Springs;
l. Water from crawl space pumps;
m. Footing drains;
n. Lawn watering;
o. Residential and charity car washing;
p. Flows from riparian habitats and wetlands;

q. Dechlorinated swimming pool discharges;
r. Street wash water;
s. Discharges from flushing and cleaning stormwater conveyances with dechlorinated, unmodified water.

(6) *Wetland dredging.* Dredging or filling of wetlands authorized by a state or federal agency pursuant to the clean water act if conducted in accordance with applicable requirements.

(7) *Mitigation.* Mitigation projects approved by a state or federal agency pursuant to the clean water act if conducted in accordance with applicable requirements.

(8) *Piping.* Piping of streams or stabilization of stream banks and shorelines in accordance with requirements of the Durham City-County Unified Development Ordinance and state or federal authorization and requirements pursuant to the clean water act.

(9) *Farming and forestry.* Ongoing farming and forestry activities that are exempt from permit requirements of section 404 of the clean water act, as specified in 40 CFR 302, conducted in accordance with applicable requirements such as the provisions of 15A NCAC 2B .0233 regarding riparian buffers in the Neuse River Basin.

(Ord. No. 13342, § 1(23-144), 11-20-2006)

Sec. 70-514. Demonstration of compliance under NPDES permits, SWPPPs, BMPs, general NPDES permits, or similar authorizations.

(a) *Required documentation, on-site record maintenance.* Properties subject to a plan to control discharges to the drainage system under NPDES permits, SWPPPs, BMPs, or local permits must demonstrate compliance. The following records shall be maintained on site and shall be available for inspection and copying by city representatives upon request.

(1) A copy of the NPDES permit, state or EPA-issued order, SWPPP, or notice of coverage, as applicable, issued for the premises, activity or operation;
(2) If applicable, a copy of the NPDES permit application, NOI to comply with a general NPDES permit, application for an sedimentation and erosion control permit, or similar application;
(3) Any monitoring plan required as a provision of a permit, SWPPP, or BMP;
(4) All inspection and monitoring data collected for a three-year period, or such shorter period as the property has been required to collect such data.

(b) *Noncompliance.* Failure to demonstrate full compliance with a permit, SWPPP, BMP, or other legal authorization, and failure to obtain a permit required under applicable law, shall, among other things, result in a discharge being considered an illicit discharge under section 70-511.

(Ord. No. 13342, § 1(23-145), 11-20-2006)

Sec. 70-515. Pollution prevention requirements for automotive activities.

(a) *Secondary containment; spill cleanup kits.* Motor oil, antifreeze, other automotive fluids, and other petroleum products that are stored outdoors shall have secondary containment and shall be stored under a covered area. Gas stations, other fuel-dispensing facilities, nonresidential properties on which ten or more gallons of petroleum or automotive products are stored, and tow-truck operators shall maintain a spill clean-up kit of a type and size to meet guidelines.

(b) *Auto towing, maintenance, service, salvage.* Properties that are used for storage of towed vehicles, vehicle maintenance, vehicle service, or salvage of vehicle parts from vehicles shall have:

(1) One or more spill clean-up kits of a type and size to meet guidelines;
(2) Secondary containment and a covered storage area for substances covered under subsection (a) of this section;
(3) Covered bays in which all vehicle service or maintenance shall be conducted, except for emergency road service, glass repair, and electrical service, such as battery replacement; and
(4) Storage for vehicle parts, both new and used, so that the parts are not exposed to stormwater runoff or precipitation.

(c) *Spills/leaks.* Persons responsible for property where a spill or leak of automotive or petroleum products has occurred shall clean up the spill or leak and report it in accordance with section 70-511(b).

(d) *NPDES permit.* Demonstration under section 70-514 of compliance with a valid NPDES permit that specifically addresses an activity controlled under this section, and imposes different requirements than those stated in this section, shall be deemed compliance with this section.

(Ord. No. 13342, § 1(23-146), 11-20-2006)

Sec. 70-516. Stormwater pollution prevention plans (SWPPPs) for storage of salvaged vehicles.

(a) Submission of SWPPP. Storage of ten or more junked, salvaged, or unlicensed vehicles (hereafter "salvage vehicles") outside, such that they are exposed to precipitation, shall require an SWPPP if the facility does not possess an NPDES permit for such activity. The SWPPP shall be developed and submitted to the director in accordance with the schedule below.

(1) By September 1, 2007, for facilities with 30 or more salvage vehicles; or
(2) By February 1, 2008, for facilities with more than ten but less than 30 salvage vehicles.

(b) Content of SWPPP. The SWPPP shall be in compliance with guidelines and shall prevent the discharge of used motor oil and other petroleum products, antifreeze, solvents, other automotive fluids, brake dust, sediment from land disturbance, and other pollutants. The SWPPP shall include the following and such other information as may be required in guidelines:

(1) A map showing the general location of the facility, and a separate site map, drawn to scale, showing location of structures, drainage features on the property, salvage autos, and vehicle parts and equipment cleaning areas;
(2) A description of storage practices, loading and unloading activities, outdoor process areas, activities that generate dust or particulates, and waste disposal practices;
(3) A list of significant spills or leaks of pollutants that have occurred at the site during the three previous years and any corrective actions taken in response;
(4) Methods, in accordance with guidelines, to reduce risk of stormwater pollution, such as secondary containment, and BMPs; and
(5) Monitoring schedule and method for documenting compliance with the SWPPP.

(c) Alternative SWPPP. A SWPPP developed pursuant to a valid NPDES general or individual permit for stormwater discharge shall be deemed compliant with this section provided compliance is demonstrated under 70-514.

(d) Maintenance of SWPPP. The SWPPP shall be maintained on site, and shall be readily available for review by the city upon request.

(Ord. No. 13342, § 1(23-147), 11-20-2006)

Sec. 70-517. Pollution prevention requirements for hazardous substances.

Hazardous substances that are stored outdoors shall have secondary containment and shall be stored in a covered area. Where the volume or location of hazardous substances presents a risk of pollution to the drainage system, the director may require a person to submit an SWPPP or application for a local permit for approval, and to follow such SWPPP or permit.

(Ord. No. 13342, § 1(23-148), 11-20-2006)

Sec. 70-518. Spills and releases of pollutants.

(a) Containment. Persons responsible for a spill or other release of pollutants upon the roads, highways, or in the right-of-way shall take appropriate and timely action to contain and clean up the spilled material to prevent it from entering any drainage system. Appropriate action may include contracting with a third party that is licensed by the state to handle and dispose of the spilled material.

(b) Report. A person responsible for a spill that is subject to G.S. 143-215.75 et seq. or other applicable law shall immediately report the spill to the Durham City-County Emergency Management System ("EMS"). The Durham City-County EMS shall report all spills, with details as to location and nature of the spill, within one working day to the director.

(Ord. No. 13342, § 1(23-149), 11-20-2006)

Secs. 70-519--70-524. Reserved.

DIVISION 3. INSPECTIONS

Sec. 70-525. Authority to enter, inspect, and monitor; routine inspection program.

(a) Right to inspect. City representatives, upon presentation of credentials and other documents as may be required by law, may enter public or private properties at all reasonable times to inspect, investigate, or monitor activities and conditions subject to this article. If consent has not been given through a permit or other similar authorization, or a person able to give consent has not consented to entry or inspection, or entry is not otherwise authorized, the director shall obtain an administrative search warrant from a magistrate as provided under G.S. 15-27.2. The director shall show either that the property is subject to a routine inspection program and inspection under such program is due, or that probable cause exists to inspect.

(b) Inspection activities. City representatives are authorized to do the following as necessary to determine compliance or noncompliance with this article:

(1) Observe, inspect, measure, sample, test, and monitor;

(2) Place devices to remain on site for runoff or discharge sampling, monitoring, flow measuring, or metering;

(3) Inspect, copy, or examine any records, reports, plans, test results or other information; and

(4) Photograph or video record property conditions, activities, potential causes of pollution, and potential violations.

(c) Confidential information. City representatives shall treat as confidential information the composition of materials and substances documented during an

investigation if a claim is timely made and substantiated that such substances are trade secrets.

(d) Obstruction. No person shall obstruct, hamper, or interfere with a city representative carrying out official duties. Upon presentation of credentials by city inspectors, necessary arrangements shall be made to allow immediate access onto premises or into an area protected by security measures. Any obstruction to the safe and easy access to property, a facility or enclosure on property, or to monitoring devices shall immediately be removed. Unreasonable delays in providing safe and reasonable access or removing obstructions shall be a violation of this article.

(e) Routine inspection program. The director may establish, though guidelines, a routine inspection program for properties, businesses, or other activities in order to gather information regarding stormwater, pollution of the drainage system, and compliance with this article. The inspection cycles for categories of properties, businesses, or activities may differ depending on location, proximity to particular streams or other waters of the state, prior history, type of business or activity conducted on site, size of facility, nature of substances on site, or other parameters related to the objectives of this article.

(Ord. No. 13342, § 1(23-150), 11-20-2006)

Secs. 70-526--70-530. Reserved.

DIVISION 4. DRAINAGE SYSTEM MAINTENANCE; CONSTRUCTION PERMITS

Sec. 70-531. Maintaining drainage systems; permitted alterations.

(a) Maintaining clear drainage system. All persons shall keep and maintain the drainage system, both surface and underground, located on their property free from obstructions, trash, and debris.

(b) Obstructing drainage system. No person shall deposit, or allow or cause to be deposited, into any part of the drainage system, including, but not limited to, street gutters, catchbasins, ditches, pipes, and streams, any material or substance that will cause or contribute to blockage or reduced discharge of the drainage system, or that will damage the drainage system. This includes, but is not limited to, refuse, rubbish, construction waste, leaves, landscaping debris, garbage, and dirt and sediment.

(c) Upset. The prohibition above shall not apply to NPDES-authorized discharges of sediment that result from an upset as defined in the applicable NPDES permit.

(d) Permitted activities. The provisions above do not prohibit the construction, reconstruction or alteration of drainage systems and BMPs that comply with city design standards and sound engineering practices where construction is in accordance with section 70-533, or the applicable sedimentation and erosion control program, and where the work employs adequate sediment and erosion control practices.

(Ord. No. 13342, § 1(23-151), 11-20-2006)

Sec. 70-532. Obstructing the free flow of water.

No person shall construct, install or maintain any stormwater or drainage system in such a manner as to obstruct or impede the free flow of water. This section does not apply to the construction, reconstruction or alteration of drainage systems and BMPs in compliance with city design standards and sound engineering practices and for which a permit or other approval has been secured from the city's stormwater services division.

(Ord. No. 13342, § 1(23-152), 11-20-2006)

Sec. 70-533. Permit requirements for construction; fees.

(a) Approvals for BMPs, construction connecting to MS4. All construction of, or nonroutine maintenance work on a BMP, or other drainage feature that is intended to prevent pollutants from entering the drainage system, or a natural or constructed portion of the drainage system that directly connects to the MS4 or to the waters of the state shall require a permit or other approval from the city.

(b) Guidelines.

(1) Guidelines may require that:

a. Permits or approvals be obtained for other work on the drainage system;

b. Certain work is exempt from permitting or approvals, based on:

1. The nature of the activity;

2. The size of the infrastructure;

3. Other permits that are in place; and

4. Other criteria relevant to drainage system impacts; and

c. Mandated practices for work on the drainage system be followed in lieu of obtaining a permit or approval.

(2) Guidelines may also specify the information required to be submitted for a permit or approval, or for a determination that a permit or approval is not required.

(c) Fees. The city shall establish appropriate fees to recover the costs of review of applications and issuance of permits and approvals authorized in this division, and for the monitoring of BMPs and other drainage features that discharge directly or indirectly to the MS4. The city may also require security instruments or other financial guarantees, or payment into a fund in lieu of such guarantees, to ensure the continuous upkeep and/or reconstruction of city-required BMPs or other pollution prevention features.

(Ord. No. 13342, § 1(23-153), 11-20-2006)

Secs. 70-534--70-537. Reserved.

DIVISION 5. ADMINISTRATION AND ENFORCEMENT

Sec. 70-538. Administration and enforcement of article and stormwater program.

The director is authorized to administer and enforce the provisions of this article and other regulations of the city concerning the stormwater system unless a contrary intention is expressed in such other regulations. Among other things, the director shall have the authority to issue guidelines to implement this article, and to establish fees, as authorized by the city council, in the adopted budget or otherwise, to implement the stormwater activities authorized in this article and in other sections of this Code. The director is also authorized to remediate any violations, to alter any previously issued remedies, and, except as limited below, to settle any case or controversy arising under this article, including, but not limited to, those subject to administrative remedies. In the event of judicial action that has been filed on behalf of or against the city regarding this article or the city's stormwater program, any settlement shall be approved by the city manager or city council, as applicable, consistent with the city manager's delegated settlement authority.

(Ord. No. 13342, § 1(23-154), 11-20-2006)

Sec. 70-539. Declaration of violation; remedies.

(a) Violation. Failure to comply with the provisions of this article or the guidelines, conditions, plans, permits, approvals, or other similar authorizations issued pursuant to this article is a violation of this article, unlawful, and subject to all remedies authorized under law, including, but not limited to, those described in this division.

(b) Separate offense. Each day of a violation may be considered a separate violation or offense.

(c) Persons responsible. All persons considered under the definitions of this article to be responsible for a violation shall be considered violators. Violators include, but are not limited to, owners of property where a violation occurs; persons in the design or construction field who have created, directed, or assisted in the design or construction of an improvement or feature in violation of the requirements of this article; and persons who have control over the use or maintenance of property or the activities occurring on property where a violation has occurred. Multiple violations may be charged against multiple individuals or entities for an action that violates this article.

(d) Remedies not limited. The remedies provided herein, whether civil, criminal, or administrative, are not exclusive; may be exercised singly, simultaneously, or cumulatively; may be combined with any other remedies authorized under the law; and may be exercised in any order.

(e) Public nuisance. A violation that results in observable or detectable negative impacts to the drainage system or to the public health or safety is a public nuisance and subject to all remedies for a nuisance available in law and equity.

(Ord. No. 13342, § 1(23-155), 11-20-2006)

Sec. 70-540. Remedies and penalties.

Remedies available for enforcement of this article, and penalties for its violation, include, but are not limited to, those described in the following subsections. Pursuit of certain remedies and penalties requires compliance with the procedures specified in section 70-541.

(1) Administrative remedies.

a. Show cause meeting. The director may have a meeting with the violator prior to taking any enforcement action under this article. The violator shall receive notice of such meeting consistent with procedures in section 70-541, and shall have an opportunity to be heard.

b. Consent orders. The director may enter into consent orders, assurances of voluntary compliance, or other similar agreements with a violator. Such agreements shall include, but not be limited to, specific action to be taken by the violator to correct the violation within the time period established in the order. A consent order may also include a mitigation project undertaken to improve environmental quality of the drainage system in the event that the director and the violator agree on such project as an additional compliance measure to generally remediate the impacts of a violation.

c. Administrative orders. The director may direct a violator to comply with this article through an administrative order which sets forth specific actions that must be taken and a timetable for taking them.

d. Mandatory security for compliance. The director may require a violator to post a bond or provide other financial security of a type, form, and amount as specified in the discretion of the director, to assure performance of any actions required to bring a property into compliance with this article.

e. Termination of utility service. Where it appears that the continuation of water and/or sewer service may contribute to a violation of this article, as, for example, an illicit connection, utility service may be terminated.

f. Costs added to utility bill. The costs of any action taken by the city to investigate and remediate a violation of this article may be added to the violator's utility bill, and, if unpaid, may result in termination of utility service as otherwise provided in this Code.

g. Termination of access. Any property on which illicit discharges to the MS4 have occurred may have their access to the MS4 terminated if such termination would contribute to the likelihood that the illicit discharge would be reduced or abated.

h. Withholding of inspections, permits, certificate of occupancy or other approvals. Building inspections; permits for development or other improvements; requests for plan approval for zoning, subdivision, other development or construction; and certificates of occupancy may be withheld or conditioned upon compliance with this article until a violator with ownership or management of the property for which permits or approvals are sought has fully complied with this article and all actions taken pursuant to this article.

(2) Civil penalties.

a. Assessment of penalty. The director may assess civil penalties for violations of this article after providing the violator notice and opportunity to respond described in the procedures set forth in section 70-541. Such penalty, if unpaid within 30 days of notice to the violator that payment is due, may be collected through a civil action in the nature of debt as described in subsection (3) of this section. The director shall apply the standards and criteria set forth in subsections (2)b through (2)d of this section in determining the amount of the penalty.

b. Penalty amounts for properties used for nonresidential purposes. A maximum base penalty of up to $10,000.00 per violation may be assessed for violations occurring on properties used, in whole or in part, for nonresidential purposes or containing nonresidential uses, subject to the following limitations and additions:

1. An additional $10.00 per gallon may be added to the base amount for an illicit discharge to the drainage system that exceeds 1,000 gallons;
2. An additional 25 percent may be added to the base amount for repeat violations; and
3. First-time violations on property, or by a person, shall be limited to $2,000.00 per violation unless the property or person is an industrial activity subject to NPDES requirements.

c. Penalty amounts for properties used for residential purposes. A maximum base penalty of up to $500.00 per violation may be assessed for violations occurring on properties used entirely for residential purposes, subject to the following limitations and additions:

1. Penalties for blockages of the drainage system shall be limited to $100.00 per violation, except for multifamily residential properties, or when the blockage causes off-site impacts.
2. The maximum base penalty may be doubled for repeat violations.

d. Criteria for assessing penalty. In determining the amount of the penalty, the director shall consider the following factors in addition to any factors set forth in guidelines:

1. The degree and extent of harm to the environment, the public health, public property, and private property;
2. The duration and gravity of the violation;
3. The effect on ground or surface water quality or on air quality or on flood hazard;
4. The cost of rectifying the damage;
5. The amount of money saved by noncompliance;
6. Knowledge of the requirements by the violator, and/or reasonable opportunity or obligation to obtain such knowledge;
7. Whether the violation was willful;
8. Actions taken by the violator to prevent or remediate the impacts;
9. Whether the violation is a repeat violation; and
10. The costs of enforcement to the city.

(3) Judicial actions.

a. Injunction, abatement. The director may institute an action in a court of competent jurisdiction for a mandatory or prohibitory injunction and/or an order of abatement or other equitable remedy that requires, among other things, that action be taken on property to correct a violation. A violator who fails to comply may be cited for contempt, and the city may execute the order under G.S. 160A-175(e). A violator may also be subject to remedies available for a nuisance under G.S. 160A-193 or other law. Costs of prosecution and/or correction and of remediation of the violation may be assessed as a lien on the property upon which the violation has occurred, and collected as unpaid taxes, as provided by law.

b. Criminal prosecution and penalties. Violation of this article shall be a misdemeanor and is subject to the maximum fine permitted under state statutes. Each day of the violation shall be a separate offense and may be punished by imposition of the maximum fine.

c. Collection of civil penalties. Action may be instituted against the violator to recover any civil penalty that has not been paid within 30 days of the date the violator receives notice of the penalty.

(Ord. No. 13342, § 1(23-156), 11-20-2006)

Sec. 70-541. Procedures for notifying violator and meeting with director.

(a) Content of notice.

(1) Except in emergencies, as described hereafter, upon determining that a violation has occurred, the director shall provide to each violator against whom remedial action or penalties may be pursued, written notice that describes:

a. The location of the property and the nature of the violation;
b. A general description of the remedies and penalties that may be incurred if the violation is not corrected;
c. The action needed to correct the violation;
d. The time period during which corrective actions must occur;
e. How to provide explanatory or additional information and a contact person with whom the violation can be discussed;
f. How to request a meeting with the director available for certain violations as described below; and
g. The deadline for providing information or requesting a meeting.

(2) Only one such notice shall be required to each violator, regardless of the number of remedies or penalties that are pursued or the timing of their institution.

(b) Service. The notice shall be placed in an envelope bearing the name of the violator and, in addition, any names of individuals upon whom service is intended. Delivery shall be by one or more of the following methods, as appropriate:

(1) Certified or registered mail, return receipt requested;

(2) Hand delivery to the individual, if the violator is an individual;

(3) Hand delivery to an adult at the business or institutional address of the violator if the violator is an entity;

(4) Any means authorized for the service of documents by Rule 4 of the North Carolina Rules of Civil Procedure; or

(5) First class mail addressed to the violator, if notice of the violation is also posted at the violator's residence or place of business, as may be appropriate.

(c) Delay in imposing certain remedies/penalties. Except in emergencies, as described hereafter, utility service shall not be terminated under section 70-540(1)e., civil penalties shall not be assessed, and judicial action shall not be initiated prior to the expiration of the time period allowed for the violator to correct the violation. The director may extend the times allowed in the written notice for correction of the violation. The extension must be in writing.

(d) Meeting. If the violator makes a timely request for a meeting with the director, during the time period set forth in the notice provided under subsection (a) of this section, such meeting shall be scheduled at a time determined in the discretion of the director prior to terminating utility service under section 70-540(1)e., imposing a civil penalty, or initiating judicial action. The violator shall have the opportunity to present any information relevant to the violation or proposed remedy or penalty at the meeting, in writing or orally.

(e) Additional written notice of termination of utility service or imposition of civil penalties.

(1) Except in emergencies as described hereafter, when the director determines to terminate utility service under section 70-540(1)e., or assess a civil penalty, additional written notice of such proposed action shall be given to the violator. The notice shall contain:

a. Copy of the notice initially given under subsection (a) of this section; and

b. The director's written determination regarding the termination of utility service and/or civil penalties to be assessed and the reasons for such action.

(2) Service on the violator shall be as provided in subsection (a) of this section.

(3) A right to appeal prior to termination of utility services may be available as further provided in the utility payment provisions of this chapter.

(Ord. No. 13342, § 1(23-157), 11-20-2006)

Sec. 70-542. Emergencies.

If delay in correcting a violation would seriously threaten the effective enforcement of this article or pose an immediate danger to the public health, safety, or welfare, or to the waters of the state, then the director may order the immediate cessation of the violation without utilizing the procedures described in section 70-541. Any person ordered to cease such violation or to remedy such violation shall do so immediately. The director may seek immediate enforcement through any remedy or penalty authorized in this article or other applicable law.

(Ord. No. 13342, § 1(23-158), 11-20-2006)

Secs. 70-543--70-551. Reserved.

APPENDIX C
City/County
ENVIRONMENTAL PROTECTIONS STANDARDS
Article 8,
Unified Development Ordinance (UDO)
Revised 2011

Article 8 of the UDO presented on the following pages may also be accessed using the following link: www.durhamnc.gov/udo/.

Ordinance Text that follows includes significant revisions to the riparian buffer protection standards (Section 8.5) adopted by Durham City Council and Durham Board of County Commissioners on November 4 and November 8, 2010, respectively. Changes in buffer protection requirements were required by the Jordan Lake Nutrient Management Strategy rules. The City's proposed buffer protections in the Jordan Lake watershed were approved by the North Carolina Environmental Management Commission on September 9, 2010. Additional changes were made to to enhance tree protection and tree coverage standards (Section 8.3), to encourage protection of existing trees and to establish requirements for the urban tier, and to enhance Wetland Protection Standards, Section 8.9.

Previous revisions:

November, 2009: Section 8.8, Steep Slope Protection Standards, was revised to clarify that a different definition for steep slopes was being used under the Sedimentation and Erosion Control requirements, as required under Session Law 2009-486, which applies to areas draining to Falls Lake. See Appendix D for additional information.

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ARTICLE 8 ENVIRONMENTAL PROTECTION

Sec. 8.1 Purpose

Durham County is endowed with an abundance of natural resources, including land, forests, streams and rivers, lakes, wildlife and natural beauty. Inappropriate development threatens the quality of the natural resources that make it a special place to live and work. Durham's governing bodies recognize that establishing standards for the protection of Durham County's natural resources represents prudent stewardship of the land and good business. The multiple purposes of natural resource protection standards are:

A. To preserve and enhance the quality of the water in rivers, streams, ponds and lakes that flow into and out of Durham County;
B. To minimize future flooding problems by restricting development in flood prone areas;
C. To preserve the water carrying capacity of watercourses and the natural water storage capacity of the floodplain;
D. To protect land and watercourses from pollutants, sedimentation and erosion;
E. To retain open spaces in order to protect their environmentally-sensitive character;
F. To protect and conserve significant natural resources from degradation due to inappropriate development. Such natural resources include Inventory Sites, wildlife and plant life habitats, wetland areas and riparian areas;
G. To minimize the impact of development by controlling the location, intensity, pattern and design of development and construction activities;
H. To enhance the aesthetic appearance of Durham as a means of improving quality of life and attracting new businesses and residents;
I. To improve air quality by reducing the heat island effect; and
J. To protect environmentally sensitive lands while recognizing the legitimate expectations of property owners and Durham's economic development goals.

Sec. 8.2 Exemptions from Environmental Protection Standards

8.2.1 Water Supply Reservoirs

Public water supply reservoirs and associated facilities shall be exempt from the requirements of this Article unless explicitly acknowledged within any section.

Sec. 8.3 Tree Protection and Tree Coverage

8.3.1 Tree Coverage Standards

A. **Purpose**
The primary purpose of the tree coverage standards is the preservation and maintenance of undisturbed tree cover and the provision of replacement tree cover on development sites in the Suburban Tier. Tree coverage serves to reduce glare, noise, air pollution, and soil erosion; to moderate temperatures; to reduce stormwater runoff; to preserve remnants of Durham's native ecology; to provide habitat for native plants and wildlife; to provide a healthy living environment; and to make Durham County a more attractive place to live.

B. Applicability

1. Tree coverage standards shall only be applied in the Urban and Suburban Tiers.
2. Developments in the RR and RS-20 Districts, and developments of less than four acres in size in the Urban Tier, shall be exempt from tree coverage requirements provided enforceable assurances are provided that no mass grading as defined in Sec. 16.3, Defined Terms, or clear-cutting as defined in paragraph 8.3.4, Clear-Cutting, will be utilized during the development process.
3. No tree coverage is required in non-residential districts in the Urban Tier.
4. Additions to existing residential structures, excluding multiplexes and apartments, are exempt from tree coverage requirements.

C. Tree Coverage

1. New development shall include tree coverage areas on a portion of the development tract.
2. Additions to development existing as of the effective date of this Ordinance shall provide tree coverage as a percentage of the area proposed for disturbance.
3. **Locations**
   a. Tree coverage areas in new subdivisions shall be located in common open space or buffers required by other provisions of this Ordinance, except that new subdivisions without the buffers that make payment in lieu of required open space under Section 7.2.2, Required Open Space, may locate tree coverage areas on private lots or as otherwise specified as below.
   b. Any forested land in the floodway, non-encroachment area, floodway fringe, non-encroachment area fringe, or Area of Shallow Flooding (Zone AO) (unless proposed to be filled or developed in accordance with Sec. 8.4.4, Development in Special Flood Hazard Areas and Future Conditions Flood Hazard Areas), preserved wetlands and wetland buffers, steep slope areas, stream buffers, Durham Natural Inventory Sites, Major Transportation Corridor (MTC) buffers, and any portion of the tract left undisturbed in order to create required perimeter buffers that satisfies the minimum size requirements established in Sec. 8.3.1D , Preserved Tree Coverage, or Sec. 8.3.1E, Replacement Tree Coverage, below may be used as tree cover.

4. Tree coverage standards may be met either by preserving existing trees on the site, by planting replacement trees, or a combination of both.

   a. Suburban Tier
   The percentage of a tract which shall have tree coverage is as indicated in the table below. The total tree coverage area shown reflects the addition of replacement tree coverage area to the preserved tree coverage area shown.

Residential Development	
Preserved Tree Coverage Area (%)	**Total Tree Coverage Area Required (%)**
20	20
At least 15 but less than 20	23
At least 10 but less than 15	24
Less than 10	25
Nonresidential Developments	
Preserved Tree Coverage Area (%)	**Total Tree Coverage Area Required (%)**
10	10
At least 8 but less than 10	13
At least 6 but less than 8	14
Less than 6	15

b. Urban Tier
Developments in residential districts in the Urban Tier shall provide a minimum 3% tree coverage.

5. For the purposes of calculating tree coverage requirements, the water surface area of ponds, lakes and other water bodies (excluding stormwater control structures) shall be excluded from the total land area of the development tract.
6. Tree preservation and tree replacement areas shall be shown on all preliminary plats, final plats, site plans and development plans in order to clearly assign tree replacement responsibility to future owners. Tree preservation and tree replacement areas on any individual lot shall be clearly shown on all plot plans for the lot.
7. Property owners shall be responsible for protecting and preserving tree preservation and tree replacement areas during and after the development process in accordance with standard horticultural practice and Sec. 8.3.2, Protection of Existing Vegetation.

D. **Preserved Tree Coverage**
Areas proposed as tree preservation shall meet the following requirements to satisfy the tree coverage standards in Sec. 8.3.1, Tree Coverage an Protection Standards:
1. The provisions of Sec. 8.3.2, Protection of Existing Vegetation, shall be fulfilled.
2. Tree preservation areas shall be located in the areas listed in Sec. 8.3.1, Tree Coverage Standards, above. Additional tree preservation areas may be located outside of these areas, in which case they shall be located in order to preserve specimen trees and to preserve clusters of trees that add to the aesthetic quality of the development as viewed from the public right-of-way.
3. **Clusters of Trees**
   a. The tree coverage area for a cluster of trees shall be determined by the exterior boundary of the total root protection zones for all of the trees in the cluster.
   b. For parcels greater than one acre, no tree preservation area for a cluster of trees may be counted toward meeting the tree coverage standard unless it

includes a minimum of 1,000 square feet (or such smaller area as required by paragraph 8.3.1C.4 above) and has no individual dimension of less than 13 feet. The area protected must include the entire root protection zone of the tree cluster, and adequate tree protection measures, as defined in paragraph 8.3.2, Protection of Existing Vegetation, must be taken during the construction and grading of the project.

c. For parcels one acre or less, no single tree preservation area for a cluster of trees may be counted toward meeting the tree coverage standard unless it includes a minimum of 500 square feet (or such smaller area as required by paragraph 8.3.1C.4 above) and has no individual dimension less than 13 feet.
d. At least 60% of the tree coverage included within any tree preservation area shall be composed of trees with at least a two inch dbh as determined through use of landscape sampling pursuant to Sec. 9.3.3, Sampling.
e. At least 75% of the root protection zone for a cluster of trees shall be located on the subject site for it to be considered a protected cluster.

4. **Individual Trees**
   a. The tree coverage area for an individual tree shall be determined by the tree's root protection zone.
   b. At least 75% of the root protection zone for an individual tree shall be located on the subject site in order for that tree to count as preserved.
   c. An individual tree may be counted toward tree coverage credit provided that its diameter is eight inches dbh or greater.

5. **Construction in Preserved Tree Coverage Area**
   a. Preserved tree coverage areas shall not be used for active recreational purposes, except for the following:
      1. Unpaved walking paths and foot trails constructed with minimal disturbance of tree roots and existing vegetation. No tree eight inches dbh or greater shall be removed for the construction of trails.
      2. Paved trails that are public trails and are shown on the most recent version of the Durham Trails and Greenways Plan. No tree eight inches dbh or greater shall be removed for the construction of the trail without approval from the Planning Director or designee. In no case shall the clearing of the trail corridor exceed 16 feet in width.
      3. Amenity areas containing such items as picnic tables and benches provided that such areas are unpaved and no larger than 200 square feet or 10% of the tree coverage area, whichever is smaller. No tree eight inches dbh or greater shall be removed for the construction of an amenity area.
   b. All buildings, utilities, and stormwater facilities shall be set back at least 10 feet from the edge of any preserved tree coverage area. No easements, except conservation, greenway, and landscape easements, shall be included within a tree coverage area.

E. Replacement Tree Coverage

Areas proposed as tree replacement shall meet the following requirements to satisfy the standards found in Sec. 8.3.1C, Tree Coverage:

1. For parcels greater than one acre, no tree replacement area may be counted toward meeting the tree coverage standard unless it includes a minimum of 1,000 square feet (or such smaller area as required by paragraph. 8.3.1C.4 above) and has no individual dimension of less than 25 feet.
2. For parcels one acre or less, no tree replacement area may be counted toward meeting the tree coverage standard unless it includes a minimum of 500 square feet (or such smaller area as required by paragraph 8.3.1C.4 above) and has no individual dimension less than 15 feet.
3. When replacement trees are provided in order to satisfy the requirements of Sec. 8.3.1C, Tree Coverage, coverage credit shall be accrued in accordance with the following table with credit calculated based on the required planting area for the proposed trees up to a maximum credit for any single tree of 275 square feet.

Hardwood Caliper (inches)	**Non-Hardwood Height (feet)**	**Credit (square feet)**
4	18 or over	275
3-1/2	16 to 18	250
3	14 to 16	225
2-1/2	12 to14	200
2	10 to12	175
1-1/2	8 to 10	150
1	7 to 8	100
0.75	5 to 7	75
Less than 0.75	Less than 5	No credit

EXAMPLE: *10 trees at 2-1/2-inch caliper requires 2,000 square feet of planting area, and provides 2,000 square feet of replacement tree credits.*

4. At least 50% of replacement trees shall be one inch caliper or greater.
5. A minimum of 50% of replacement trees shall be large, maturing, hardwood species native to Durham County. The remainder of the replacement trees shall be a mix of canopy and understory hardwood and non-hardwood species native to Durham County, as long as no more than 50% of this remainder are pines. Replacement trees shall be provided as a mix of species, in accordance with the standards set in paragraph 9.2.3B.5, Mixing of Tree Species.
6. At least 75% of the replacement trees planted to augment preserved tree coverage clusters pursuant to paragraph 8.3.1.3.f shall be native understory hardwoods of one inch caliper or greater.
7. Where evidence can be provided that a development tract has been in continuous agricultural use since January 1, 1980, the tree coverage standard indicated in Sec. Sec. 8.3.1C, Tree Coverage, may be reduced by the proportion of the entire development tract that is in such agricultural use, up to 33%. Such portion of the tract shall not be required to remain in agricultural use upon approval of a site plan by the approving authority. Tree coverage requirement reductions under this paragraph shall not apply to nonresidential development.

EXAMPLE: *A 100 acre site in the Suburban Tier is to be developed as single-family housing. Twenty percent of the site is currently in agricultural use. Therefore, instead of the 20% tree coverage requirement, the overall site is only required to provide 16% tree coverage.*

8. Areas designated as replacement tree coverage shall be subject to the use limitations imposed on preserved tree coverage in Sec. 8.3.1D.5, Construction in Preserved Tree Coverage Areas, except that stormwater control measures designed as bioretention facilities shall be allowed.
9. Replacement trees shall be planted before any Certificate of Compliance is issued, unless the planting has been deferred to an appropriate season in accordance with the requirements of Sec. 9.11.2, Extensions for All Other Development.

8.3.2 Protection of Existing Vegetation

Any trees preserved on a development tract in order to meet Ordinance requirements or otherwise indicated to be preserved shall meet the following protection standards.

A. Protection measures to be used during grading and construction, including details of the tree protection fence(s) and its location(s), shall be shown on the site, landscape, grading, utility, demolition, and erosion control plans.
B. Root protection zones shall be established around all trees to be preserved. The root protection zone shall either be a six-foot radius around the tree or a one foot radius for every inch of tree dbh, whichever is greater.
C. A tree protection fence constructed of a material resistant to degradation by sun, wind, and moisture for the duration of the construction, shall be installed at the same time as the erosion control measures, and shall remain in place until all construction is complete. Such fencing shall be mounted on metal posts placed no further than ten feet apart. Silt fencing shall not serve as tree protection fencing except in unusual circumstances, such as when topography limits the area available for installation of both tree protection fencing and erosion control measures.
D. At the start of grading involving the lowering of the existing grade around a tree or stripping of topsoil, a clean, sharp, vertical cut shall be made at the edge of the tree save area at the same time as other erosion control measures are installed. Tree protection fencing shall be installed on the side of this cut farthest away from the tree trunk. This procedure shall be incorporated as a note on the grading and erosion control plans.
E. No storage of materials, dumping of waste materials, fill, or parking of equipment shall be allowed within the root protection zone, and no trespassing shall be allowed within the boundary of the root protection zone, and shall be so noted on the grading and erosion control plans and posted at each end of the tree protection fence with perimeter signs spaced a maximum of 100 feet on center thereafter. Each sign shall read "no trespassing/tree protection area" and "prohibido entrar/zona protectora para los arboles".

8.3.3 Tree Survey

A. **Purpose**
The primary purpose of the tree survey requirements is to provide better information about the presence and location of significant trees on sites proposed for development. This information is needed before plans for development are so far advanced that it is unreasonable and impractical to modify the plans to protect the trees identified on the tree survey. Knowing the location and size of specimen trees helps the staff and governing body evaluate possible modifications to the proposed plans to preserve significant trees and improve the appearance of proposed development.

B. **General Tree Survey**
For a development plan showing building envelopes rather than building footprints, a generalized survey describing existing forest stands, indicating the range of species and approximate size of trees on the tract, shall be provided.

C. Specimen Tree Survey

1. A specimen tree survey shall be required for any development plan showing specific building footprints, site plan, or preliminary plat.
2. The specimen tree survey shall show the general location, species and size of any specimen tree, which shall be defined as all trees other than trees of the Pinus genus greater than 18 inches dbh. specimen tree of the Pinus genus shall only be considered significant and required to be shown on tree surveys in the Rural Tier.
3. A specimen tree survey shall not be required for land in the floodway, non-encroachment area, floodway fringe, non-encroachment area fringe, or Area of Shallow Flooding (Zone AO) (unless proposed to be filled or developed in accordance with Sec. 8.4.4, Development in Special Flood Hazard Area and Future Conditions Flood Hazard Areas), preserved wetlands and wetland buffers, steep slope areas, stream buffers, Major Transportation Corridor (MTC) buffers, and, if preserved, Durham Natural Inventory Sites.

D. Land Disturbance Tree Survey

1. A land disturbance tree survey shall be required for any site plan, preliminary plat, grading plan, or erosion control plan.
2. The land disturbance tree survey shall show the location, species, size and root protection zone of any tree greater than 10 inches dbh that is within a tree protected area and within 30 feet of any area proposed for disturbance. For the purpose of this paragraph, a tree protected area shall include any floodplain, steep slope area, stream buffers, required landscape buffers, tree coverage areas, Inventory sites, or wetlands. In a conservation subdivision under Sec. 6.2.4, Conservation Subdivision, a protected area shall also include any other primary or secondary conservation area.

8.3.4 Clear-Cutting

A. **Standard**
Properties shall not be clear-cut during the conduct of forestry activities. To maintain the visual character of the site from adjoining properties and right-of-way, a vegetated perimeter buffer shall be maintained while tree harvesting for forestry occurs. A 32-foot wide buffer of naturally existing vegetation shall be maintained along all boundaries of the property being forested that adjoin other

properties. Along public rights-of-way, a 50-foot buffer of naturally existing vegetation shall be maintained, exclusive of areas required for access to the site.

B. Penalties

1. **City**
   Site plans proposing development of properties that failed to maintain such a buffer during forestry activities shall be denied for a period of five years from the date of clearing.
2. **County**
   Site plans proposing development of properties that failed to maintain such a buffer during forestry activities shall be denied for a period of three years from the date of clearing.

Sec. 8.4 Floodplain and Flood Damage Protection Standards

8.4.1 Purpose

The primary purpose of the floodplain and flood damage protection standards is to preserve and maintain the natural floodplain in an undisturbed vegetated state in order to maintain flood storage capacity, control stormwater, improve water quality and conserve plant and wildlife habitat. Additionally, these standards serve to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas.

In addition, this section serves to facilitate implementation of the Federal Flood Insurance Program and to minimize the possibility that new construction will sustain damage from flooding by:

A. Restricting or prohibiting uses that are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
B. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
C. Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
D. Controlling filling, grading, dredging, or other development that may increase erosion or flood damage;
E. Preventing or regulating the construction of flood barriers that unnaturally divert flood waters or that may increase flood hazards to other lands;
F. Minimizing damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets and bridges located in areas of special flood hazard; and
G. Ensuring that property owners and potential property owners are notified that property is a Special Flood Hazard Area or Future Conditions Flood Hazard Area.

Commentary: Losses in floodprone areas are the result of the cumulative effects of obstructions, removal of vegetative cover, and construction practices that cause an increase in flood heights and velocities. Increased flood heights and velocities create a greater threat to land uses and structures that are inadequately elevated, floodproofed, or are otherwise unprotected from flood damage. Occupancy in flood prone areas by uses vulnerable to floods or other hazards can result in loss of life, property, health and safety hazards, disruption of commerce

and governmental services, extraordinary public expenditures of flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering consideration. Larger floods can and will occur. Actual flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the Special Flood Hazard Areas and Future Conditions Flood Hazard Areas or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of Durham City or County or by any officer or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

8.4.2 Applicability

This section shall apply to all Special Flood Hazard Areas and Future Conditions Flood Hazard Areas within the City and County of Durham as identified by the Federal Emergency Management Agency (FEMA) or produced under the Cooperating Technical State (CTS) agreement between the State of North Carolina and FEMA in its Flood Hazard Boundary Map (FHBM) or Flood Insurance Study (FIS) and its accompanying flood maps, such as the Flood Insurance Rate Map(s) (FIRM) and/or the Flood Boundary Floodway Map(s) (FBFM), for Durham County dated May 2, 2006; February 2, 2007; April 16, 2007; June 4, 2007; August 2, 2007; or May 16, 2008, are adopted by reference and declared to be a part of this ordinance. Also adopted by reference and declared to be a part of this ordinance are associated Physical Map Revisions and Letters of Map Change issued by FEMA as of [date on which ordinance has been adopted by both governing bodies]. The Special Flood Hazard Areas and Future Conditions Flood Hazard Areas also include those defined through standard engineering analysis for private developments or by governmental agencies, but which have not yet been incorporated in the FIRM. This includes, but is not limited to, detailed flood data:

1. generated as a requirement of Sec. 3.22.2.B (11 & 12), Duties and Responsibilities;
2. preliminary FIRMs where more stringent than the effective FIRM; or
3. post-disaster Flood Recovery Maps.

8.4.3 Standards

A. **General**

In all Special Flood Hazard Areas and Future Conditions Flood Hazard Areas the following provisions are required:

1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure;
2. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage;
3. All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damages;

4. Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. These include but are not limited to HVAC equipment, water softener units, bath/kitchen fixtures, ductwork, electric meter panels/boxes, utility/cable boxes, appliances (i.e., washers, dryers, refrigerator, etc.), hot water heaters, electric outlets/switches;
5. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
6. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters;
7. On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding;
8. Any alteration, repair, reconstruction, or improvements to a structure which is in compliance with the provisions of this ordinance, shall meet the requirements of new construction; and
9. New solid waste disposal facilities and sites, hazardous waste management facilities, salvage yards, and chemical storage facilities shall not be permitted. A structure or tank for chemical or fuel storage incidental to an allowed use or to the operation of a water treatment plant or wastewater treatment facility may be located in a Special Flood Hazard Area only if the structure or tank is either elevated or floodproofed to at least the regulatory flood protection elevation and certified according to the certification requirements in Sec. 3.22, Floodplain Development Permit.
10. Fill material shall be used for all new construction and substantial improvements to create an elevation that is two feet above base flood elevation, or future conditions flood elevation, except as otherwise authorized pursuant to 8.4.4, Development in Special Flood Hazard Areas and Future Conditions Flood Hazard Areas. The fill material shall be required to extend for a distance of 40 feet from the exterior walls of a building. Where the distance to the property line is less than 40 feet, the fill shall extend to the property line. The required fill material distance shall include a sloped edge with a maximum 3:1 slope [for example, for a fill three feet deep: 31 feet of flat fill plus nine feet of sloped fill] or a retaining wall in lieu of the slope [for example, a side yard of flat fill and a retaining wall]. Residential accessory structures which are defined as nonhabitable structures by the North Carolina Building Code are exempt from requirements to extend the fill material away from the base but are required to be placed on fill which is two feet, or five feet in Zone A, above base flood elevation. Exceptions from any of these requirements resulting from special storm water considerations shall be forwarded to the approving authority, if other than the Floodplain Administrator, with a recommendation from the Floodplain Administrator.

B. **Specific Standards**

In all Special Flood Hazard Areas where Base Flood Elevation (BFE) data has been provided and in Future Conditions Flood Hazard Areas where future conditions flood elevations data has been provided, as set forth in Sec. 8.4.2, Applicability,

or Sec. 3.24.2.B (11 & 12), Duties and Responsibilities, the following provisions are required:

1. **Subdivisions**
    1. Land in the Special Flood Hazard Areas and Future Conditions Flood Hazard Areas may be used for the following purposes, provided that such uses are designed and constructed to minimize clearing, grading, erosion and water quality degradation and are in compliance with the Sec. 8.4, Floodplain and Flood Damage Protection Standards. Land within Special Flood Hazard Areas and Future Conditions Flood Hazard Areas shall not serve to meet minimum lot size requirements, except in the Rural Tier and on property zoned RR or RS-20 in the Suburban Tier where at least 50% of the required lot area is located outside the floodway or non-encroachment area or floodway fringe.
    2. When permitted, development proposals located within Special Flood Hazard Areas shall:
        1. be consistent with the need to minimize flood damage;
        2. have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
        3. have adequate drainage provided to reduce exposure to flood hazards; and,
        4. have Base Flood Elevation (BFE) data provided if development is greater than the lesser of five (5) acres or fifty (50) lots/manufactured home sites. Such Base Flood Elevation (BFE) data shall be adopted by reference per Sec. 8.4.2, Applicability, to be utilized in implementing this code.

2. **Residential Construction**
   New construction or substantial improvement of any residential structure (including manufactured homes) shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation.
3. **Non-Residential Construction**
   New construction or substantial improvement of any commercial, industrial (other than hazardous, solid waste, salvage yards, chemical storage facilities or similar uses which are prohibited) or other non-residential structure shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation. Structures located in AE and X (Future) Zones may be floodproofed to the regulatory flood protection elevation in lieu of elevation provided that all areas of the structure below the required flood protection elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification shall be provided to the official

as set forth in the certification requirements in Sec. 3.22, Floodplain Development Permit.

4. **Manufactured Homes**
    1. New or replacement manufactured homes shall be elevated so that the reference level of the manufactured home is no lower than the regulatory flood protection elevation.
    2. Manufactured homes shall be securely anchored to an adequately anchored foundation to resist flotation, collapse, and lateral movement in accordance with the State of North Carolina Regulations for Manufactured/Mobile Homes, 1995 Edition, and any revision thereto adopted by the Commissioner of Insurance pursuant to NCGS §143-143.15 or a certified engineered foundation. Additionally, when the elevation would be met by an elevation of the chassis thirty-six (36) inches or less above the grade at the site, the chassis shall be supported by reinforced piers or other foundation elements of at least equivalent strength. When the elevation of the chassis is above thirty-six (36) inches in height, an engineering certification is required.
    3. All foundation enclosures or skirting shall be in accordance with Sec. 8.4.3.B.5, Elevated Buildings.
    4. All new, substantially improved or substantially damaged manufactured home parks or subdivisions located within Special Flood Hazard Areas shall prepare an evacuation plan for evacuation of all residents. The plan shall be filed with the Inspections Director, or designee (as the Floodplain Administrator) and the Emergency Management Coordinator prior to the time of site plan approval, plat approval, or building permit, if site plans or plats are not required.

5. **Elevated Buildings**

    New construction or substantial improvements of elevated buildings that include fully enclosed areas that are below the regulatory flood protection elevation shall not be designed to be used for human habitation, but shall be designed to be used only for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises, be constructed entirely of flood resistant materials below the regulatory flood protection level in Zone AE and X Zone (Future) and meet the following design criteria:
    1. Measures for complying with this requirement shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. To meet this requirement, the foundation must either be certified by a professional engineer or architect or meet the following minimum design criteria:
        1. Provide a minimum of two openings on different sides of each enclosed area subject to flooding.
        2. The total net area of all openings must be at least one (1) square inch for each square foot of each enclosed area subject to flooding.

3. If a building has more than one enclosed area, each area must have openings on exterior walls to allow floodwater to directly enter;
4. The bottom of all required openings shall be no higher than one (1) foot above the adjacent grade; and
5. Openings may be equipped with screens, louvers, or other opening coverings or devices provided they permit the automatic flow of floodwaters in both directions. For purposes of this provision, vinyl or sheet metal skirting shall not be considered an enclosure for regulatory and flood insurance rating purposes and therefore shall not require hydrostatic openings.

2. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be partitioned or finished into separate rooms, except to enclose **storage areas.**

6. Additions/Improvements

1. Additions and/or improvements to pre-FIRM structures when the addition and/or improvements in combination with any interior modifications to the existing structure are:
    1. not a substantial improvement the addition and/or improvements must be designed to minimize flood damages and must not be any more non-conforming than the existing structure; or
    2. a substantial improvement, the existing structure and the addition and/or improvements must comply with the standards for new construction.
2. Additions to post-FIRM structures with no modifications to the existing structure shall require only the addition to comply with the standards for new construction.
3. Additions and/or improvements to post-FIRM structures whereas the addition and/or improvements in combination with any interior modifications to the existing structure are:
    1. not a substantial improvement, the addition and/or improvements only must comply with the standards for new construction; or
    2. a substantial improvement, the existing structure and the addition and/or improvements must comply with the standards for new construction.
4. Where a fire wall or independent perimeter load-bearing wall is provided between the addition and the existing building, the addition(s) shall be considered a separate building and only the addition must comply with the standards for new construction.
5. Manufactured homes, except replacement manufactured homes located in an existing manufactured home park or subdivision, shall not be permitted in the floodway or non-encroachment area. Permitted manufactured homes shall be subject to the non-

encroachment standards of Sec. 8.4.3E, Floodway and Non-Encroachment Areas.

7. **Recreational Vehicles**
   Recreational vehicles shall not be located within Special Flood Hazard Areas for 180 days or more and shall be licensed and ready for highway use (on wheels attached to a site by quick-disconnect type utilities with no permanently attached additions). Recreational vehicles not meeting these standards shall meet the standards of manufactured homes above.
8. **Temporary Structures**
   Prior to the issuance of a floodplain development permit for a temporary structure, Applicants must submit to the Floodplain Administrator a written plan for the removal of such structure(s) in the event of a hurricane or flash flood warning notification. The plan must include the following information:
   1. a proposed time period for which the temporary use will be permitted;
   2. the name, address, and phone number of the individual responsible for the removal of the temporary structure;
   3. the time frame prior to the event at which a structure will be removed (i.e. minimum of 72 hours before landfall of a hurricane or immediately upon flood warning notification);
   4. a copy of the contract or other suitable instrument with a trucking company to ensure the availability of removal equipment when needed; and
   5. designation, accompanied by documentation, of a location outside the Special Flood Hazard Area or Future Conditions Flood Hazard Area to which the temporary structure will be moved.
9. **Accessory Structures**
   When accessory structures (sheds, detached garages, etc.) are to be placed within a Special Flood Hazard Area or Future Conditions Flood Hazard Area, the following criteria shall be met:
   1. Accessory structures shall not be used for human habitation (including work, sleeping, living, cooking or restroom areas);
   2. Accessory structures shall be designed to have low flood damage potential;
   3. Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters;
   4. Accessory structures shall be firmly anchored in accordance with Sec. 8.4.3, General;
   5. All service facilities such as electrical and heating equipment shall be installed in accordance with Sec. 8.4.3, Specific Standards;
   6. Openings to relieve hydrostatic pressure during a flood shall be provided below regulatory flood protection elevation in conformance elevated building requirements in Sec. 8.4.3, Standards; and
   7. An accessory structure with a footprint less than 150 square feet does not require an elevation or floodproofing certificate. Elevation or floodproofing certifications are required for all other accessory

structures in accordance with the certification requirements in Sec. 3.22, Floodplain Development Permit.

C. **Floodplains without Base Flood Elevations**

Within the Special Flood Hazard Areas established in Sec. 8.4.2, Applicability, where no Base Flood Elevation (BFE) data has been provided, the following provisions shall apply:

1. No encroachments, including fill, new construction, substantial improvements or new development shall be permitted within a distance of 20 feet each side from top of bank or five times the width of the stream whichever is greater, unless certification with supporting technical data by a registered professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.
2. The BFE used in determining the regulatory flood protection elevation shall be determined based on one of the following criteria set in priority order:
   a. If Base Flood Elevation (BFE) data is available from other sources, all new construction and substantial improvements within such areas shall also comply with all applicable provisions of this ordinance and shall be elevated or floodproofed in accordance with standards in Sec. 8.4.3 (A & B).
   b. All subdivision, manufactured home park and other development proposals shall provide Base Flood Elevation (BFE) data if development is greater than five (5) acres or has more than fifty (50) lots/manufactured home sites. Such Base Flood Elevation (BFE) data shall be adopted by reference per Sec. 8.4.2, Applicability, to be utilized in implementing this ordinance.
   c. When Base Flood Elevation (BFE) data is not available from a Federal, State, or other source as outlined above, the reference level shall be elevated to or above five feet above the highest adjacent grade.

D. **Floodplains with Base Flood Elevations but no Established Floodway or Non-Encroachment Areas**

Along rivers and streams where Base Flood Elevation (BFE) data is provided but neither floodway nor non-encroachment areas are identified for a Special Flood Hazard Area on the FIRM or in the FIS, no encroachments, including fill, new construction, substantial improvements, or other development, shall be permitted unless certification with supporting technical data by a registered professional engineer is provided demonstrating that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

E. **Floodway and Non-Encroachment Areas**

Located within the Special Flood Hazard Areas established in Sec 8.4.2, Applicability, are areas designated as floodways or non-encroachment areas, which are extremely hazardous due to the velocity of floodwaters that have erosion potential and carry debris and potential projectiles. In such areas no encroachments, including fill, new construction, substantial improvements, or other development shall be permitted unless the Federal Emergency Management Agency (FEMA) authorizes conditional approval of the proposed encroachment via a Conditional Letter of Map Revision (CLOMR) or a professional engineer registered in the State of North Carolina certifies that such uses will result in no increases in flood levels during the occurrence of a base flood, as demonstrated through

hydrologic and hydraulic analysis performed in accordance with standard engineering practice if required by the Floodplain Administrator.

F. **Standards for Areas of Shallow Flooding (Zone AO)**
Located within the Special Flood Hazard Areas established in Sec 8.4.2, Applicability, are areas designated as shallow flooding areas. These areas have special flood hazards associated with base flood depths of one (1) to three (3) feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and indeterminate. In addition to the general standards in 8.4.3.A, all new construction and substantial improvements shall meet the following requirements.
   1. The reference level shall be elevated at least as high as the depth number specified on the Flood Insurance Rate Map (FIRM), in feet, plus a freeboard of 2 feet, above the highest adjacent grade; or at least five feet above the highest adjacent grade if no depth number is specified.
   2. Non-residential structures may, in lieu of elevation, be floodproofed to the same level as required in Sec. 8.4.3.F.1 so that the structure, together with attendant utility and sanitary facilities, below that level shall be watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. Certification is required as per Sec. 3.22.6, Certification Requirements, and Sec. 8.4.3.B.3, Non-Residential Construction.
   3. Adequate drainage paths shall be provided around structures on slopes, to guide floodwaters around and away from proposed structures.

8.4.4 Development in Special Flood Hazard Areas and Future Conditions Flood Hazard Areas

Development and land disturbing activity within Special Flood Hazard Areas and Future Conditions Flood Hazard Areas shall be prohibited, except as provided below. The Floodplain Administrator and the governing bodies shall not approve development that is located below the regulatory flood protection elevation if such development is otherwise required to be located at or above the regulatory flood protection elevation or is not permitted within the Special Flood Hazard Areas or Future Conditions Flood Hazard Areas. Development addressed under Sec. 8.4.3C, Floodplains without Base Flood Elevations, and Sec. 8.4.3 D, Floodplains with Base Flood Elevations but no Established Floodway or Non-Encroachment Areas, shall be deemed floodway development for purposes of this section.

A. **Development Allowed**
Land in Special Flood Hazard Areas may be used for the following purposes, with no special approvals required:
   1. Agricultural uses, including active agriculture, pasture forestry, wildlife sanctuary, game farms, and similar uses; and
   2. Lawns and gardens.

B. Development Requiring Floodplain Administrator Approval
   1. Development of one single-family or duplex residence on a single lot of record that exists as of January 1, 2006, may utilize fill, pursuant to a floodplain development permit issued under Sec. 3.22, Floodplain Development Permit, in the floodway fringe, non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO) if the Floodplain Administrator determines that:

a. The proposed fill provides for a better balance between overall efficiency of the site design and improved conservation elsewhere on the site than would be possible without intrusion in the floodway fringe, non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO); and
b. The proposed fill represents the minimum amount of floodway fringe, non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO) intrusion to achieve this better balance.

2. Floodproofing or elevation by design in lieu of required fill for new construction or substantial improvements on lots of record that exist as of January 1, 2006 pursuant to a floodplain development permit issued under Sec. 3.22, Floodplain Development Permit. If the Floodplain Administrator approves floodproofed or elevated-by-design construction or improvements rather than use of fill in Zone AE or Zone X (Future), the approval shall specify the minimum foundation opening requirements and limitations on below-BFE enclosures uses, if applicable.

C. Development Requiring Development Review Board Approval

1. Land in Special Flood Hazard Areas or Future Conditions Flood Hazard Areas may be used for the following purposes, provided that the DRB determines that such uses are designed and shall be constructed to minimize clearing, grading, erosion and water quality degradation.
   a. Active and passive recreational activities.
   b. Wetlands constructed or restored for mitigation purposes.
2. Land in the floodway fringe, or non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO) may be used for the following purposes, and may be filled in support of such uses, provided that the DRB determines that such uses are designed and shall be constructed to minimize clearing, grading, erosion and water quality degradation.
   a. Crossings by streets, driveways, pedestrian walkways, and railroads provided that they cross the Special Flood Hazard Areas or Future Conditions Flood Hazard Areas as nearly perpendicular to the stream as possible. Such facilities may run within and parallel to the stream if no other access to the property is feasible.
   b. Intakes, docks, piers, utilities (including water and wastewater treatment, stormwater control and sedimentation and erosion control facilities), bridges, other public facilities and water-dependent structures.
3. Land in the floodway or non-encroachment area may be used for the following purposes, and may be filled in support of such uses, if the certification required under Sec. 8.4.3C, Floodplains without Base Flood Elevations, Sec. 8.4.3D, Floodplains with Base Flood Elevations but no Established Floodway or Non-Encroachment Areas, or Sec. 8.4.3E, Floodway and Non-Encroachment Areas, as appropriate, has been provided, and if the DRB determines that such uses are designed and shall be constructed to minimize clearing, grading, erosion and water quality degradation.
   a. Crossings by streets, driveways, pedestrian walkways, and railroads provided that they cross Special Flood Hazard Areas or Future Conditions Flood Hazard Areas as nearly perpendicular to the stream as possible. Such facilities may run within and parallel to the stream if no other access to the property is feasible.

b. Intakes, docks, piers, utilities (including water and wastewater treatment, stormwater control and sedimentation and erosion control facilities), bridges, other public facilities and water-dependent structures.
c. Other encroachments authorized by FEMA.

D. Development Requiring Governing Body Approval

1. **Fill or Development in the Floodway Fringe or Non-Encroachment Area Fringe**

   Fill or development (e.g., parking or floodproofing or elevation by design) in the floodway fringe, non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO) that is not authorized above is not permitted unless it is in support of otherwise permissible uses and authorized by a major special use permit issued under Sec. 3.9, Special Use Permit, and provided that the appropriate governing body finds that:

   a. The proposed fill or development provides for a better balance between overall efficiency of the site design, and improved conservation elsewhere on the site than would be possible without intrusion into the floodway fringe, non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO); and
   b. The proposed fill or development represents the minimum amount of floodway fringe, non-encroachment area fringe, or Areas of Shallow Flooding (Zone AO) intrusion to achieve this better balance.

   Commentary: *Intrusion within the floodway fringe or non-encroachment area fringe may allow preservation of other significant resources on the site, and the governing body is empowered to review the balancing of these two concepts.*

E. No credit shall be allowed for land in the floodway or non-encroachment area, except in the RR District where 100% density credit may be given for land in the floodway or non-encroachment area in Conservation Subdivisions pursuant to Sec 6.2.4, Conservation Subdivision.
F. The amount of land in the floodway fringe or non-encroachment area fringe may be credited for residential density on adjacent land in the same development at a rate of 50% of that allowed by the zoning, except in the RR District where 100% density credit may be given for land in the floodway fringe or non-encroachment area fringe in Conservation Subdivisions pursuant to Sec 6.2.4, Conservation Subdivision.

Sec. 8.5 Stream Buffer Protection Standards

8.5.1 Purpose Objectives

The primary purpose of the stream buffer protection standards is to maintain land adjacent to streams in a vegetated state in order to enhance and maintain water quality, protect stream channel wetlands, minimize stormwater runoff, reduce sedimentation and erosion, provide nutrient removal, conserve plant and wildlife habitat and protect wildlife movement corridors.

Commentary: *Note that streams may have additional stream buffer requirements in accordance with Sec. 8.7, Watershed Protection Overlay Standards, Section 401*

Water Quality Certification administered by the North Carolina Division of Water Quality, and related requirements within the jurisdiction of the US Environmental Protection Agency and US Army Corps of Engineers.

8.5.2 Applicability

This section shall apply to any person or entity conducting activities within the City or County of Durham, except where such activities are otherwise regulated by the State of North Carolina or the United States. Outside of the Neuse River Basin, activities otherwise regulated by the State include forest harvesting and agricultural activities, activities conducted by a local, state, or federal government, and activities under multiple jurisdictions except where such multiple jurisdictions are the City and County of Durham exclusively. This section shall supersede all locally implemented buffer requirements stated in 15A NCAC 02B .0214 through .0216 as applied to WS-II, WS-III, and WS-IV waters in the Jordan watershed. Where any requirement of this section conflicts with any other valid law, the most stringent requirement shall apply.

The requirements of this section shall apply in all cases, including where State standards are less stringent. Review and approval by the City or County is always required, except in the case of an exempt use, and shall occur pursuant to the applicable process in each case (e.g., Preliminary Plat, Major Site Plan, etc.). Within the Neuse River Basin, final review by the City or County shall occur after any State action is completed.

8.5.3 Definitions

Within the Neuse River Basin, the definitions contained or referenced in 15A NCAC 02B .0233 and .0242 shall apply to this section. Outside of the Neuse River Basin, the definitions contained or referenced in 15A NCAC 02B .0263, .0267, and .0268 shall apply to this section. Such definitions shall supersede any conflicting UDO definition for purposes of this section.

8.5.4 Riparian Buffers Protected

A. **Regulated Activities**

This section shall apply to any activity conducted within any riparian buffer, and to any activity conducted outside of any riparian buffer that has hydrologic impacts upon that buffer in violation of the diffuse flow requirements of paragraph 8.5.5, Diffuse Flow Requirements. There is no disturbed area minimum for regulated activities and they include but are not limited to activities conducted pursuant to building permits. As stated in Sec. 8.5.2, Applicability, compliance with this entire section is required even where State standards are less stringent. Within the Neuse River Basin, final review by the City or County shall occur after any State action is completed.

B. Buffers Protected

1. **General Riparian Buffers**

Riparian buffers as depicted on the table below shall be required adjacent to the following surface waters: intermittent streams; perennial streams; modified natural streams; lakes; and ponds including beaver ponds. The table includes the additional buffer width required for certain surface waters in watershed protection overlays. It does not include the 10-foot setback required under Sec.

8.5.10C below. A lake or pond shall receive the same buffer as the stream to which it is connected at the point of initial connection. A gap of 300 feet or less in a stream, as determined by the City or County, shall receive the same buffer as the upstream portion of such stream.

Commentary: UDO Sec. 16.3, Defined Terms, defines "adjacent" as "[p]roperty abutting directly on the boundary of, touching, or sharing a common point." The applicable state rules define "modified natural stream" as "an on-site channelization or relocation of a stream channel and subsequent relocation of the intermittent or perennial flow as evidenced by topographic alterations in the immediate watershed. A modified natural stream must have the typical biological, hydrological, and physical characteristics commonly associated with the conveyance of water."

Watershed Protection Overlay (Riparian Buffer Widths by Tier and Overlay)														
Key: P = Perennial; I = Intermittent; NA = Not applicable because not located therein; M/LR-A = Lake Mitchie/Little River Critical Area; M/LR-B = Lake Mitchie/Little River Protected Area; E-A = Eno River Critical Area; E-B = Eno River Protected Area; F/J-A = Falls/Jordan Critical Area; F/J-B = Falls/Jordan Protected Area														
Tier	**None**		**M/LR-A**		**M/LR-B**		**E-A**		**E-B**		**F/J-A**		**F/J-B**	
Downtown and Compact Neighborhood														
Stream Type	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Width	50	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Urban														
Stream Type	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Width	50	50	NA	NA	NA	NA	NA	NA	100	50[1]	NA	NA	100	50[1]
Suburban														
Stream Type	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Width	50	50	150	50	150	50	150	50	100	50[1]	150	100	100	50[1]
Rural														
Stream Type	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Width	50	50	150	50	150	50	NA	NA	100	50[1]	150	100	100	50[1]
[1]Stream buffer minimum of 100 feet if a high density option is utilized per Sec. 8.7.2B.1.														

2. **Riparian Reservoir Buffers**
   Riparian buffers shall be required adjacent to reservoirs pursuant to Sec. 8.6, Water Supply Reservoir Buffer.
3. **Riparian Wetland Buffers**
   Riparian buffers shall be required adjacent to wetlands pursuant to Sec. 8.9, Wetlands Protection Standards.

4. Wetlands adjacent to, or within 50 feet of, surface waters shall be considered part of the riparian buffers but are regulated pursuant to 15A NCAC 2B .0230 and .0231, 15A NCAC 2H .0500, 15A NCAC 2H .1300, and Sections 401 and 404 of the Federal Water Pollution Control Act.

C. **Buffer Measurement**

Riparian buffers shall be measured as follows:

1. For intermittent and perennial streams, begin at the top of the bank and extend landward the required distance on all sides of the surface water, measured horizontally on a line perpendicular to a vertical line marking the top of the bank;
2. For ponds, lakes and reservoirs located within a natural drainage way, begin at the normal water level and extend landward the required distance, measured horizontally on a line perpendicular to a vertical line marking the normal water level;
3. Where an intermittent or perennial stream begins or ends, including but not limited to when it goes underground, enters or exits a culvert, or enters or exits a wetland, begin at the top of the bank and extend landward the required distance in a radius around the beginning or end; and

Commentary: The radius requirement does not apply to a continuous stream that flows through a culvert within an existing stream buffer.

4. Where an intermittent, perennial, or modified natural stream contains a gap of 300 feet or less, as determined by the City or County, extend the upstream buffer in a straight line through the gap, or in an alternative manner if approved by the Planning Director or designee, until it meets the downstream buffer.

D. Buffer Identification

1. Riparian buffers shall be clearly indicated on all development plans, site plans, preliminary plats, final plats, sedimentation and erosion control plans, any other plans required before, during, or after construction, and any other documents as required under applicable law or policy.
2. Signs or other mechanisms that clearly demarcate riparian buffer boundaries shall be required for all new development or redevelopment.

    a. Temporary signs shall be installed before clearing and grading begins and maintained until permanent signs are installed. Tree save or silt fencing may be used in lieu of temporary signs with prior approval from the City or County as appropriate.
    b. Permanent signs shall be installed prior to issuance of certificate of occupancy and maintained in perpetuity.
    c. All signs shall be posted at intervals of one per parcel or every 50 feet, whichever is less.
    d. Each sign shall be [at least, City only] 4” by 6” in size, shall face away from the buffer, and shall read “Riparian Buffer – Do Not Disturb Except as Authorized by the City [County] of Durham."

e. All signs must be placed on metal or wood posts installed securely in the ground, except that permanent signs may be placed on permanent fencing along the buffer boundary. If wood posts are used they must be at least 2" x 2" in size and be made of treated wood. Posts must extend a minimum of three feet above ground and be sunk at least two feet below ground

8.5.5 Diffuse Flow Requirements

Diffuse flow shall be maintained in riparian buffers by dispersing concentrated flow prior to its entry into a buffer and reestablishing vegetation as listed below. These requirements apply to all development, including development that does not propose to impact or conduct an activity within a riparian buffer.

A. Concentrated runoff from new ditches or man-made conveyances shall be converted to diffuse flow at non-erosive velocities before the runoff enters a riparian buffer except as authorized under paragraph 8.5.10, Uses.
B. Corrective action to restore diffuse flow shall be taken as necessary and shall be designed to impede the formation of erosion gullies.
C. New stormwater conveyances including drainage ditches, roadside ditches, and stormwater BMPs shall not be allowed in or through riparian buffers except as authorized under paragraph 8.5.10, Uses.

8.5.6 Maps and On-Site Determinations

A. Maps

All of the following maps shall be used to identify surface water subject to the requirements of this section:

1. The most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture, which means the most recent hard copy paper bound map or CD-ROM or PDF of such map; and
2. The most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic map prepared by the United States Geologic Survey (USGS); and
3. Outside of the Neuse River Basin, any map approved by the Geographic Information Coordinating Council, the North Carolina Environmental Management Commission and both governing bodies as more accurate than the maps listed in paragraphs 1 and 2 above. However, such map shall not be used for buffer delineation on projects that are existing and ongoing under Sec. 8.5.7 , Existing Use Exemption.

Surface water shall be deemed present if it is at least approximately shown on any map. If any surface water is depicted differently on different maps, the most restrictive depiction shall apply.

B. On-Site Determinations

1. **Within the Neuse River Basin**
   A landowner or other affected party who believes that surface water is inaccurately depicted shall consult the North Carolina Division of Water Quality (Division) and may request an on-site determination by the Division.

2. **Outside of the Neuse River Basin**
   a. The Division or another party may request an on-site determination by the City or County as appropriate of the specific origination point of a stream where it is in question.
   b. A landowner or other affected party, including the Division, who believes that one or more maps inaccurately depict, or omit based on site-specific evidence, surface water shall consult the City or County as appropriate and may request an on-site determination by the City or County.
   c. When an on-site determination is requested, a City or County representative, or other party authorized or accepted by the City or County, who has successfully completed the Division's *Surface Water Identification Training Certification* course, its successor, or other equivalent training curriculum approved by the Division, shall make the on-site determination following submission of any fees, information or documents required by the City or County. An origination point shall be established using the latest version of the Division publication, *Identification Methods for the Origins of Intermittent and Perennial Streams*.
   d. A City or County representative, or other party authorized or accepted by the City or County, who has successfully completed the training required above may also make either type of on-site determination absent an outside consultation or request.
   e. An on-site determination shall be valid for five years from the date of the determination unless specified otherwise therein.

3. Surface water shown on a map shall be exempt from Sec. 8.5, Riparian Buffer Protection Standards, if it is determined on site to be: 1) a manmade pond or lake located outside of a natural drainage way, meaning the pond or lake is not fed by, and has no direct discharge to, an intermittent or perennial stream; 2) an ephemeral stream; 3) not present on the ground, except for any stream gap of 300 feet or less; or 4) a ditch or other manmade conveyance other than a modified natural stream unless constructed for navigation or boat access.
4. Surface water not shown on a map shall be governed by Sec. 8.5, Riparian Buffer Protection Standards, if it is determined on site to be: 1) a pond or lake located in a natural drainage way, meaning the pond or lake is fed by and has a direct discharge to an intermittent or perennial stream; 2) a perennial stream, including any gap of 300 feet or less; 3) an intermittent stream, including any gap of 300 feet or less; or 4) a modified natural stream, including any gap of 300 feet or less.
5. Despite the provisions of Section 2.4, Board of Adjustment, any dispute shall be referred to the Division Director c/o the 401 Oversight Express Permitting Unit, or its successor, in writing. The Director's determination is subject to review as provided in Articles 3 and 4 of G.S. 150B.

8.5.7 Existing Use Exemption

A. General

This section shall not apply to the portion of a riparian buffer occupied by the footprint of a legal existing and ongoing use. An existing and ongoing use is a use that was present within the riparian buffer as of July 22, 1997 within the Neuse River Basin, or as the effective date of this section outside of the Neuse River Basin, and has continued to exist since that time. Such uses may include but are not limited to agriculture, buildings, industrial facilities, commercial areas, transportation facilities, maintained lawns, utility lines and on-site sanitary sewage systems. A use that converts from an existing and ongoing use to another use shall no longer be exempt. Conversion includes but is not limited to changing an agricultural operation to non-agricultural use, failing to maintain a lawn, or failing to meet the criteria specified below for activities allowed.

B. Exemption Maintained

The following activities do not convert an existing and ongoing use to another use:

1. Activities necessary to maintain a use provided that no impervious surface is added to the riparian buffer where it did not exist as of the applicable date, existing diffuse flow is maintained, and either 1) outside of the Neuse River Basin, the site remains similarly vegetated, or 2) within the Neuse River Basin, no additional vegetation is removed except that grazed or trampled by livestock;
2. Grading and revegetating of the outer 20 feet of a buffer that is not located in a watershed protection overlay, provided that the health of the vegetation in the inner 30 feet of the buffer is not compromised, the ground is stabilized and existing diffuse flow is maintained;
3. Outside of the Neuse River Basin, change of ownership through purchase or inheritance.

C. Outside the Neuse River Basin

Outside of the Neuse River Basin, a project that meets at least one of the following criteria is also existing and ongoing:

1. The project requires a 401 Certification and 404 Permit and they were issued prior to the effective date of this section;
2. The project requires a state permit (e.g., landfill, National Pollutant Discharge Elimination System (NPDES) wastewater discharge, land application of residuals, road construction activity), has started construction or is under contract to start construction, and received all required state permits and certifications prior to the effective date of this section;
3. The project is reviewed through the Clean Water Act Section 404/National Environmental Policy Act Merger 01 Process or its immediate successor and reached agreement with the NC Department of Environment and Natural Resources on avoidance and minimization prior to the effective date of this section; or

4. The project can avoid review under the Clean Water Act Section 404/National Environmental Policy Act Merger 01 Process or its immediate successor due to a Finding of No Significant Impact and received written approval from the City or County as appropriate prior to the effective date of this section.

8.5.8 Piping Streams

Piping of streams is prohibited except where necessary to accomplish a use that is authorized under paragraph 8.5.10, Uses, and approved as required.

Commentary: Approved piping is a use within an existing buffer and the buffer remains in effect. There is no gap in the buffer, so buffer requirements apply along the piped portion of the stream.

8.5.9 Lots and Density Credits

Land within the stream buffer shall not serve to meet minimum lot size requirements, except in the Rural Tier and on property zoned RR or RS-20, in the Suburban Tier, where at least 50% of the required lot area is outside the stream buffer. No credit shall be allowed for land within stream buffers, except in the RR District, where density credits may be given for stream buffers in conservation subdivisions pursuant to Sec. 6.2.4, Conservation Subdivision.

8.5.10 Uses

A. As stated in Sec. 8.5.2, Applicability, compliance with this entire section is required even where State standards are less stringent. Within the Neuse River Basin, final review by the City or County shall occur after any State action is completed.
B. No new clearing, grading, or development shall take place nor shall any new building permits be issued in violation of this section. Parties subject to this section shall abide by all state rules and laws regarding waters of the state including but not limited to 15A NCAC 2B .0230 and .0231, 15A NCAC 2H .0500, 15A NCAC 2H .1300, and Sections 401 and 404 of the Federal Water Pollution Control Act.
C. Buildings and other features that require grading and construction shall be set back at least ten feet from the edge of the riparian buffer.
D. Any use authorized by this section shall be designed, constructed and maintained to minimize the amount of intrusion into the riparian buffer and to minimize clearing, grading, erosion, water quality degradation, and damage to vegetation.
E. Where any use involves temporary land clearing, revegetation shall occur pursuant to an approved vegetation plan. Such plan shall include trees as specified under paragraph 9.2.3B.5, Mixing of Tree Species, and the Durham Landscape Guidelines, planted at a density sufficient to provide 320 trees per

acre at maturity with at least 50% of those trees having the potential of attaining a two and a half inch or greater dbh within seven years.

F. **Use Category Requirements**

1. **Exempt**
   An exempt use may occur without authorization provided it adheres to the limitations contained in the Table of Uses below. In addition, an exempt use shall be designed, constructed, maintained and monitored to minimize soil disturbance and maximize water quality protection.

2. **Allowable**
   An allowable use requires written authorization from the North Carolina Division of Water Quality, City, or County as appropriate and may occur following a finding of "no practical alternatives" and issuance of an Authorization Certificate pursuant to paragraph 8.5.11, No Practical Alternatives/Authorization Certificate.

3. **Allowable with Mitigation**
   An allowable with mitigation use requires written authorization from the North Carolina Division of Water Quality, City, or County as appropriate and may occur following a finding of "no practical alternatives" and issuance of an Authorization Certificate pursuant to paragraph 8.5.11, No Practical Alternatives/Authorization Certificate, and approval of a mitigation strategy pursuant to paragraph 8.5.12, Mitigation.

G. Table of Uses

The following table sets out potential new uses within the riparian buffer, or outside of the buffer with impacts upon the buffer, and categorizes them as exempt, allowable, or allowable with mitigation. The requirements for each category are contained in paragraph F, Use Category Requirements, above. All uses not categorized as exempt, allowable, or allowable with mitigation are prohibited and may not occur within the riparian buffer or outside of the riparian buffer with impacts on the buffer unless a variance is obtained pursuant to paragraph 8.5.13, Variances. Uses include construction, monitoring, and maintenance activities.

Key (see Sec. 8.5.10F, Use Category Requirements): E = Exempt; A = Allowable; AM = Allowable with Mitigation; X or not listed = Prohibited; NA = Not applicable.	
Use	**Category**
Outside of the Neuse River Basin, access trails: pedestrian access trails leading to the surface water, docks, fishing piers, boat ramps, overlooks, view points, and other water dependent activities:	
• Pedestrian access trails that are restricted to the minimum width practicable and do not exceed four feet in width of buffer disturbance, and provided that installation and use does not result in removal of any tree and no impervious surface is added to the riparian buffer.	E
• Pedestrian access trails that exceed 4 feet in width of buffer disturbance, the installation or use results in removal of any tree or impervious surface is added to the riparian buffer.	A
Airport facilities:	
• Airport facilities that impact equal to or less than 150 linear feet or one-third of an acre of riparian buffer.	X
• Airport facilities that impact greater than 150 linear feet or one-third of an acre of riparian buffer.	X
• Outside of the Neuse River Basin, activities necessary to comply with FAA requirements (e.g. radar uses or landing strips).[1]	A
Archaeological activities not covered by another specific use.	E
Bridges not covered by another specific use.	A

Outside of the Neuse River Basin, canoe access provided that installation and use does not result in removal of any tree and no impervious surface is added to the buffer.	E
Dam maintenance activities:	
• Dam maintenance activities that do not cause additional buffer disturbance beyond the footprint of the existing dam or those covered under the U.S. Army Corps of Engineers Nationwide Permit No. 3.	E
• Dam maintenance activities that do cause additional buffer disturbance beyond the footprint of the existing dam or those not covered under the U.S. Army Corps of Engineers Nationwide Permit No.3.	A
Drainage ditches, roadside ditches and stormwater conveyances through riparian buffers:	
• New stormwater flows to existing drainage ditches, roadside ditches, and stormwater conveyances provided flows do not alter or result in the need to alter the conveyance and are managed to minimize the sediment, nutrients and other pollution that convey to waterbodies.	E
• Outside of the Neuse River Basin, realignment of existing roadside drainage ditches retaining the design dimensions, provided that no additional travel lanes are added and the minimum required roadway typical section is used based on traffic and safety considerations.	A
• New (or altered if outside of the Neuse River Basin) drainage ditches, roadside ditches and stormwater outfalls provided that a stormwater management facility is installed to control nutrients as directed by the appropriate jurisdiction and attenuate flow before the conveyance discharges through the riparian buffer.	A
• New drainage ditches, roadside ditches and stormwater conveyances applicable to linear projects that do not provide a stormwater management facility due to topography constraints provided that other practicable BMPs are employed.	AM
Driveway crossings of streams and other surface waters subject to this section:	
• Driveway crossings on single family residential lots that disturb equal to or less than 25 linear feet or 2,500 square feet of riparian buffer.	A
• Driveway crossings on single family residential lots that disturb greater than 25 linear feet or 2,500 square feet of riparian buffer.	A
• In a subdivision that cumulatively disturb equal to or less than 150 linear feet or one-third of an acre of riparian buffer	A
• In a subdivision that cumulatively disturb greater than 150 linear feet or one-third of an acre of riparian buffer	AM
• Outside of the Neuse River Basin, driveway impacts other than crossing of a stream or other surface waters subject to this section.	AM
Fences:	
• Fences on single-family lots provided that disturbance is minimized and installation does not result in removal of any tree (or, within the Neuse River Basin, forest vegetation).	X
• Fences on lands other than single-family lots provided that disturbance is minimized and installation does not result in removal of any tree (or, within the Neuse River Basin, forest vegetation).	X
• Outside of the Neuse River Basin, fences provided that disturbance is minimized and installation results in removal of any tree.	X
Fertilizer application: one-time application only, to establish vegetation.	E
Forest harvesting as regulated by the State of North Carolina pursuant to 15A NCAC 02B .0233 and 15A NCAC 02B .0267.	Per State Regulation
Greenway / hiking trails designed, constructed and maintained to maximize nutrient removal and erosion protection, minimize adverse effects on aquatic life and habitat, and protect water quality to the maximum extent practical.	A
Historic preservation not covered by another specific use.	E
Landscaping of the outer 20 feet of a riparian buffer in the Urban, Compact Neighborhood, or Downtown Tier that is not located in a watershed protection overlay in accordance with an approved City or County revegetation plan.	E
Maintenance access on modified natural streams: a grassed travel way on one side of the water body when less impacting alternatives are not practical. The width and specifications of the travel way shall be only that needed for equipment access and operation. The travel way shall be located to maximize stream shading.	A
Mining activities:	
• Mining activities that are covered by the Mining Act provided that new riparian buffers that meet the requirements of this section are established adjacent to the relocated channels.	A
• Mining activities that are not covered by the Mining Act OR where new riparian buffers that meet the requirements of this section are not established adjacent to the relocated channels.	AM
• Wastewater or mining dewatering wells with approved NPDES permit.	E
Playground equipment:	
• Playground equipment on single family lots that exist as of adoption of this section provided that installation and use does not result in removal of vegetation.	E
• Playground equipment installed on lands other than single-family lots or that requires removal of vegetation.	X

Within the Neuse River Basin, ponds in natural drainage ways, excluding dry ponds; outside of the Neuse River Basin, ponds created by impounding streams and not used as stormwater BMPs.	
• New ponds provided that a riparian buffer that meets the requirements of this section is established adjacent to the pond.	A
• New ponds where a riparian buffer that meets the requirements of this section is NOT established adjacent to the pond.	AM
Protection of existing structures, facilities and stream banks when this requires additional disturbance of the riparian buffer or the stream channel.	A
Railroad impacts other than crossings of streams and other surface waters subject to this section.	AM
Railroad crossings of streams and other surface waters subject to this section:	
• Railroad crossings that impact equal to or less than 40 linear feet of riparian buffer.	A
• Railroad crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre of riparian buffer.	A
• Railroad crossings that impact greater than 150 linear feet or one-third of an acre of riparian buffer.	AM
Removal of previous fill or debris provided that diffuse flow is maintained and vegetation is restored.	A
Road impacts other than crossings of streams and other surface waters subject to this section.	AM
Road crossings of streams and other surface waters subject to this section:	
• Road crossings that impact equal to or less than 40 linear feet of riparian buffer.	A
• Road crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre of riparian buffer.	A
• Road crossings that impact greater than 150 linear feet or one-third of an acre of riparian buffer.	AM
Outside of the Neuse River Basin, road relocation: Relocation of existing private access roads associated with public road projects where necessary for public safety:	
• Less than or equal to 2,500 square feet of buffer impact.	A
• Greater than 2,500 square feet of buffer impact.	AM
Scientific studies and stream gauging.	E
Within the Neuse River Basin, stormwater management ponds excluding dry ponds:	
• New stormwater management ponds provided that a riparian buffer that meets the requirements of this section is established adjacent to the pond.	A
• New stormwater management ponds where a riparian buffer that meets the requirements of this section is not established adjacent to the pond.	AM
Outside of the Neuse River Basin, stormwater BMPs:	
• Wet detention, bioretention, and constructed wetlands.	AM
Streambank or, outside of the Neuse River Basin, shoreline stabilization.	A
Temporary roads, provided that the disturbed area is restored to pre-construction topographic and hydrologic conditions immediately after construction is complete and replanted immediately with comparable vegetation, except that tree planting may occur during the dormant season. A one-time application of fertilizer may be used to establish vegetation. At the end of five years the restored buffer shall comply with the restoration criteria of paragraph 8.5.12E, Riparian Buffer Restoration or Enhancement.	
• Less than or equal to 2,500 square feet of buffer disturbance and not perpendicular to the stream.	X
• Greater than 2,500 square feet of buffer disturbance and not perpendicular to the stream.	X
• Associated with culvert installation outside of the Neuse River Basin or bridge construction or replacement and not perpendicular to the stream.	X
• Perpendicular to the stream.	A
Temporary sediment and erosion control devices, provided that the disturbed area is restored to pre-construction topographic and hydrologic conditions immediately after construction is complete and replanted immediately with comparable vegetation, except that tree planting may occur during the dormant season. A one-time application of fertilizer may be used to establish vegetation. At the end of five years the restored buffer shall comply with the restoration criteria of paragraph 8.5.12E, Riparian Buffer Restoration or Enhancement.	
• To control impacts associated with uses approved by the appropriate jurisdiction or that have received a variance, provided that sediment and erosion control for upland areas is addressed to the maximum extent possible, outside the buffer.	A
• In-stream temporary erosion and sediment control measures for work within a stream channel that is authorized under Sections 401 and 404 of the Federal Water Pollution Control Act.	A
• In-stream temporary erosion and sediment control measures for work within a stream channel.	A
Utility, electric, aerial, perpendicular crossings of streams and other surface waters subject to this section:[2,3,5]	
• Disturb equal to or less than 150 linear feet of riparian buffer.	E
• Disturb greater than 150 linear feet of riparian buffer.	A
Utility, electric, aerial, other than perpendicular crossings:[2,3,5]	AM
Utility, electric, underground, perpendicular crossings:[3,4,5]	

• Disturb less than or equal to 40 linear feet of riparian buffer.	E
• Disturb greater than 40 linear feet of riparian buffer.	A
Utility, electric, underground, other than perpendicular crossings:[1,4]	E
Utility, non-electric, perpendicular crossings of streams and other surface waters subject to this section.[3,5]	
• Disturb equal to or less than 40 linear feet of riparian buffer with a maintenance corridor equal to or less than 10 feet in width.	A
• Disturb equal to or less than 40 linear feet of riparian buffer with a maintenance corridor greater than 10 feet in width.	A
• Disturb greater than 40 linear feet but equal to or less than 150 linear feet of riparian buffer with a maintenance corridor equal to or less than 10 feet in width.	A
• Disturb greater than 40 linear feet but equal to or less than 150 linear feet of riparian buffer with a maintenance corridor greater than 10 feet in width.	AM
• Disturb greater than 150 linear feet of riparian buffer.	AM
Utility, non-electric, other than perpendicular crossings.[1,4,5]	AM
Vegetation management, pursuant to applicable City or County guidelines.	
• Emergency fire control measures provided that topography is restored.	E
• Planting vegetation to enhance the riparian buffer.	E
• Pruning forest vegetation provided that the health and function of the forest vegetation is not compromised.	E
• Removal of individual trees that are in danger of causing damage to dwellings, other structures or human life, or outside of the Neuse River Basin, are imminently endangering stability of the streambank	E
• Outside of the Neuse River Basin, removal of individual trees that are dead, diseased or damaged.	E
• Removal of poison ivy.	E
• Removal of either 1) within the Neuse River Basin, understory nuisance vegetation, or 2) outside of the Neuse River Basin, invasive exotic vegetation, both as defined in: Smith, Cherri L. 1998. *Exotic Plant Guidelines.* Dept. of Environment and Natural Resources. Division of Parks and Recreation. Raleigh, NC. Guideline #30.	E
Outside of the Neuse River Basin, vehicular access roads leading to water-dependent structures as defined in 15A NCAC 02B .0202, provided they do not cross the surface water and have minimum practicable width not exceeding ten feet.	A
Water dependent structures as defined in 15A NCAC 02B .0202, including their installation, maintenance, use, and removal.	A
Water supply reservoirs:	
• New reservoirs where a riparian buffer that meets the requirements of this section is established adjacent to the reservoir.	A
•New reservoirs where a riparian buffer that meets the requirements of this section is not established adjacent to the reservoir	AM
Water wells:	
• Single family residential water wells.	E
• All other water wells.	A
Wetland, stream and, outside of the Neuse River Basin, buffer restoration:	
• Wetland, stream and buffer restoration that requires NC Division of Water Quality approval for the use of a 401 Water Quality Certification.	E
• Wetland, stream and buffer restoration that does not require Division of Water Quality approval for the use of a 401 Water Quality Certification.	A
Outside of the Neuse River Basin, wildlife passage structures.	A

[1] Provided that:
- No heavy equipment is used.
- Vegetation in undisturbed portions of the buffer is not compromised.
- Felled trees are removed by chain.
- No permanent felling of trees occurs in protected buffers or streams.
- Stumps are removed only by grinding.
- At the completion of the project the disturbed area is stabilized with native vegetation.
- The buffer meets the requirements of Sec. 8.5.5, Diffuse Flow Requirements.

[2]Provided that all of the following BMPs for overhead utility lines are used. If all of these BMPs are not used, then the overhead utility lines shall require a no practical alternative evaluation.
- A minimum zone of 10 feet wide immediately adjacent to the water body shall be managed such that only vegetation that poses a hazard or has the potential to grow tall enough to interfere with the line is removed.
- Woody vegetation shall be cleared by hand. No land grubbing or grading is allowed.
- Vegetative root systems shall be left intact to maintain the integrity of the soil. Stumps shall remain where trees are cut.
- Riprap shall not be used unless it is necessary to stabilize a tower.
- Stumps are removed only by grinding.
- No fertilizer shall be used other than a one-time application to re-establish vegetation.

• Construction activities shall minimize the removal of woody vegetation, the extent of the disturbed area, and the time in which areas remain in a disturbed state.
• Active measures shall be taken after construction and during routine maintenance to ensure diffuse flow of stormwater through the buffer.
• In wetlands, mats shall be utilized to minimize soil disturbance.

[3] Provided that poles or aerial infrastructure, including towers, shall not be installed within 10 feet of a water body absent a no practical alternative evaluation.

[4]Provided that all of the following BMPs for underground utility lines are used. If all of these BMPs are not used, then the underground utility line shall require a no practical alternative evaluation.
• Woody vegetation shall be cleared by hand. No land grubbing or grading is allowed.
• Vegetative root systems shall be left intact to maintain the integrity of the soil. Stumps shall remain, except in the trench where trees are cut.
• Underground cables shall be installed by vibratory plow or trenching.
• The trench shall be backfilled with the excavated soil material immediately following cable installation.
• No fertilizer shall be used other than a one-time application to re-establish vegetation.
• Construction activities shall minimize the removal of woody vegetation, the extent of the disturbed area, and the time in which areas remain in a disturbed state.
• Active measures shall be taken upon completion of construction and during routine maintenance to ensure diffuse flow of stormwater through the buffer.
• In wetlands, mats shall be utilized to minimize soil disturbance.

[5]Perpendicular crossings are those that intersect the surface water at an angle between 75 degrees and 105 degrees.

8.5.11 No Practical Alternatives/Authorization Certificate

A. A person who wishes to undertake a use designated as allowable or allowable with mitigation shall first submit a request for a “no practical alternatives” determination. Within the Neuse River Basin, the request shall be submitted to the North Carolina Division of Water Quality (Division). Outside of the Neuse River Basin, the request shall be submitted to the City or County as appropriate. In the request, the applicant shall certify that the project meets all of the following criteria:
    1. The basic project purpose cannot be practically accomplished to better minimize disturbance, preserve aquatic life and habitat, and protect water quality;
    2. The use cannot practically be reduced in size or density, reconfigured or redesigned to better minimize disturbance, preserve aquatic life and habitat, and protect water quality; and
    3. Best management practices shall be used if necessary to minimize disturbance, preserve aquatic life and habitat, and protect water quality.
B. The applicant shall also submit at least the following information:
    1. The name, address and phone number of the applicant;
    2. The nature of the activity to be conducted by the applicant;
    3. The location of the activity, including the jurisdiction;
    4. A map of sufficient detail to accurately delineate the boundaries of the land to be utilized in carrying out the activity, the location and dimensions of the riparian buffers, and the location and dimensions of any disturbance in riparian buffers associated with the activity;
    5. An explanation of why the activity cannot be practically accomplished, reduced or reconfigured to better minimize disturbance to the riparian buffer, preserve aquatic life and habitat and protect water quality; and
    6. Best management practices proposed to control the impacts associated with the activity.

C. Within 60 days of a complete submission, the appropriate jurisdiction (the Division acting pursuant to 15 NCAC 02B .0233 (8)) shall review the entire project and make a finding of fact as to whether the criteria in paragraph 1 above have been met. If they have, "no practical alternatives" has been established and the jurisdiction shall issue an Authorization Certificate. Failure to act within 60 days shall be construed as a finding of "no practical alternatives" and an Authorization Certificate shall be issued to the applicant. Outside of the Neuse River Basin, however, such 60-day deadline may be extended if one of the following occurs:
    1. The applicant agrees, in writing, to a longer period;
    2. The jurisdiction determines that the applicant requires an additional reasonable period of time in which to furnish requested information the jurisdiction deems necessary to its decision; or
    3. The final decision is to be made pursuant to a public hearing.
D. The appropriate jurisdiction may attach conditions to an Authorization Certificate that support the purpose, spirit and intent of the state riparian buffer protection program and/or this section.
E. Outside of the Neuse River Basin, the Authorization Certificate shall be denied if the applicant refuses access to its records or premises for the purposes of gathering information the appropriate jurisdiction deems necessary to its decision or if the jurisdiction determines that the applicant has failed to furnish requested information the jurisdiction deems necessary to its decision within the 60-day period or an additional period as authorized under paragraph C.2 above.
F. Despite the provisions of Section 2.4, Board of Adjustment, appeals from Authorization Certificate determinations shall be to the Division Director, c/o the 401 Oversight Express Permitting Unit, or its successor, in writing. The Director's decision is subject to review as provided in Articles 3 and 4 of G.S. 150B.

8.5.12 Mitigation

Mitigation is required where: 1) a person wishes to undertake a use designated as allowable with mitigation and has obtained a "no practical alternatives" determination; and 2) a person is required to perform mitigation as a condition of variance approval under this section. Within the Neuse River Basin, the proposal shall be submitted to the North Carolina Division of Water Quality (Division), which shall proceed pursuant to 15A NCAC 02B .0242. Outside of the Neuse River Basin, the proposal shall be submitted to the City or County as appropriate, which shall proceed pursuant to this section as authorized under 15A NCAC 02B .0268.

The appropriate jurisdiction (the Division acting pursuant to 15 NCAC 02B .0242) shall issue a mitigation approval upon determining that a proposal meets the requirements of this section. Within the Neuse River Basin, the approval shall specify the required area and location of mitigation. Outside of the Neuse River Basin, the approval shall identify at a minimum the option chosen, the required and proposed areas, and the mitigation location or offset payment amount as applicable. As stated in Sec. 8.5.2, Applicability, compliance with this entire section is required even where State

standards are less stringent. Within the Neuse River Basin, final review by the City or County shall occur after any State action is completed.

A. **Mitigation Options**

The mitigation requirement may be met through one of the following options:

1. Participation in a private compensatory mitigation bank in the same hydrologic area, as defined in NCGS 143.214(11), as the proposed impact that is approved by the NC Department of Environment and Natural Resources.
2. Payment of a compensatory mitigation fee to the Riparian Buffer Restoration Fund pursuant to 15A NCAC 02B .0269 contingent upon acceptance of payments by the North Carolina Ecosystem Enhancement Program. This option is available to a non-government applicant only if option 1 is not available;
3. Donation of real property or of an interest in real property pursuant to paragraph D, Donation of Real Property, below to satisfy a compensatory mitigation fee in whole or in part; or
4. Restoration or enhancement of a non-forested riparian buffer pursuant to paragraph E, Riparian Buffer Restoration or Enhancement, below.
5. Construction of an alternative measure that reduces nutrient loading as well as or better than the riparian buffer that is lost in the same river basin as the riparian buffer that is lost and that is approved by the Division.

B. **Mitigation Area**

The appropriate jurisdiction shall determine the required area of mitigation as follows:

1. Add the following areas to determine the impacts in square feet to each portion of the riparian buffer:
    a. The area of the footprint of the use causing the impact to the riparian buffer;
    b. The area of the boundary of any clearing and grading activities within the riparian buffer necessary to accommodate the use; and
    c. The area of any ongoing maintenance corridors within the riparian buffer associated with the use; and
2. Apply the following multipliers to the impacts determined in paragraph 1 to each portion of the riparian buffer:
    a. Impacts to the inner 30 feet of the riparian buffer shall be multiplied by three;
    b. Impacts to the outer 20 feet of the riparian buffer shall be multiplied by one and one-half; and
    c. Impacts to wetlands within those two portions of the riparian buffer that are subject to mitigation under 15A NCAC 2H .0506 shall comply with the mitigation ratios in 15A NCAC 2H .0506.

C. **Mitigation Location**

1. Within the Falls Reservoir Watershed, mitigation shall be located within the Upper Falls Watershed, as defined in 15A NCAC 2B.0275 and .0276,

and the same distance from, or closer to, the Upper Falls Reservoir, as defined in 15A NCAC 2B.0275 and .0276, as the proposed impact, and as close to the location of the impact as feasible. Alternatively, mitigation may be located anywhere within the Upper Falls Watershed provided that the mitigation proposal accounts for differences in delivery of nutrients to the Upper Falls Watershed resulting from differences between the locations of the buffer impact and mitigation.

2. Within the Jordan Reservoir Watershed, mitigation shall be located within the same subwatershed, as defined in 15A NCAC 02B.0262, and the same distance from, or closer to, the reservoir as the proposed impact, and as close to the location of the impact as feasible. Alternatively, the applicant may propose mitigation anywhere within the same subwatershed, as defined in 15A NCAC 02B.0262, provided that the mitigation proposal accounts for differences in delivery of nutrients to the affected arm of the reservoir resulting from differences between the locations of the buffer impact and mitigation.
3. In any location, mitigation of riparian buffer loss in the watershed of a drinking water supply shall be performed in the watershed of that drinking water supply and as may be further limited by the North Carolina Environmental Management Commission.

Additional location requirements for the property donation option are enumerated in paragraph D, Donation of Property, below.

D. **Donation of Property**

1. Donation of real property interests that meet the requirements listed below may partially or fully satisfy payment of a compensatory mitigation fee to the Riparian Buffer Restoration Fund, calculated pursuant to 15A NCAC 02B .0269. The value of the property interest shall be determined by an appraisal performed in accordance with paragraph 4 below. The donation shall satisfy the mitigation requirement if the appraised value of the donated property interest is equal to or greater than the required fee. If the appraised value of the donated property interest is less than the required fee, the applicant shall pay the balance.
2. A conservation easement shall be accepted only if it is granted in perpetuity.
3. Any property interest shall be accepted only if it meets all of the following requirements:
    a. In addition to the location requirements of paragraph C, Mitigation Location, above, the property shall be located within an area that is identified as a priority for restoration in, or is otherwise consistent with the goals of, the Division's *Basinwide Wetlands and Riparian Restoration Plan* (within the Neuse River Basin) or its *Basinwide Wetlands and Riparian Restoration Plan for the Cape Fear River Basin* (outside of the Neuse River Basin), both developed pursuant to NCGS 143-214.10;
    b. The property shall contain riparian buffers not currently protected by the State's riparian buffer protection program that are in need of restoration as defined in paragraph E.4 below;

c. The restorable riparian buffer on the property shall have a minimum length of 1000 linear feet along a surface water and a minimum width of 50 feet measured horizontally on a line perpendicular to the surface water;
d. The size of the restorable riparian buffer on the property shall equal or exceed the area of mitigation responsibility determined under paragraph B above;
e. Outside of the Neuse River Basin, restoration shall not require removal of man-made structures or infrastructure. Within the Neuse River Basin, the property shall not require excessive measures for successful restoration, such as removal of structures or infrastructure, and restoration of the property shall be fully capable of offsetting the adverse impacts of the requested use;
f. The property shall be suitable to be successfully restored, based on existing hydrology, soils, and vegetation;
g. The estimated cost of restoring and maintaining the property shall not exceed the value of the property minus site identification and transaction costs;
h. The property shall not contain any building, structure, object, site, or district that is listed in the National Register of Historic Places established pursuant to Public Law 89-665, 16 U.S.C. 470 as amended;
i. The property shall not contain any hazardous substance or solid waste;
j. The property shall not contain structures or materials that present health or safety problems to the general public. If wells, septic, water or sewer connections exist, they shall be filled, remediated or closed at the expense of the applicant or donor in accordance with state and local health and safety regulations;
k. The property and adjacent properties shall not have prior, current, or known future land use that would inhibit the function of the restoration effort; and
l. The property shall not have any encumbrances or conditions on the transfer of the property interests.

4. At the expense of the applicant or donor, the following information shall be submitted to the appropriate jurisdiction with any proposal for donation or dedication of interest in real property:
   a. Documentation that the property meets the requirements laid out in paragraph E.3 below;
   b. US Geological Survey 1:24,000 (7.5 minute) scale topographic map, county tax map, USDA Natural Resource Conservation Service County Soil Survey Map, and county road map showing the location of the property along with information on existing site conditions, vegetation types, and existing structures and easements;
   c. A current property survey performed in accordance with the procedures of the North Carolina Department of Administration, State Property Office as identified by the State Board of Registration for Professional Engineers and Land Surveyors in "Standards of Practice for Land Surveying in North Carolina";

d. A current appraisal of the value of the property performed in accordance with the procedures of the North Carolina Department of Administration, State Property Office as identified by the Appraisal Board in the "Uniform Standards of Professional North Carolina Appraisal Practice"; and
e. A title certificate.

E. **Riparian Buffer Restoration or Enhancement**

Mitigation through riparian buffer restoration or enhancement shall meet the following requirements:

1. The applicant may restore or enhance a non-forested riparian buffer if either of the following applies:
   a. The area of riparian buffer restoration is equal to the required area of mitigation determined pursuant to paragraph B, Mitigation Area, above; or
   b. The area of riparian buffer enhancement is three times larger than the required area of mitigation determined pursuant to paragraph B, Mitigation Area, above;
2. The location of the riparian buffer restoration or enhancement shall comply with the requirements of paragraph C, Mitigation Location, above;
3. The riparian buffer restoration or enhancement site shall have a minimum width of 50 feet measured horizontally on a line perpendicular to a vertical line marking the top of the bank for a stream or the normal water level for a pond, lake, or reservoir;
4. Outside of the Neuse River Basin, enhancement and restoration shall each have the objective of establishing a forested riparian buffer. Enhancement shall be distinguished from restoration based on existing buffer conditions. Where existing trees are sparse, meaning greater than or equal to 100 trees per acre but less than 200 trees per acre, a buffer shall be enhanced. Where existing woody vegetation is absent, meaning less than 100 trees per acre, a buffer shall be restored;
5. The applicant shall first receive an Authorization Certificate for the proposed use according to the requirements of paragraph 8.5.11, No Practical Alternatives/Authorization Certificate. The applicant shall then submit a restoration or enhancement plan to the City or County as appropriate. The restoration or enhancement plan shall contain the following:
   a. A map of the proposed restoration or enhancement site;
   b. A vegetation plan. The vegetation plan shall include trees as specified under paragraph 9.2.3B.5, Mixing of Tree Species, and the Durham Landscape Guidelines, planted at a density sufficient to provide 320 trees per acre at maturity with at least 50% of those trees having the potential of attaining a two and a half inch or greater dbh within seven years;
   c. A grading plan. The site shall be graded in a manner to ensure diffuse flow through the riparian buffer;
   d. A fertilization plan; and
   e. An implementation schedule.

6. Within one year after restoration or enhancement plan approval, the applicant shall present proof to the appropriate jurisdiction that the riparian buffer has been restored or enhanced. If proof is not presented within this timeframe, the applicant shall be in violation of both the State and local riparian buffer protection programs;
7. The mitigation area shall be placed under a perpetual conservation easement that provides for protection of the property's nutrient removal functions;
8. The applicant shall submit annual reports for a period of five years after the restoration or enhancement showing that the trees planted have survived and that diffuse flow through the riparian buffer has been maintained. The applicant shall replace trees that do not survive and restore diffuse flow if needed during that five-year period.

8.5.13 Variances

A person who wishes to undertake a prohibited use shall first submit a request for a minor or major variance to the appropriate jurisdiction as stated below. A minor variance is required for any activity that impacts only the outer 20 feet of a riparian buffer. A major variance is required for any activity that impacts any portion of the inner 30 feet of a riparian buffer. Such variances are separate from variances authorized under Sec. 3.15, Variance.

A. Within the Neuse River Basin

1. Minor Variance

Pursuant to15 NCAC 02B .0233 (9), a minor variance request shall be submitted to the North Carolina Division of Water Quality (Division) for review and decision. The Division may attach conditions to approval that support the purpose, spirit and intent of the riparian buffer protection program. Appeal from the Division decision shall be to the Office of Administrative Hearings.

2. Major Variance

Pursuant to 15 NCAC 02B .0233 (9)(c), a major variance request shall be submitted to the Division for initial review. If the Division determines that the request meets the requirements of paragraph 3, Variance Requirements, below, it shall submit preliminary findings to the NC Environmental Management Commission c/o the Division of Water Quality, 401 Oversight Express Permitting Unit, or its successor. Within 90 days after receipt by the Director of a complete application, the Commission shall approve, approve with conditions or stipulations, or deny the request. Upon and in accordance with the Commission's decision, the Division shall issue a final decision granting, granting subject to conditions or stipulations, or denying the major variance. Appeal from either the initial Division determination or the Commission decision shall be to the Office of Administrative Hearings.

3. Variance Requirements

Pursuant to 15 NCAC 02B .0233 (9)(a), the Division shall make a finding of fact as to whether the following requirements have been met:

a. There are practical difficulties or unnecessary hardships that prevent compliance with the strict letter of the riparian buffer protection requirements; Practical difficulties or unnecessary hardships shall be evaluated in accordance with the following:
    1. If the applicant complies with the provisions of this section, he/she can secure no reasonable return from, nor make reasonable use of, his/her property. Merely proving that the variance would permit a greater profit from the property shall not be considered adequate justification for a variance. Moreover, the Division shall consider whether the variance is the minimum possible deviation from the terms of this section that shall make reasonable use of the property possible;
    2. The hardship results from application of this section to the property rather than from other factors such as deed restrictions or other hardship;
    3. The hardship is due to the physical nature of the applicant's property, such as its size, shape, or topography, which is different from that of neighboring property;
    4. The applicant did not cause the hardship by knowingly or unknowingly violating this section;
    5. The applicant did not purchase the property after the effective date of 15A NCAC 02B .0233, Neuse River Basin: Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Existing Riparian Buffers, and then requesting an appeal; and
    6. The hardship is unique to the applicant's property, rather than the result of conditions that are widespread. If other properties are equally subject to the hardship created in the restriction, then granting a variance would be a special privilege denied to others, and would not promote equal justice.

b. The variance is in harmony with the general purpose and intent of this section and preserves its spirit; and

c. In granting the variance, the public safety and welfare have been assured, water quality has been protected, and substantial justice has been done.

B. Outside the Neuse River Basin

1. Minor Variance

A minor variance request shall be submitted to the City or County as appropriate for review and decision. The City or County may attach conditions to approval that support the purpose, spirit and intent of the riparian buffer protection program and this section. Despite the provisions of Section 2.4, Board of Adjustment, appeal from the City or County decision shall be to the Division Director, c/o the 401 Oversight

Express Permitting Unit, or its successor. The Director's decision is subject to review as provided in Articles 3 and 4 of G.S. 150B.

2. **Major Variance**
   A major variance request shall be submitted to the City or County as appropriate for initial review. If the City or County determines that the request meets the requirements of paragraph 3, Variance Requirements, below, it shall submit preliminary findings to the North Carolina Environmental Management Commission c/o the Division of Water Quality, 401 Oversight Express Permitting Unit, or its successor. Within 90 days after receipt by the City or County of a complete application, the Commission approves, approves with conditions and stipulations, or denies the request. Despite the provisions of Section 2.4, Board of Adjustment, appeal from the initial City or County determination or the Commission decision shall be to Superior Court.

3. **Variance Requirements**
   The City or County shall make the following three findings of fact in order to determine that the variance requirements are met:

   a. There are practical difficulties or unnecessary hardships that prevent compliance with the riparian buffer protection requirements. The following criteria must all be met in order to make such finding:
      1. If the applicant complies with the provisions of this section, he/she can secure no reasonable return from, nor make reasonable use of, his/her property. Merely proving that the variance would permit a greater profit from the property shall not be considered adequate justification for a variance. Moreover, the variance shall be the minimum possible deviation from the terms of this Ordinance that shall make reasonable use of the property possible;
      2. The hardship results from application of this section to the property rather than from other factors such as deed restrictions or other hardship;
      3. The hardship is due to the physical nature of the applicant's property, such as its size, shape, or topography, such that compliance with provisions of this section would not allow reasonable use of the property;
      4. The applicant did not cause the hardship by knowingly or unknowingly violating this Ordinance;
      5. The applicant did not purchase the property after the effective date of this Ordinance, and then request a variance; and
      6. The hardship is rare or unique to the applicant's property.
   b. The requested variance is in harmony with the general purpose, spirit and intent of the state riparian buffer protection requirements and/or this section; and

c. In granting the variance, the public safety and welfare have been assured, water quality has been protected, and substantial justice has been done.

Sec. 8.6 Water Supply Reservoir Buffer

8.6.1 Reservoir Buffer Standards

A. A reservoir buffer shall be maintained from the normal pool of all water supply reservoirs as shown in the table below, except that the buffer around any reservoir shall not apply to land that does not naturally drain to that reservoir. If the land around any reservoir does not naturally drain to that reservoir, the riparian buffer requirements of Sec. 8.5, Riparian Buffer Protection Standards, shall apply.

Reservoir	Buffer Width
Lake Michie	250 feet
Little River Reservoir	250 feet
Jordan Reservoir	250 feet[1]
Falls Reservoir	250 feet[1]
[1] On nonresidential uses, the buffer width shall extend to 1,000 feet in accordance with Sec. 4.11.4, Nonresidential Land Use Restrictions.	

B. Reservoir buffers shall remain in natural undisturbed vegetation, except for intrusions allowed pursuant to Sec. 8.5, Riparian Buffer Protection Standards.

8.6.2 Buffer Reductions

A. At the request of a property owner, the governing body may reduce the reservoir buffer requirements through the issuance of a Major Special Use Permit, pursuant to Sec. 3.9, Special Use Permit, whenever it determines that:
   1. The reservoir buffer would result in exceptional hardship, depriving the property owner of all reasonable use of the property.
   2. The proposed intrusion into the reservoir buffer is the minimum amount necessary to relieve that exceptional hardship.

   The maximum reduction permitted is to the riparian buffer width required under Sec. 8.5, Riparian Buffer Protection Standards.

B. In making its determination, the governing body shall consider topography, erosion potential, and the size of the parcel, in addition to the review of factors specified in Sec. 3.9.8, Criteria for Approval of Major and Minor Special Use Permits.

Sec. 8.7 Watershed Protection Overlay Standards

8.7.1 Applicability

The watershed protection overlay standards of this section shall apply to the Watershed Protection Overlay as set forth in Sec. 4.11, Watershed Protection Overlay.

8.7.2 General Requirements

A. Minimum Lot Size

1. In all Watershed Protection Overlays, except F/J-B and E-B, the minimum lot sizes indicated in the following table shall be applied in all new subdivisions unless the subdivision uses the cluster provision in accordance with Sec. 6.7, Cluster Subdivision, or the conservation subdivision provisions of Sec. 6.2.4, Conservation Subdivision.

Overlay	Minimum Lot Size	
	Rural Tier	Suburban Tier
M/LR-A	3 acres	20,000 square feet
M/LR-B	3 acres	20,000 square feet
F/J-A	3 acres	1 acre
E-A	Not Applicable	20,000 square feet

2. In the F/J-B and E-B overlays, developers of single-family subdivisions shall comply with the requirements of the underlying zoning district.

B. Impervious Surface Limits

1. Any development in a Watershed Protection Overlay shall be subject to limits on the amount of impervious surfaces permitted in accordance with the following table. Development plans, site plans, preliminary plats, and final plats shall clearly identify the amount of existing and proposed impervious surfaces.

Overlay	Low Density Option Impervious Surface Limit	High Density Option Impervious Surface Limit
M/LR-A	6%	Not permitted
M/LR-B	6%	Not permitted
F/J-A	Within one-half mile of the normal pool: 6%; Between one-half and one mile from the normal pool: 9%	Not permitted in the Rural Tier. 40%, for all areas not in the Rural Tier and for those uses allowed in Sec. 4.11.4; Nonresidential Land Use Restrictions, intensities greater than 25% shall require a Major Special Use Permit pursuant to Sec. 3.9, Special Use Permit.
F/J-B, E-B	24%	70%
E-A	24%	Not permitted

2. The impervious surface limit provisions of this section may be exceeded through an impervious surface credit transfer. Credit for the impervious surfaces allowed on one or more parcels ("donor parcels") may be transferred to non-contiguous parcels ("receiving parcels"), such that the amount of impervious surface available for a development project would be the total of what is normally allowed on the receiving parcel plus what is transferred from the donor parcel(s). Impervious surface credit transfer is subject to the following provisions:
    a. The donor parcel and receiving parcel shall be located within the same water supply watershed.
    b. The impervious surface credit transfer shall not be from a donor parcel in Area B to any receiving parcel in Area A, or from a donor parcel in an F/J-A area with a 9% limit to a receiving parcel in an F/J-A area with a 6% limit.
    c. The portion of the donor parcel which is restricted from development as part of the impervious surface credit transfer shall remain in a vegetated or natural state or used for crop production or pasture provided that best management practices (BMPs) as developed by the Soil and Water Conservation District are utilized. The portion of the donor site restricted from development shall be protected from all future development through use of a permanent conservation easement in favor of either:
        1. Durham County or the City of Durham; or
        2. A land trust or similar conservation-oriented non-profit organization with legal authority to accept such easements (the organization shall be bona fide and in perpetual existence and the conveyance instruments shall contain an appropriate provision for retransfer to the County or City, as appropriate, in the event the organization becomes unable to carry out its functions). If the entity accepting the easement is not the County or City, then a third right of enforcement favoring the County or City shall be included in the easement.
    d. The impervious surface credit transfer shall be reviewed and approved through use of the site plan process pursuant to Sec. 3.7, Site Plan Review.
    e. The donor parcel shall be deemed appropriate for acceptance by the County or City, as appropriate, under the Durham County Review Criteria for Acceptance of Conservation Easements for Impervious Surface Transfer.

C. **Stormwater Control Requirements**
Where development proposes intensity greater than the maximum authorized by the Low Density Option, engineered stormwater controls shall be used to control stormwater runoff from the first inch of rainfall in order to meet water quality concerns.

D. Ownership, Design and Maintenance of Engineered Stormwater Controls

1. Unless otherwise approved, ownership of the engineered stormwater controls shall remain with the property owner or a property owner's association, which shall be responsible for the continued care and maintenance of such controls.

2. Engineered stormwater controls shall be designed and constructed in accordance with standards and specifications established by the City Public Works Director or County Engineer, or their designees, as appropriate.
3. Except as allowed in (c.) below, no building permit shall be issued for a site proposed for development, until:
    a. The City Public Works Director or County Engineer, or their designees, as appropriate, has approved plans and specifications for the proposed engineered stormwater controls and the property owner has entered into an Agreement and Covenants or Operation and Maintenance Agreement with the City or County, as appropriate, in accordance with the terms established by either the City Public Works Director or County Engineer, or their designees, as appropriate; and
    b. The property owner has posted a performance bond, other surety instrument, or other payment satisfactory to the City or County, as appropriate, in an amount determined by the City Public Works Director or County Engineer, or their designees, as appropriate to assure construction, maintenance, repair, and/or reconstruction necessary for adequate performance of the engineered stormwater controls.
    c. For office, institutional, commercial, industrial and multi-family projects, building permits may be issued but construction drawing approval or water or sewer permit approval shall be withheld until compliance with (a) and (b) above.

    The Agreement and Covenants or Operations and Maintenance Agreement required under paragraph a. above may be required prior to site plan or preliminary plat approval.

4. No certificate of compliance shall be issued for any structure constructed within a site proposed for development, other than as allowed below, until the City Public Works Director or County Engineer, or their designees, as appropriate, has approved construction of the engineered stormwater controls and after review and approval of submitted “as-built” drawings. Notwithstanding this requirement, the Stormwater Division of the City may allow for delay in approval of construction of stormwater controls and submission and approval of as-built drawings for single family housing, duplexes, and townhomes in accordance with adopted policies of the City.

E. **Riparian Buffers**
Riparian buffers are required in accordance with Sec. 8.5, Riparian Buffer Protection Standards.

F. Wastewater Treatment and Facilities

1. **Wastewater Treatment**
Except as indicated below, wastewater treatment facilities shall be prohibited in all Watershed Protection Overlays.

a. Individual on-site ground absorption systems shall be permitted, subject to the approval of the Durham County Health Department or the State of North Carolina, as applicable.
b. A spray irrigation wastewater treatment system to serve a single-family house shall be permitted, provided that:
    1. The owner enters into a written agreement with the Durham County Health Department which:
        1. Provides for Health Department access to the property for the purpose of monitoring the system during its construction and operation; and
        2. Provides that the owner and certified operator shall provide to the Health Department copies of any and all applications, plans, permits, reports and any other documents concerning but not limited to the permitting, system, design, construction, operation, monitoring or repair of the system.
    2. The owner shall not act as the certified operator for a spray irrigation system to be installed on his or her property.
c. Publicly-owned wastewater treatment facilities, and replacement and expansions of such facilities, shall be allowed in F/J-B and E-B overlays.
d. Wastewater treatment facilities may be permitted in the F/J-A overlay through the issuance of a Major Special Use Permit pursuant to Sec. 3.9, Special Use Permit, subject to the restrictions described in Sec. 12.7, Water and Sanitary Sewer Systems.

2. Sanitary Sewer Services

a. Except in the Rural Tier, public and private sanitary sewer lines, force mains, and pump stations shall be permitted within all Watershed Protection Overlays. Public and private pump stations shall be equipped with the following safety features:
    1. Battery-backed alarm systems activated by pump failure or power outage, connected by an automatic dialer to a 24-hour maintenance service approved by the City Public Works Director or County Engineer, or their designees, as appropriate.
    2. Provision for connection of a portable generator. The City Public Works Director or County Engineer, or their designees, as appropriate, may require the pump station to be equipped with on-site, stand-by power.
b. Within the Rural Tier, new public or private sanitary sewer lines or outfalls, including necessary force mains and pump stations, may be permitted within the Watershed Protection Overlays subject to City Council or Board of Commissioners approval, as appropriate:
    1. Only to serve an existing use or structure for which a health hazard has been documented by the County Health Department or the State of North Carolina; or
    2. If associated with a wastewater treatment facility permitted pursuant to Paragraph 1, Wastewater Treatment, above.
c. In considering such extensions, all reasonable alternatives shall be considered prior to a decision to extend the sewer services. All

service connections, installed in accordance with the North Carolina Plumbing Code, shall be permitted only in accordance with Article III, Water and Sewer Main Extensions*, of Chapter 70, Utilities*, of the Durham City Code.

G. Hazardous and Nuclear Materials

1. Prior to site plan approval, an Emergency Contingency Plan shall be prepared and submitted through the Planning Department to the Durham County Fire Marshall and the Environmental Resources Director for review and approval. The Emergency Contingency Plan shall be prepared in accordance with the requirements in the Superfund Amendments and Reauthorization Act (SARA), Title III and shall be updated annually. In addition, the Emergency Contingency Plan shall include:

    a. A plan for the site showing buildings and the locations of points of storage, transfer and use of nuclear and hazardous materials;
    b. A list of nuclear and hazardous materials kept on-site in any quantities;
    c. The location of spill control valves on any bridges and causeways; and
    d. The person responsible for on-site spill control and containment, and the appropriate means of contacting that person on a 24-hour basis.

2. Any container or tank used to store hazardous materials shall be equipped with leak detection devices and shall be double-walled or have other secondary containment features.
3. Points of storage, transfer and use of substantial quantities of hazardous materials shall be protected by a dike or comparable containment structure, constructed of a material resistant to hazardous material the dike or structure is designed to contain. The dike or structure shall be sized to handle at least the maximum amount of material to be stored or used and shall be constructed and installed in a manner to exclude rainwater and stormwater runoff.
4. All floor drains that could collect hazardous materials shall be connected to a corrosion resistant tank or catch basin sized to handle the maximum amount of hazardous material to be stored or used. These floor drains shall not be open to the site's natural drainage system and discharges to the site's storm drainage system or to adjacent surface waters shall be prohibited.
5. Points of storage, transfer and use of hazardous or nuclear materials shall have roof coverage.

8.7.3 Exceptions

All development within Watershed Protection Overlays shall be subject to the restrictions in this section, with the following exceptions:

1. Existing Development

For the purposes of this section, existing development shall be considered to include any impervious surfaces constructed before January 1, 1994. All new

uses and activities and all expansions of previously-existing uses and activities shall conform to Sec. 4.11.4, Nonresidential Land Use Restrictions and Sec. 8.7.2, General Requirements.

2. Existing Single-Family Lots

New construction and additions to existing residential buildings on single-family residential lots recorded prior to January 1, 1994 shall be constructed in accordance with the watershed protection regulations, if any, in effect at the time the lot was created.

3. Stormwater Control Exemptions

Proposed development projects not in the Rural Tier, and in F/J-B or E-B overlays involving less than one acre cumulatively, of land disturbing activity shall be exempt from the stormwater control requirements indicated in this Section.

8.7.4 High Density Option Approval

Any development utilizing the High Density Option within the F/J-A overlay shall require site plan approval by the appropriate governing body.

8.7.5 Changes to Tier Boundaries

The City or County shall not extend the Urban or Suburban Tier boundaries further into the M/LR-A or F/J-A overlays.

Sec. 8.8 Steep Slope Protection Standards

8.8.1 Purpose

The primary purpose for the slope protection standards is to minimize grading, land instability and the removal of vegetation in order to:

A. Protect the quality of wetlands and water courses below the slope from increased sedimentation;
B. Protect steep slope plant and animal habitat from disturbance and development; and
C. Preserve the aesthetic quality of the natural terrain.

8.8.2 Exception, Sedimentation and Erosion Control

Notwithstanding the requirements of this section, steep slopes for purposes of sedimentation and erosion control are defined in Sec.12.10.4B, Stabilization of Disturbed Land, and regulated under Sec. 3.8, Sedimentation and Erosion Control, and Sec. 12.10, Sedimentation and Erosion Control.

8.8.3 Steep Slope Areas

A. Slope is the relationship of vertical rise to horizontal run, expressed as a percentage. Steep slope areas shall be defined as land areas that:
    1. Have a grade of 25% or more;
    2. Have an area of 5,000 square feet or greater; and

3. Are located within 200 feet of any floodway fringe or perennial stream or within 100 feet of an intermittent stream.

B. Steep slope areas refer to natural grades and shall not include man-made grades. Slope calculations shall use the smallest contour interval for which maps are available. Steep slope areas shall be determined irrespective of tract boundaries.

C. Steep slope areas shall be clearly indicated on all site plans, development plans, preliminary plats, and final plats. When a property owner or developer believes that the presence or location of a steep slope area is different than what is shown on the appropriate topographic map, the Development Review Board shall have the authority to determine the location or presence of the moderate or steep slope area for purposes of meeting the requirements of this section.

8.8.4 Steep Slope Development Limitations

Development and land disturbing activity on steep slope areas shall be conducted only in accordance with the following requirements. Compliance with these requirements shall be determined by the approving authority.

A. Development shall be designed and constructed in order to minimize disturbance to the natural landform as much as possible. Development shall demonstrate appropriate terrain-adaptive design and construction techniques. An inability to design a particular development allowed by the underlying zone without significant disturbance to the natural landform may indicate that the site should not accommodate the full amount of proposed development. Alternate site design and construction measures shall be encouraged to mitigate the effects of development on steep slopes. The grade of reconstructed slopes shall not exceed 50%. Non-load bearing retaining walls shall be encouraged in order to reduce the amount of disturbance to the natural slope.

B. In order to accommodate building placement on steep slope areas, street and side yard setbacks on lots on the interior of the development may be reduced by up to 50% by the Development Review Board.

C. On any tract proposed for construction, no more than 15% of the steep slope area on the tract shall be graded. For purposes of this calculation, the land areas of individual steep slope areas on the tract shall be added together to establish the total steep slope area for the tract.

D. Development shall be designed and arranged in order to minimize the impact of street construction on steep slope areas. Proposed right-of-way for major thoroughfares, minor thoroughfares and collector streets shall be exempt from the steep slope area grading limits of this section, provided that the Development Review Board determines that proposed rights-of-way are designed and arranged in order to minimize the impact on steep slope areas.

8.8.5 Density Credits

The amount of land designated as steep slopes may be credited for residential density on adjacent land in the same development at a rate of 15% of that allowed by the zoning.

Sec. 8.9 Wetlands Protection Standards

8.9.1 Purpose

The primary purpose of the wetlands protection standards is to conserve and maintain natural wetlands in an undisturbed vegetated state in order to provide storage of stormwater runoff, minimize degradation of preserved wetlands from the impacts of adjacent development, improve water quality and preserve plant and wildlife habitat.

8.9.2 Application of Wetlands Protection

The City and County acknowledge the pre-eminence of the Federal and State governments with regard to the identification and regulation of wetlands. Accordingly, the standards contained within this section shall not duplicate the requirements of the US Army Corps of Engineers (the Corps) or the North Carolina Department of Environment and Natural Resources (DENR), Division of Water Quality (DWQ), but shall require the buffering of wetland areas, identified by these agencies, on development plans, site plans, preliminary plats, and final plats, and as otherwise required under Sec. 8.5, Riparian Buffer Protection Standards.

8.9.3 Wetland Buffer Applicability

A. A wetland buffer shall not apply to any wetland approved for dredging or filling under a Section 404 Permit issued by the Corps or a Section 401 Water Quality Certification issued by the DWQ.
B. A wetland buffer shall not apply to wetland areas associated with man-made ponds unconnected to intermittent or perennial streams or to man-made drainage ditches.
C. A wetland buffer shall be required for any wetland area one acre or greater in size.

8.9.4 Wetland Buffer Width

The wetland buffer shall be provided along the perimeter boundary of the wetland area and shall be at least 25 feet in width.

8.9.5 Wetland Buffers Standards

Wetland buffers shall be governed by Sec. 8.5, Riparian Buffer Protection Standards, except where it may conflict with this section, in which case this section applies.

Sec. 8.10 Durham Inventory Site Protection Standards

Sites listed in the Durham County Inventory of Important Natural Areas, Plants and Wildlife, which in case of a conflict may be superseded or supplemented by more current information from the North Carolina Heritage Program as determined by the Planning Director, are protected through a series of development standards, including, but not limited to

1. Site plan review procedure in Sec. Sec. 3.7;
2. Special use permits in Sec. 3.9;
3. Conservation subdivisions in Sec. 6.2.4;
4. Open space in Sec. 7.2 ; and
5. Tree protection and tree coverage in Sec. 8.3.

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APPENDIX D

City/County

SEDIMENTATION AND EROSION CONTROL

REVISED NOVEMBER 2009

Unified Development Ordinance (UDO)

Excerpts Related to Sedimentation and Erosion Control

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CITY OF DURHAM | DURHAM COUNTY
NORTH CAROLINA

MEMORANDUM

Date: December 7, 2009

To: Thomas J. Bonfield, City Manager
Through: Keith Chadwell, Deputy City Manager
From: Steven L. Medlin, AICP, City-County Planning Director
Subject: Amendment to the Unified Development Ordinance – Sedimentation and Erosion Control (TC0900007)

Summary. This proposed amendment includes a set of changes to the Unified Development Ordinance (UDO) that will bring the City of Durham into compliance with sedimentation and erosion control measures required in recent state legislation to address water quality in Falls Lake. It also includes related UDO text changes recommended by the Environmental Enhancements to the UDO Steering Committee and changes recommended by staff to reorganize and clarify the relevant sections to make them more user-friendly and effective. The proposed text is shown in Attachments A and B.

The Board of County Commissioners considered this item on November 23, 2009, and staff will report on their actions during this public hearing.

Recommendations. The Planning Department is recommending approval.

The Planning Commission held a public hearing on this proposed text amendment on October 13, 2009 and recommended approval by a vote of 13-0.

Background. In the summer of 2008, the Joint City-County Planning Committee (JCCPC) established a Steering Committee for the Environmental Enhancements to the UDO (EEUDO). This Steering Committee, made up of development community representatives, neighborhood leaders, and environmental activists, and co-chaired by Commissioner Reckhow and Councilman Woodard, created a set of recommendations in May of 2009 for improvements to UDO environmental regulations. Those improvements focus on four areas: sedimentation and erosion control; water quality and stream buffers; site preparation; and tree protection and preservation. Attachment C is the section of these recommendations pertaining to sedimentation and erosion control. In June of 2009, the JCCPC instructed staff to begin implementing the Steering Committee recommendations.

A parallel effort was undertaken through the state legislature to improve water quality in Falls Lake. The resulting legislation, S.L. 2009-486 (Attachment D), requires the City of Durham to adopt more stringent sedimentation and erosion control measures by

January 1, 2010. On September 2, 2009, the JCCPC recommended that staff initiate a sedimentation and erosion control text amendment containing the State requirements, the EEUDO recommendations, and changes proposed by staff. On October 13, 2009, the Planning Commission held a public hearing on this item and voted unanimously (13-0) to recommend approval.

Since the Planning Commission public hearing, a set of changes have been made to the proposed text amendment reflecting requests of the Planning Commission and state regulators. They include (references below are to the proposed, not current, paragraph designations):

- Adding a citation of the state statute regarding the 30-day requirement before commencing land-disturbing activity in paragraph 3.8.1B;
- Changing the word "should" to "shall" in paragraph 12.10.3D, Control Surface Water;
- Changing the state law citation in the commentary to paragraph 12.10.4B, Stabilization of Disturbed Land, from the senate bill to the session law;
- Removing reference to "uncovered" land in the first sentence of paragraph 12.10.4C, Stabilization of Sedimentation and Erosion Control Devices;
- Deleting the last row in the chart in paragraph 12.10.5B.1; and
- Making additional clarifying technical changes throughout the text.

Issues. The changes required by S.L. 2009-486 are included in the proposed text and listed below with the proposed UDO references and Attachment A page numbers.

- Sediment traps and basins must be sized to handle a 25-year storm event (Sec. 12.10.4D, page 16 and 12.10.5B, pages 18-19).
- Sediment traps and basins must have a settling efficiency of 70 percent (Sec. 12.10.4F, page 16).
- Stormwater channels must be designed with slopes that can restrain accelerated erosion (Sec. 12.10.4J, page 17).
- Stabilization measures must conform to the following schedule (Sec. 12.10.4B, page 15):
  - Seven days for permanent groundcover; or
  - For temporary cover:
    - Fourteen days for areas of no slope;
    - Ten days for areas of moderate slope, defined as an inclination of 3:1 or less; or
    - Seven days for steep slopes, defined as an inclination of greater than 3:1.

The proposed text also includes four additional measures recommended by the EEUDO Steering Committee. They are listed below with the proposed UDO references and Attachment A page numbers.

- Lower the threshold for the size of land disturbance that requires an erosion control plan from one acre (43,560 square feet) to 20,000 square feet (Sec. 12.10.2B, page 12).
- Require stabilization measures within seven days on traps, basins, and diversion ditches (Sec. 12.10.4C , pages 15-16).
- Require the use of skimmers in traps and basins (Sec. 12.10.4E, page 16).
- Maintain a minimum 3,600 cubic foot basin in the Suburban and Rural tiers while employing the use of a skimmer (current minimum with a skimmer is 1,800 cubic feet) (Sec. 12.10.4E, page 16).

In addition, staff recommends using this opportunity to make a series of technical changes designed to improve the organization of sedimentation and erosion control provisions and clarify technical requirements, such as:

- Moving procedural requirements to Section 3.8;
- Moving technical requirements to Section 12.10;
- Removing references to inapplicable items, such as a fee reduction schedule that has not been adopted by the Board of County Commissioners, and trout waters and coastal areas which do not exist in Durham County;
- Clarifying the steep slope definition for sedimentation and erosion control mandated by state law in Section 8.8;
- Identifying watershed protection overlay districts, rather than high quality water districts, as areas that will require a land disturbance permit at 12,000 square feet in Section 12.10.2B;
- Clarifying technical requirements for land disturbance activities; and
- Amending Sections 15.1 and 15.5 to align penalties with the new provisions in Sections 3.8 and 12.10.

The EEUDO Steering Committee, upon completing its recommendations in May 2009, requested the opportunity to review and provide input on the draft text changes resulting from the EEUDO process. However, due to the time constraint for adoption imposed by S.L. 2009-486, there is not sufficient time to bring the matter back before the Committee. The four additional items recommended by the Committee had no significant opposition during its initial deliberations. Committee members were made aware of the need for expedited adoption via e-mail on September 9, 2009, and advised of the proposed changes. Staff subsequently met with a committee member at his request to discuss the proposed text, and a committee member was present at the Planning Commission hearing. Committee members on the Planning Commission and the JCCPC received copies. No committee member has raised an objection or concern to date, and no one spoke at the Planning Commission hearing.

Alternatives. The City Council may approve the amendment, deny the portions of the amendment not required under S.L. 2009-486, or direct modifications of the language not required under S.L. 2009-486.

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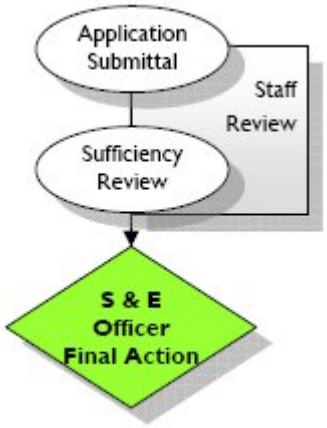
Attachments: Attachment A - Mark-up Copy of Proposed Ordinance
Attachment B - Clean Copy of Proposed Ordinance
Attachment C - Environmental Enhancements to the UDO, Sedimentation and Erosion Control
Attachment D - Session Law 2009-486
Attachment E - Planning Commission Comments

Cc: Keith Luck, Assistant Director, Durham City-County Planning Department
Glen Whisler, Director, Durham County Engineering Department

Sec. 3.8 Sedimentation and Erosion Control

3.8.1 Applicability



A. If required under Sec. 12.10, Sedimentation and Erosion Control, an approved sedimentation and erosion control plan and/or a land-disturbing permit shall be obtained before commencing land-disturbing activity.

B. Pursuant to Sec. 113A-57(4) of the North Carolina Sedimentation Pollution Control Act of 1973, land-disturbing activity that requires a sedimentation and erosion control plan under Sec. 12.10, Sedimentation and Erosion Control, shall not commence until at least 30 days after a sedimentation and erosion control plan is filed with the County Sedimentation and Erosion Control Office, regardless of when the plan is approved.

3.8.2 Application Requirements

A. Erosion and Sedimentation Control Plan

1. Three copies of a sedimentation and erosion control plan shall be filed with the County Sedimentation and Erosion Control Office.
2. A sedimentation and erosion control plan shall contain engineering drawings, vicinity maps, assumptions, calculations, narrative statements, and a construction sequence as needed to adequately describe the proposed development and the measures proposed to comply with the requirements of this Article.
3. A sedimentation and erosion control plan shall be prepared by, and bear the seal and signature of, a registered professional engineer, registered landscape architect, registered architect, registered land surveyor, or certified professional sediment and erosion control specialist. The County Sedimentation and Erosion Control Officer or designee may deem such a seal and signature not necessary due to site simplicity (as the absence of sensitive geographical features and receiving watercourses) and the limited nature of the sedimentation and erosion control measures required.
4. The approval of a sedimentation and erosion control plan is conditioned on the applicant's compliance with federal, state and local water quality laws, regulations, and rules.
5. An approved sedimentation and erosion control plan shall be kept on file at the job site

C. Land-Disturbing Permit

1. A land-disturbing permit may be obtained by submitting the following:

a. Applicable fee;

b. Zoning compliance checkoff issued by the Durham City-County Planning Department;

c. Completed Durham County Financial Responsibility/Ownership Form With Landowner Consent Form (FRO);

d. Approved sedimentation and erosion control plan, if required;

e. Improvement security, if required;

f. Certification that tree protection fencing has been installed, if required; and

g. Approval of the proposed project by the City or County as applicable.

2. No permit shall be issued until such time as the Sedimentation and Erosion Control Officer or designee is assured that the proposed land-disturbing activity will be carried out in accordance with this section and Sec. 12.10, Sedimentation and Erosion Control, and the approved sedimentation and erosion control plan, if required. A land-disturbing permit application may be disapproved for the same reasons that a sedimentation and erosion control plan may be disapproved, as set forth in Sec. 3.8.7, Disapproval of Plan, of this Ordinance.
3. The Sedimentation and Erosion Control Officer or designee shall require security to assure performance of the conditions of the permit whenever a land-disturbing activity is in excess of five acres or whenever the Officer or designee determines that the activity may result in significant off-site damage. The applicant shall file with the Officer or designee an improvement security in the form of a performance or cash bond or letter of credit. The amount shall be that which the Officer or designee deems sufficient to cover all costs of protection or other improvements required for conformity with standards specified in this section and Sec. 12.10, Sedimentation and Erosion Control. The security may be adjusted or released as the amount of disturbed area changes. The security shall be released when the Officer or designee has certified that all of the requirements of such sections have been met. Forfeiture of the improvement security shall not release the person conducting the land disturbing activity of their obligation to install and maintain necessary erosion control measures, to stabilize the site, or any other obligation of this section or Sec. 12.10, Sedimentation and Erosion Control, or any rule or order promulgated in furtherance thereof.
4. Prior to initiating land-disturbing activity, the permittee shall notify the Sedimentation and Erosion Control Office of the date that such activity will begin.
5. A land-disturbing permit issued shall be prominently displayed at the job site until all construction is completed, all permanent sedimentation and erosion control measures are removed, and the site has been stabilized as required.

3.8.3 Fees

The fees charged for the administration and enforcement of this Article shall be as prescribed by the Board of Commissioners.

3.8.4 Action by Sedimentation and Erosion Control Office

A. The County Sedimentation and Erosion Control Office shall forward a copy of each complete sedimentation and erosion control plan to the Durham Soil and Water Conservation District for review and comment.
B. The County Sedimentation and Erosion Control Officer or designee shall review each complete sedimentation and erosion control plan submitted and within 30 days of receipt shall notify the person submitting the plan that it has been approved, approved with modifications, or disapproved. Failure to approve, approve with modifications, or disapprove a complete plan within 30 days of receipt shall be deemed approval. Failure to approve, approve with modifications, or disapprove a revised plan within 15 days of receipt shall be deemed approval. Disapproval of a plan must specifically state in writing the reasons for disapproval.
C. If, following commencement of a land-disturbing activity pursuant to an approved sedimentation and erosion control plan, the County Sedimentation and Erosion Control Officer or designee determines that the plan is inadequate to meet the requirements of this section or Sec. 12.10, Sedimentation and Erosion Control, the Officer or designee may require such revisions as it deems necessary to comply with such sections. Failure to approve, approve with modifications, or disapprove a revised plan within 15 days of receipt shall be deemed approval. Pending approval of a revised plan, work shall cease or shall continue only as authorized by the Officer or designee.
D. The County Sedimentation and Erosion Control Officer or designee shall review each permit application that does not require an approved sedimentation and erosion control plan and within 14 calendar days of receipt shall notify the person submitting the application that it has been issued or denied.

3.8.5 Action by Durham Soil and Water Conservation District

The Durham Soil and Water Conservation District shall review a sedimentation and erosion control plan and submit any comments and recommendations to the County Sedimentation and Erosion Control Office within 20 days of receipt or within any shorter period of time as may be agreed upon by the District and the Office. Failure of the District to submit its comments and recommendations within 20 days or within any agreed-upon shorter period of time shall not delay final action on the plan.

3.8.6 Preconstruction Conference

When deemed necessary by the Sedimentation and Erosion Control Officer, or designee, a preconstruction conference may be required.

3.8.7 Disapproval of Plan

A. An erosion control plan may be disapproved upon a finding that an applicant, or a parent, subsidiary or other affiliate of the applicant:
    1. Is conducting or has conducted land-disturbing activity without an approved plan, or has received notice of violation of a plan previously approved by the North Carolina Sedimentation Control Commission or a

local government pursuant to the North Carolina Sedimentation Pollution Control Act of 1973, as amended, and all rules and orders adopted pursuant to it (the Act) or local ordinance adopted pursuant to the Act, and has not complied with the notice within the time specified in the notice;

2. Has failed to pay a civil penalty assessed pursuant to the Act or a local ordinance adopted pursuant to the Act by the time the payment is due;
3. Has been convicted of a misdemeanor pursuant to NCGS § 113A-64(b) or any criminal provision of a local ordinance adopted pursuant to the Act; or
4. Has failed to substantially comply with state rules or local ordinances and regulations adopted pursuant to the Act.

B. For purposes of this subsection, an applicant's record may be considered for only the two years prior to the application date.

C. Any person engaged in land-disturbing activity who fails to file a plan in accordance with this Article, or who conducts a land-disturbing activity except in accordance with provisions of an approved plan, shall be deemed in violation of this Article.

3.8.8 Amendment of Plan

Applications for amendment of an erosion control plan in written and/or graphic form may be made at any time under the same conditions as described in this section for a new application. Until such time as such amendment is approved by the Sedimentation and Erosion Control Officer, or designee, the land-disturbing activity shall not proceed except in accordance with the erosion control plan as originally approved.

3.8.9 Appeals

A. Except as provided in paragraph B. of this subsection, the appeal of a disapproval or approval with modifications of a plan shall be governed by the following provisions:
    1. The disapproval or modification of any proposed erosion control plan or the refusal to issue a land-disturbing permit by the Sedimentation and Erosion Control Officer, or designee, shall entitle the person submitting the plan, or applying for the permit, to a hearing if such person submits written demand to the Clerk to the Board of Commissioners for a hearing within 15 days after receipt of written notice of disapproval or modifications. The written demand must specify, with particularity, the factual and/or legal basis for the appeal. No grounds, other than those so specified, may be argued;
    2. Hearings held pursuant to this section shall be conducted by the Board of Commissioners within 15 days after the date of the appeal or request for a hearing, or at the next regularly scheduled meeting, whichever is later; and
    3. If the Board of Commissioners upholds the disapproval or modification of a proposed erosion control plan or refusal to issue a permit following the public hearing, the person submitting the plan or permit application shall then be entitled to appeal the Board of Commissioners' decision to the

State Sedimentation Control Commission as provided in NCGS § 113A-61(c) and Title 15 NCAC 4B.0018(d).

B. In the event that an erosion control plan is disapproved pursuant to Sec. 3.8.7, Disapproval of Plan, the County Sedimentation and Erosion Control Office shall notify the Director of the Division of Land Resources (within the North Carolina Department of Environment and Natural Resources [DENR]) of such disapproval within ten days. The Office shall advise the applicant and the Director in writing as to the specific reasons that the plan was disapproved. The applicant may appeal the Office's disapproval of the plan pursuant to Sec. 3.8.7, Disapproval of Plan, directly to the State Sedimentation Control Commission.

3.8.10 Expiration

A. A land-disturbing permit shall expire at the end of:

1. One year from the date of issuance if no land-disturbing activity has been undertaken in that period. No land-disturbing activity may take place following expiration until the person responsible has applied for, and received, a new land-disturbing permit. The fee for the new permit shall be 100% of the current applicable fee; or
2. A two-year period, unless it is extended by the Sedimentation and Erosion Control Officer upon written request of the permit holder. The request for extension shall include reasons for incompletion of the work. After review of the original plan and an on-site inspection of the completed work, the permit may be extended effective for a period not to exceed six months from the date of expiration of the original permit. The fee for the extended permit shall be 25% of the current applicable fee. If work cannot be completed and the site permanently stabilized prior to expiration of the permit extension, then a new land-disturbing permit must be applied for and obtained as described in this section

B. An approved sedimentation and erosion control plan for which no permit has been issued shall expire one year from the approval date. If a plan has been disapproved, a revised plan must be submitted within one year from the disapproval date or the file will be closed.

Sec. 8.8 Steep Slope Protection Standards

8.8.1 Purpose

The primary purpose for the slope protection standards is to minimize grading, land instability and the removal of vegetation in order to:

A. Protect the quality of wetlands and water courses below the slope from increased sedimentation;

B. Protect steep slope plant and animal habitat from disturbance and development; and

C. Preserve the aesthetic quality of the natural terrain.

8.8.2 Exception – Sedimentation and Erosion Control

Notwithstanding the requirements of this section, steep slopes for purposes of sedimentation and erosion control are defined in Sec.12.10.4B, Stabilization of Disturbed Land, and regulated under Sec. 3.8, Sedimentation and Erosion Control, and Sec. 12.10, Sedimentation and Erosion Control.

8.8.3 Steep Slope Areas

A. Slope is the relationship of vertical rise to horizontal run, expressed as a percentage. Steep slope areas shall be defined as land areas that:

1. Have a grade of 25% or more;

2. Have an area of 5,000 square feet or greater; and

3. Are located within 200 feet of any floodway fringe or perennial stream or within 100 feet of an intermittent stream.

B. Steep slope areas refer to natural grades and shall not include man-made grades. Slope calculations shall use the smallest contour interval for which maps are available. Steep slope areas shall be determined irrespective of tract boundaries.

C. Steep slope areas shall be clearly indicated on all site plans, development plans, preliminary plats and final plats. When a property owner or developer believes that the presence or location of a steep slope area is different than what is shown on the appropriate topographic map, the Development Review Board shall have the authority to determine the location or presence of the moderate or steep slope area for purposes of meeting the requirements of this section.

8.8.4 Steep Slope Development Limitations

Development and land disturbing activity on steep slope areas shall be conducted only in accordance with the following requirements. Compliance with these requirements shall be determined by the approving authority.

A. Development shall be designed and constructed in order to minimize disturbance to the natural landform as much as possible. Development shall demonstrate appropriate terrain-adaptive design and construction techniques. An inability to design a particular development allowed by the underlying zone without significant disturbance to the natural landform may indicate that the site should not accommodate the full amount of proposed development. Alternate site design and construction measures shall be encouraged to mitigate the effects of development on steep slopes. The grade of reconstructed slopes shall not exceed 50%. Non-load bearing retaining walls shall be encouraged in order to reduce the amount of disturbance to the natural slope.

B. In order to accommodate building placement on steep slope areas, street and side yard setbacks on lots on the interior of the development may be reduced by up to 50% by the Development Review Board.

C. On any tract proposed for construction, no more than 15% of the steep slope area on the tract shall be graded. For purposes of this calculation, the land areas of individual steep slope areas on the tract shall be added together to establish the total steep slope area for the tract.

D. Development shall be designed and arranged in order to minimize the impact of street construction on steep slope areas. Proposed right-of-way for major thoroughfares, minor thoroughfares and collector streets shall be exempt from the steep slope area grading limits of this section, provided that the Development Review Board determines that proposed rights-of-way are designed and arranged in order to minimize the impact on steep slope areas.

8.8. 5 Density Credits

The amount of land designated as steep slopes may be credited for residential density on adjacent land in the same development at a rate of 15% of that allowed by the zoning.

Sec. 12.10 Sedimentation and Erosion Control

12.10.1 Purposes

1. This Section is adopted for the purposes of:
    1. Regulating private, non-exempt land-disturbing activity to control accelerated erosion and sedimentation in order to prevent the pollution of water and other damage to lakes, watercourses and other public and private property by sedimentation; and
    2. Establishing procedures through which these purposes can be fulfilled.
2. No person shall undertake any land-disturbing activity without first obtaining a permit therefore from the Sedimentation and Erosion Control Officer, or designee as required by this section.

12.10.2 Applicability

A. Exemptions. The following activities do not require a permit under this section:
    1. Land disturbing activities for the purpose of fighting fires;
    2. Land disturbing activities for the stockpiling of raw or processed sand, stone or gravel in material processing plants and storage yards, provided that sediment control measures have been utilized to protect against off-site damage;
    3. Land disturbing activities that are less than 12,000 square feet in surface area. In determining the area, lands under one or diverse ownership being developed as a unit will be aggregated. Notwithstanding this provision, an erosion control plan and/or permit may be required by the Sedimentation and Erosion Control Officer, or designee when off-site damage is occurring, or if the potential for off-site damage exists. Additionally, this Section may apply when the applicant, or a parent, subsidiary, or other affiliate of the applicant has engaged in any activity enumerated in Sec. 3.8.7, Disapproval of Plan.
    4. As set forth in NCGS § 113A-52.01, land disturbing activities undertaken on agricultural land for the production of plants and animals useful to man, including but not limited to:

        a. Forage and sod crops, grain and feed crops, tobacco, cotton and peanuts;

b. Dairy animals and dairy products;
c. Poultry and poultry products;
d. Livestock, including beef cattle, llamas, sheep, swine, horses, ponies, mules or goats, including the breeding and grazing of any or all such animals;
e. Bees and apiary products; and
f. Fur animals;

5. Land disturbing activities undertaken on forest land for the production and harvesting of timber and timber products and which are conducted in accordance with best management practices set out in Forest Practice Guidelines Related to Water Quality, as adopted by the North Carolina Department of Environment and Natural Resources (DENR.) If land-disturbing activity undertaken on forestland for the production and harvesting of timber and timber products is not conducted in accordance with Forest Practice Guidelines Related to Water Quality, the provisions of this Article shall apply to such activity and any related land-disturbing activity;
6. Land disturbing activities undertaken by persons as defined in NCGS § 113A-52(8) who are otherwise regulated by the provisions of the Mining Act of 1971, NCGS §§ 74-46--74-68;
7. Land-disturbing activities over which the state has exclusive regulatory jurisdiction as provided in NCGS § 113A-56(a);
8. Land disturbing activities undertaken for the duration of an emergency, activities essential to protect human life; and
9. This section shall not require ground cover on cleared land forming the future basin of a planned reservoir.

B. Plan Required
Subject to the exemptions listed in subsection 12.10.2, a sedimentation and erosion control plan shall be required for any land-disturbing activity within the County, including the City, if more than 20,000 aggregate square feet will be disturbed, or if 12,000 or more aggregate square feet will be disturbed in a M/LR-A, M/LR-B, F/J-A, or E-A watershed protection overlay district. The Sedimentation and Erosion Control Officer or designee may also require a plan for any land-disturbing activity if it determines that off-site damage is occurring or the potential for off-site damage exists. A plan may also be required when the applicant, or a parent, subsidiary, or other affiliate of the applicant, has engaged in any activity listed in Sec. 3.8.7, Disapproval of Plan.

	Less than 12,000 s.f.	12,000 s.f. to ~~1 acre~~20,000 s.f.	More than ~~1 acre~~20,000 s.f.
Plan	MR	MR(*R)	R
Permit	MR	R	R
Plan to District			R

MR - May be required when off-site damage is occurring, the potential for off-site damage exists, or if the applicant or a parent, subsidiary, or other affiliate of the applicant has engaged in any activity enumerated in Sec. 3.8.7, Disapproval of Plan.

R - Required.

***R -** Required in a Lake Michie/Little River Critical Area (M/LR-A), Lake Michie/Little River Protected Area (M/LR-B), Falls/Jordan Critical Area (F/J-A) and Eno River Critical Area (E-A).

C. Protection of Property
   Persons conducting land-disturbing activity shall take all reasonable measures to protect all public and private property from damage caused by such activity.
D. More Restrictive Rules Shall Apply
   Whenever conflicts exist between federal, State or local laws, and ordinances or rules, the more restrictive provision shall apply.

12.10. 3 Basic Control Objectives

In order for a sedimentation and erosion control plan to be approved, the following control objectives shall be met:

A. Identify Critical Areas
   On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.
B. Limit Time of Exposure
   All land-disturbing activity is to be planned and conducted to limit exposure to the shortest feasible time.
C. Limit Exposed Areas
   All land-disturbing activity is to be planned and conducted to minimize the size of the area to be exposed at any one time.
D. Control Surface Water
   Surface water runoff originating upgrade of exposed areas shall be controlled to reduce erosion and sediment loss during the period of exposure.
E. Control Sedimentation
   All land-disturbing activity is to be planned and conducted so as to restrain off-site sedimentation damage.
F. Manage Stormwater Runoff
   When the increase in the velocity of stormwater runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving watercourse, plans are to include measures to control the velocity at the point of

discharge so as to minimize accelerated erosion of the site and increased sedimentation of the stream.

12.10. 4 Mandatory Standards for Land-Disturbing Activity

No land-disturbing activity shall occur except in accordance with the mandatory standards listed below. Except where more stringent standards are specified in this Ordinance, the technical standards and specifications contained in the North Carolina Erosion and Sediment Control Planning and Design Manual shall also apply.

A. Buffer Zones
Except where more stringent buffer requirements are specified in Article 8, Erosion Protection, and/or Article 9, Landscaping and Buffering, the following requirements shall apply:
1. No land-disturbing activity during periods of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25% of the buffer zone nearest the land-disturbing activity. This subsection shall not apply to a land-disturbing activity in connection with the construction of facilities to be located on, over or under a lake or natural watercourse; and
2. Unless otherwise provided, the width of a buffer zone is measured from the edge of the water to the nearest edge of the disturbed area, with the 25% of the strip nearer the land-disturbing activity containing natural or artificial means of confining visible siltation.

B. Stabilization of Disturbed Land
The angle for disturbed land shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control devices or structures.
1. Ongoing Activity. Land left exposed shall be planted or otherwise provided with temporary ground cover, devices, or structures sufficient to restrain erosion,, within the applicable time period after completion of any phase of grading or period of inactivity as follows: seven days for a steep slope; ten days for a moderate slope; 14 days for land with no slope or inclination. For purposes of this section, a moderate slope means an inclined area, the inclination of which is less than or equal to three units of horizontal distance to one unit of vertical distance; and a steep slope means an inclined area, the inclination of which is greater than three units of horizontal distance to one unit of vertical distance. No other criteria apply.

> ***Commentary:*** *The moderate and steep slope definitions in this section are mandated by state law (S.L. 2009-486) for sedimentation and erosion control purposes. This steep slope definition differs from the steep slope definition under UDO Sec. 8.8, Steep Slope Protection Standards, which is otherwise applicable throughout the UDO.*

2. Completed Activity. For any area of land-disturbing activity where grading activities have been completed, temporary or permanent ground cover

sufficient to restrain erosion shall be provided as soon as practicable, but in no case later than seven days after completion of grading.

C. Stabilization of Sedimentation and Erosion Control Devices
Whenever land-disturbing activity exceeds 12,000 square feet, the person conducting the land-disturbing activity shall install such sedimentation and erosion control devices and practices as are sufficient to retain the sediment generated by the land-disturbing activity within the boundaries of the tract during construction upon and development of such tract, and shall plant or otherwise provide a temporary ground cover sufficient to restrain erosion generated by such devices and practices within seven days.

D. Erosion and sedimentation control measures, structures and devices shall be so planned, designed and constructed as to provide protection from the calculated maximum peak of runoff from the 25-year storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices," or other calculation procedures acceptable to the Sedimentation and Erosion Control Officer, or designee.

E. Each sediment basin or trap in the Suburban or Rural Tier shall have a minimum volume of 3,600 cubic feet per acre of disturbed area and a minimum surface area of 435 square feet per cfs of Q_{25} (25-year storm) peak inflow. Each sediment basin or trap in the Downtown, Compact Neighborhood, or Urban Tier shall have a minimum volume of 1,800 cubic feet per acre of disturbed area and a minimum surface area of 325 square feet per cfs of Q_{25} peak inflow. A skimmer shall be used in each sediment basin or trap.

F. Sediment basins and traps shall be designed and constructed such that the basin will have a settling efficiency of at least 70% for the 40-micron (0.04mm) size soil particle transported into the basin by the runoff of that two-year storm that produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Service's "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of the State or the United States or any generally recognized organization or association.

G. Sediment basins and traps shall not be installed in perennial or intermittent streams.

H. Existing ponds and lakes shall not be used as sediment basins or traps.

I. One party shall retain operational control of any basin or trap. Sold outparcels shall be permitted separately.

J. Newly constructed open channels shall be designed and constructed with side slopes no steeper than two horizontal to one vertical if a vegetative cover is used for stabilization, unless soil conditions permit steeper slopes or where the slopes are stabilized by using mechanical devices, structural devices or other acceptable ditch liners. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion.

K. Additional areas may be added per the criteria enumerated in this section only if the basin or trap is properly installed and maintained.

L. In high quality water (HQW) zones, uncovered areas shall be limited at any time to a maximum total area of 20 acres. Only the portion of the land-disturbing activity within a HQW zone shall be governed by this section. Larger areas may be uncovered with the written approval of the Director of DENR.

12.10. 5 Permanent Downstream Protection of Stream Banks, Channels and Slopes

A. Intent
Stream banks and channels downstream from any land-disturbing activity shall be protected from increased degradation by accelerated erosion caused by increased velocity of runoff from the land-disturbing activity.

B. Performance Standard
The land-disturbing activity shall be planned and conducted such that the velocity of stormwater runoff in the receiving watercourse at the point of discharge resulting from a 25-year storm after development shall not exceed the greater of:

1. The velocity specified according to the soil type in the following table, for a point of discharge into a receiving watercourse with bare soil or rock banks or bed;

Materials		**Maximum Permissible Velocities**	
Name	**Description**	**FPS [1]**	**MPS [2]**
Fine Sand (noncolloidal)	Cecil fine sandy loam, Pinkston fine sandy loam	2.5	0.8
	Appling sandy loam, Creedmoor sandy loam, Helena sandy loam, Mayodan sandy loam, Wedowee sandy loam, Wilkes sandy loam, White shore sandy loam		
Silt Loam (noncolloidal)	Georgeville silt loam, Herndon silt loam, Lignum silt loam, Roanoke silt loam	3	0.9
Ordinary Firm Loam	Iredell loam, Mecklenburg loam, Wahee loam, Davidson clay loam, White Store clay loam-eroded		
Fine Gravel		5	1.5
Stiff Clay (very colloidal)	Iredell-Urban land complex, White Store-Urban land complex, Mayodan-Urban land complex	5	1.5
Graded, Loam to Cobbles (noncolloidal)	Tatum gravelly silt loam, Nason stony silt loam, Goldston slaty (channery) silt loam	5	1.5
Graded, Silt to Cobbles (colloidal)		5.5	1.7
Alluvial Silts (noncolloidal)	Wehadkee silt loam, Congaree silt loam, Chewacla silt loam, Cartecay silt loam	3.5	1.1
Alluvial Silts (colloidal)		5	1.5
Coarse Gravel (noncolloidal)		6	1.8
Cobbles and shingles		5.5	1.7
Shales and Hard Pans		6	1.8

Materials		Maximum Permissible Velocities	
Name	**Description**	**FPS [1]**	**MPS [2]**
Gullied Land and Urban Land	These soil types are variable with respect to texture, both colloidal and noncolloidal. The amount of cut, fill and grading into the original soil could affect velocity. Average velocity is 3.0.	3	0.9
[1] **FPS**: Feet per second [2] **MPS**: Meters per second			

2. The velocity specified according to the type of vegetation and depth of flow in the following table, for a point of discharge into a vegetated receiving watercourse; or

Vegetatively Protected Watercourses and Point of Stormwater Discharge			
Group No.	**Vegetation**	**Depth of Flow (feet)**	**Maximum Permissible Velocity**
1	Bermudagrass	up to 1 greater than 1	4 6
2	Reed canarygrass; Kentucky bluegrass	up to 1 greater than 1	3 6
3	Grass and legumes, mixed; Weeping lovegrass	up to 1 greater than 1	3 4
4	Annuals: Annual lespedeza (KOBE); Sudangrass Small grain: (Rye, Oats, barley); Ryegrass	up to 1 greater than 1	2.5 2.5
Notes: Do not use vegetative protection on longitudinal parallel to flow slopes steeper than 10% except for side slopes. Annuals: use only as temporary protection until permanent cover is established.			

3. The receiving watercourse determined for the 25-year storm prior to development.

C. If the conditions enumerated in paragraph B, Performance Standard, of this subsection cannot be met, the channel below the discharge point shall be designed and constructed to withstand the expected velocity.

D. Slope Protection

When soils with slopes as indicated in the following table occur between a point of stormwater discharge and the next confluence of concentrated stormwater runoff, such areas, on- or off-site, shall be protected from accelerated erosion

by diverting the stormwater discharge from those soil surfaces. Diversion may include the provision of piped, paved or armored storm drainage facilities.

Critical Soils of Durham County		
ApC	Appling sandy loam	6-10% slopes
CfC	Cecil fine sandy loam	6-10% slopes
CrC	Creedmoor sandy loam	6-10% slopes
DaD	Davidson clay loam	6-10% slopes
GeC	Georgeville silt loam	6-10% slopes
GeD	Georgeville silt loam	10-15% slopes
GlE	Goldston slaty silt loam	10-25% slopes
GlF	Goldston slaty silt loam	25-45% slopes
GrC	Granville sandy loam	6-10% slopes
Gu	Gullied land	Clayey materials
HeC	Helena sandy loam	6-10% slopes
HrC	Herndon silt loam	6-10% slopes
HsC	Herndon stony silt loam	2-10% slopes
IrC	Iredell loam	6-10% slopes
IyC	Iredell-Urban land complex	6-10% slopes
MfC	Mayodan sandy loam	6-10% slopes
MfD	Mayodan sandy loam	10-15% slopes
MfE	Mayodan sandy loam	15-25% slopes
MrC	Mayodan-Urban land complex	0-10% slopes
MrD	Mayodan-Urban land complex	10-15% slopes
MuC	Mecklenburg loam	6-10% slopes
NaD	Nason silt loam	10-15% slopes
NaE	Nason silt loam	15-25% slopes
NoD	Nason stony silt loam	10-15% slopes
PfC	Pinkston fine sandy loam	2-10% slopes
PfE	Pinkston fine sandy loam	10-25% slopes
TaE	Tatum gravelly silt loam	15-25% slopes
Ur	Urban land	
WmD	Wedowee sandy loam	10-25% slopes
WmE	Wedowee sandy loam	15-25% slopes
WsC	White Store sandy loam	6-10% slopes
WsE	White Store sandy loam	10-25% slopes
WvC2	White Store clay loam	2-10 % slopes, eroded
WvE2	White Store clay loam	10-25% slopes, eroded
WwC	White Store-Urban land complex	0-10% slopes
WwE	White Store-Urban land complex	10-25% slopes
WxE	Wilkes sandy loam	10-25% slopes

E. **Acceptable Management Measures**
Measures applied alone or in combination to satisfy the intent of this section are acceptable if there are no objectionable secondary consequences. The State Sedimentation Control Commission recognizes that the management of stormwater runoff to minimize or control downstream channel and bank erosion is a developing technology. Innovative techniques and ideas will be considered and may be used when shown to have the potential to produce successful results. Some alternatives are to:

3. Avoid increases in surface runoff volume and velocity by including measures to promote infiltration to compensate for increased runoff from areas rendered impervious;
4. Avoid increases in stormwater discharge velocities by using vegetated or roughened swales and waterways in lieu of closed drains and high velocity paved sections;
5. Provide energy dissipaters at outlets of storm drainage facilities to reduce flow velocities at the point of discharge. These may range from simple rip-rapped sections to complex structures; and
6. Protect watercourses subject to accelerated erosion by improving cross sections and/or providing erosion-resistant lining.

F. Exceptions
This section shall not apply where it can be demonstrated, to the satisfaction of the Sedimentation and Erosion Control Officer or designee, that stormwater discharge velocities will not create an erosion problem in the receiving watercourses.

12.10.6 Borrow and Waste Areas

When the person conducting the land-disturbing activity is also the person conducting the borrow or waste disposal activity, areas from which borrow is obtained and which are not regulated by the provisions of the Mining Act of 1971, and waste areas for surplus materials other than landfills regulated by the State Department of Environmental and Natural Resources Division of Solid Waste Management, shall be considered as part of the land-disturbing activity where the borrow material is being used or from which the waste material originated. When the person conducting the land-disturbing activity is not the person obtaining the borrow and/or disposing of the waste, these areas shall be considered a separate land-disturbing activity.

12.10. 7 Access and Haul Roads

Temporary access and haul roads, other than public roads, constructed or used in connection with any land-disturbing activity shall be considered a part of such activity.

12.10. 8 Operations in Lakes or Natural Watercourses

Land-disturbing activity in connection with construction in, on, over, or under a lake or natural watercourse shall be planned and conducted in such a manner as to minimize the extent and duration of disturbance of the stream channel. The relocation of a stream, where relocation is an essential part of the proposed activity, shall be planned

and executed so as to minimize changes in the stream flow characteristics, except when justification for significant alternation to flow characteristic is provided.

12.10. 9 Responsibility for Maintenance

During the development of a site, the person conducting the land-disturbing activity shall install and maintain all temporary and permanent erosion and sedimentation control measures as required by the North Carolina Sedimentation Pollution Control Act of 1973, as amended, and all rules and orders adopted pursuant to it (the Act), this section, rules or orders adopted or issued pursuant to this section or the Act, or an approved sedimentation and erosion control plan. After site development, the land owner or person in possession or control of the land shall install and/or maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road or street right-of-way or easement accepted for maintenance by a governmental agency.

12.10.10 Additional Measures

Whenever the Sedimentation and Erosion Control Officer, or designee, determines that significant sedimentation is occurring as a result of land-disturbing activity, despite application and maintenance of protective practices, the person conducting the land-disturbing activity will be required to and shall take the additional protective action directed.

Sec. 15.1 Violations; Violators

15.1.1 Applicability
Sec. 15.5, Sedimentation and Erosion Control Enforcement and Penalties, shall apply to enforcement of provisions of this Ordinance and state statute or regulation governing sedimentation and erosion control. Sec. 15.6, Floodplain and Flood Damage Protection Enforcements and Penalties, shall apply to enforcement of provisions of this Ordinance and state statute or regulation governing floodplain and flood damage protection. The provisions of those sections, where applicable, shall supersede conflicting provisions of this Article.

15.1.2 Violation

A. It shall be unlawful and a violation of this Ordinance to establish, create, expand, alter, occupy, or maintain any use, land development activity, or structure, including but not limited to signs and buildings, that violates or is inconsistent with any provision of this Ordinance or any order, approval, or authorization issued pursuant to this Ordinance . Approvals and authorizations include, but are not limited to: special use permits, sign permits, certificates of compliance, variances, building permits, development plans, site plans, and conditions of such permits, variances, and plans.

B. It shall also be a violation to engage in any construction, land development activity, or use, without all approvals and authorizations required by this Ordinance.
C. Each day of a violation may be considered a separate and distinct violation.

15.1.3 Violator

A. General
Violators may include any person who owns, leases, occupies, manages, or builds any structure or engages in any land development activity in violation of this Ordinance and any person who owns, leases, or occupies a use in violation of this Ordinance. A violation may be charged against more than one violator.

> ***Commentary:*** *The definition of violator and the ability to charge more than one violator means that both tenant and landlord, where applicable, may be in violation and subject to penalties.*

B. Sedimentation and Erosion Control (Sec. 3.8, Sec. 12.10, Sec. 15.5)
The person responsible for violations of Sec. 3.8, Sedimentation and Erosion Control or Sec. 12.10, Sedimentation and Erosion Control, or Sec. 15.5, Sedimentation and Erosion Control Enforcement and Penalties, consistent with the provisions of NCGS, §113A-64 shall mean:
1. The developer or other person who has, or holds himself out as having, financial or operation control over the land disturbing activity; or
2. The landowner or person in possession, or control of the land when he or she has directly or indirectly allowed the land disturbing activity or has benefited from it, or has failed to comply with the North Carolina Sedimentation Pollution Control Act of 1973, as amended, and all rules and orders adopted pursuant to it (the Act), Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, Sec. 15.5, Sedimentation and Erosion Control Enforcement and Penalties, rules or orders adopted or issued pursuant to those sections or the Act, or an approved sedimentation and erosion control plan.

15.1.4 Responsibility

The Planning and/or Inspections Director, and/or County Engineer, or appropriate designees, shall enforce this Ordinance and the remedies authorized under this section. The responsible individual shall have the authority to settle any violations that involve the payment of money to the governing entity in exchange for a written release from actual or potential claims.

Sec. 15.5 Sedimentation and Erosion Control Enforcement and Penalties

15.5.1 Agents, officials or other qualified persons authorized by the Sedimentation and Erosion Control Officer or designee may periodically inspect land-disturbing activities to ensure compliance with the North Carolina Sedimentation Pollution Control Act of 1973, as amended, and all rules and orders adopted pursuant to

it ("the Act), Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, rules or orders adopted or issued pursuant to these sections or the Act, or an approved sedimentation and erosion control plan and to determine whether the measures utilized or required in the plan are effective in restraining erosion and retaining sediment resulting from land-disturbing activity. Notice of the right to inspect shall be included in the notification of plan approval of each sedimentation and erosion control plan.

15.5.2 No person shall willfully resist, delay or obstruct an authorized representative, employee or agent of Durham County while that person is lawfully inspecting or attempting to inspect a land-disturbing activity under this section.

15.5.3 If it is determined that a person engaged in land-disturbing activity has failed to comply with the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, rules or orders adopted or issued pursuant to those sections of the Act, or an approved sedimentation and erosion control plan, a notice of violation shall be served upon that person. The notice may be served by any means authorized under NCGS § 1A-1, rule 4. The notice shall specify a date by which the person must comply with the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, rules or orders adopted pursuant to those sections or the Act, or an approved sedimentation and erosion control plan and inform the person of the actions that need to be taken to comply. If the person engaged in land-disturbing activity fails to comply within the time specified, enforcement action shall be initiated.

15.5.4 The Sedimentation and Erosion Control Officer, or designee shall have the power to conduct such investigations as he/she may reasonably deem necessary to carry out their duties as prescribed in this section, and for this purpose to enter at reasonable times upon any property, public or private, for the purpose of investigating and inspecting the sites of any land-disturbing activity.

15.5.5 The Sedimentation and Erosion Control Officer, or designee shall also have the power to require written statements, or the filing of reports under oath, with respect to land-disturbing activity.

15.5.6 Revocation of Permits

A. The County Engineer shall have the power to revoke land-disturbing permits issued pursuant to Sec. 3.8, Sedimentation and Erosion Control, and Sec. 12.10, Sedimentation and Erosion Control. When the Sedimentation and Erosion Control Officer, or designee, proposes to the County Engineer that a land-disturbing permit be revoked, the Officer or designee shall serve the permittee or other responsible person with a notice of intent to revoke specifying the time and date of a pre-termination hearing to be held before the County Engineer. The notice shall be delivered at least three working days, Monday through Friday, before the date specified for the pre-termination hearing.
B. Should the County Engineer determine that the land disturbing permit should be revoked, he/she shall serve the permittee or other responsible person with a

notice of revocation. Upon receipt of the notice of revocation, the responsible person shall immediately cause or order the cessation of all land-disturbing activities except those activities which are specifically directed towards bringing the site into a state of compliance.

C. The person responsible for the land-disturbing activity may appeal the revocation of a land-disturbing permit to the Board of Commissioners by submitting a written demand to the Clerk to the Board of Commissioners for a hearing within 15 days after receipt of the written notice of revocation. The written demand must specify, in detail, the factual and/or legal basis for the appeal. No grounds other than those so specified may be argued.

D. No person shall resume or continue any land-disturbing activity other than those necessary to bring the site into a state of compliance after receipt of a revocation notice and before reissuance of a land-disturbing permit or decision of the Board of Commissioners reinstating a land-disturbing permit. After the Sedimentation and Erosion Control Officer or designee has inspected the site and approved the remedial work, the responsible party may reapply for a land-disturbing permit. The fee for reapplication shall be 100% of the current application fee.

15.5.7 Civil Penalties

A. Any person who violates any of the provisions of the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, or rules or orders adopted or issued pursuant to those sections or the Act, or who initiates or continues a land-disturbing activity for which a sedimentation and erosion control plan and/or land-disturbing permit is required except in accordance with such plan or permit shall be subject to civil penalties. The maximum civil penalty for a violation shall be $5,000.00, or $5,000.00 per day for a continuing violation. Civil penalties may be imposed from the date a violation was commenced. Each day of continuing violation shall constitute a separate violation.

B. The Sedimentation and Erosion Control Officer or designee shall impose the civil penalties authorized by this section. The Sedimentation and Erosion Control Officer or designee shall notify the person upon whom the civil penalties are imposed, of the amount of the penalties and the reason for the penalties. In determining the amount of the penalties the Sedimentation and Erosion Control Officer or designee shall consider the degree and extent of harm caused by the violation, the cost of rectifying the damage, the amount of money the violator saved by noncompliance, whether the violation was committed willfully, and the prior record of the violator in complying or failing to comply with the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, rules or orders adopted or issued pursuant to those sections or the Act, or an approved sedimentation and erosion control plan. The notice of civil penalties shall be served by any means authorized under NCGS §1A-1, rule 4, and shall direct the violator to either pay or contest the civil penalties, within 30 days after receipt of the notice by filing a petition for a contested case under NCGS §150B, art. 3. The administrative law judge hearing the matter shall make a recommended decision to the Board of Commissioners. If either party wishes to challenge the recommended decision, they must file with the Clerk to the Board of Commissioners, and serve on the other parties,

and the Office of Administrative Hearings, specific exceptions and objections, detailing the errors of fact or law they contend exist within the recommended decision, and other written argument they wish to submit, within 30 days after the issuance of same. Other parties shall file any response they wish to make to a submission of exceptions and objections within 30 days of service of same, but may not use this subsequent filing to submit new, or additional, exceptions and objections of their own. The recommended decision and any written submissions of the parties will be reviewed by the Board of Commissioners within 90 days after the official record in this matter is served upon the Clerk to the Board of Commissioners by the Office of Administrative Hearings. The Board of Commissioners shall adopt or modify the recommended decision consistent with the provisions of NCGS. §150B-36. Appeal of the decision of the Board of Commissioners shall be in accordance with NCGS §150B, art. 4.

C. If payment is not received within 30 days after demand for payment is made the matter will be referred to the County Attorney's Office for initiation of a civil action to recover the amount of the civil penalties. Civil penalties that are not contested are due when the violator is served with a notice of civil penalties. Civil penalties that are contested are due at the conclusion of the administrative and judicial review.

D. The clear proceeds of civil penalties collected pursuant to this section shall be credited to the Durham Public Schools in accordance with the provisions of NCGS §115C-437.

15.5.8 Criminal Penalties

Any person who knowingly or willfully violates any provision of the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, or rules or orders adopted or issued pursuant to those sections or the Act, or who knowingly or willfully initiates or continues a land-disturbing activity for which an approved sedimentation and erosion control plan and/or land-disturbing permit is required except in accordance with such plan or permit shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed $5,000.00, as provided in NCGS §113A-64.

15.5.9 Enforcement Alternatives

Violation of any provision of this Article shall result in forfeiture of any applicable security or portion thereof required under Sec. 3.8.3.

A. Whenever there is reasonable cause to believe that any person is violating or threatening to violate the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, any rule or order adopted or issued pursuant to those sections or the Act, or an approved sedimentation and erosion control plan, the County Attorney may, either before or after the institution of any other action or proceeding authorized by this section, institute a civil action as provided in Sec. 15.3.3, Injunctive Relief in Superior Court, for injunctive relief to restrain the violation or threatened violation in superior court.

B. The institution of an action for injunctive relief under this section shall not relieve any party to such proceedings from any civil or criminal penalties assessed under this section.
C. Land-disturbing activities undertaken without first obtaining a land-disturbing permit, but which are required by Sec. 3.8, Sedimentation and Erosion Control, to obtain a land-disturbing permit, shall be subject to a permit fee of 200% of the current applicable fee, in addition to any civil penalties assigned per Sec. 15.5.7, Civil Penalties.
D. Conveyance of the property subject to the permit, in whole or in part, shall not terminate the permit holder's obligations under the Act, this section, Sec. 3.8, Sedimentation and Erosion Control, Sec. 12.10, Sedimentation and Erosion Control, any rule or order adopted or issued pursuant to those sections or the Act, or an approved sedimentation and erosion control plan until such time as a substitute, or succeeding, permit is approved by the Sedimentation and Erosion Control Officer or designee.

15.5.10 Restoration of Areas Affected by Failure to Comply

The Sedimentation and Erosion Control Officer or designee may require a person who engaged in a land-disturbing activity and failed to retain sediment generated by the activity, as required by NCGS §113A-57(3) and Sec. 12.10, Sedimentation and Erosion Control, to restore the waters and land affected by the failure so as to minimize the detrimental effects of the resulting pollution by sedimentation. This authority is in addition to any other civil or criminal penalty or injunctive relief authorized under this section or the Act.

APPENDIX E
City of Durham

SEDIMENTATION AND EROSION CONTROL SITE INSPECTION PROTOCOL

Date: August 5, 2008

The Sediment and Erosion Control(S & E) Division of the Durham County Engineering Department is charged with enforcement of the Durham City/County Erosion Control Unified Development Ordinance. The engine for enforcement lies with the performance of field inspections at active construction sites. There are on average, 170 active project sites per month. Each active project is field inspected at least once during each calendar month. Historically, 10-15% of these sites are inspected multiple times each calendar month. Compliance issues, heavy rain events, project size/complexity and citizen complaints/inquiries all serve to trigger additional inspections of particular sites. For example, additional inspections can be generated as a result of citizen complaints about activity that has been started, sometimes without notification to this office. Finally, newly submitted projects more often than not have a requirement for tree protection fencing attached to them. This office generates an initial inspection report related to the tree fence installation, prior to issuing a land disturbance permit. Once the permit is issued, common practice is to perform a field inspection at the newly permitted site within ten days of the permit issuance. Historically, the above activities have generated an average of between 180 and 200 inspections per month which equates to 65 inspections per inspector per month.

The S & E division has a sophisticated database that serves as a tracking device to insure that all active projects are inspected each calendar month. At the beginning of each month, an active project list is generated. As inspectors perform field inspections, they enter the completed inspection dates into the database. Subsequently, the inspected projects are removed from the monthly uninspected project list, leaving a clear account of those projects still in need of inspection during that calendar month. At the end of each month a list of completed inspections, by project, is prepared.

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APPENDIX F
City of Durham
Code of Ordinances

STORMWATER PERFORMANCE STANDARDS FOR DEVELOPMENT

Chapter 70, Article X

The following ordinance applies to development and redevelopment that occurs in any part of the City. The ordinance text may be found at the following link: www.municode.com/resources/gateway.asp?pid=19967&sid=33
(Navigate to Chapter 70, Article X.)

The current requirements were adopted effective June 15, 2010, modifying the City's Phase II Ordinance adopted March 17, 2009. The Phase II Ordinance replaced previous requirements to control peak flow and to control nitrogen in stormwater runoff from development in the Neuse River Basin. Peak flow requirements date back to 1997, while Neuse Stormwater requirements became effective in 2001, limiting nitrogen export to 3.6 pounds per acre per year.

Current requirements limit nitrogen export to 2.2 pounds per acre per year and phosphorous export to 0.5 pounds per acre per year. A history of the City's Stormwater control requirements and a summary of the most recent changes is provided below together with the current ordinance.

Ordinance History and Summary of Major Changes in June 15, 2010 Code **F-2**

Article X **Stormwater Performance Standards for Development** **F-5**
Sec. 70-736 Purpose, Definitions, and Applicability F-5
Sec. 70-737 Pollutant and Nutrient Control Requirements F-8
Sec. 70-738 Peak Runoff Control Requirements F-13
Sec. 70-739 BMP Design and Approval Requirements F-14
Sec. 70-740 BMP Maintenance F-15
Sec. 70-741 Buffer Requirements F-15

Ordinance History and Summary of Major Changes Between March 16, 2009 Ordinance And June 15, 2010 Ordinance By Section:

Prior to adoption of the City's Phase II Post Construction Ordinance in 2009, the following requirements were in effect:

Water Supply Overlay Requirements. These requirements are contained in the UDO in Article 8 and require water quality treatment based on the water supply overlay and impervious cover proposed. (city/county requirements predate state rules and began in 1985)

Peak Flow Requirements. The 2- and 10-year discharges are required to be analyzed for each project to determine the effects of any increase in discharge. Detention may be required. (Effective April 23, 1997.)

Neuse Basin Regulations. There are requirements for nitrogen control, 1-year discharge control, and buffer requirements. This ordinance incorporates the existing Neuse requirements into one ordinance for the Neuse and Cape Fear Basins effectively covering the entire City. (Effective March 9, 2001)

Peak flow requirements applied throughout the city. Neuse and Water Supply Overlay water quality requirements covered approximately 60% of the City.

To address Phase II Post Construction requirements in NCS000249, the City's adopted Stormwater Performance Standards for Development, effective March 17, 2009. This ordinance replaced the peak flow and Neuse requirements with a comprehensive ordinance. The Water Supply Overlay requirements were left intact as independently applicable requirements, although the water quality treatment provisions are less stringent than those required under the March 17, 2009 ordinance.

The Phase II Post Construction Ordinance included numerous enhancements. Nitrogen export limits adopted under the Neuse Nutrient Sensitive Waters Strategy were extended to the Cape Fear River Basin as an interim measure for Jordan Lake. The ordinance implemented 'common plan of development' based on cumulative disturbance thresholds, with various effective dates in the definitions for provisions carried over from prior ordinances. The 2009 ordinance used ranges of impervious cover to establish minimum performance standards, such as requiring that low density projects with less than 24% Impervious Cover (IC) provide treatment of all piped stormwater flows, and requiring projects between 24% and 37% IC to also address total suspended solids (TSS). Nitrogen requirements for projects in excess of 37% IC will typically require a treatment train approach so explicit requirements were considered unnecessary. Because the ordinance extended nitrogen control requirements to areas for which state Neuse nutrient offset mitigation programs are not available, the ordinance added alternative provision, including land banking, as provided for in the Neuse River Nutrient Sensitive Waters Model Stormwater Program.

The Phase II Post Construction Ordinance was revised, effective June 15, 2010 to further enhance pollution control and modify options available for compliance. Nitrogen export limits were reduced jurisdiction-wide from 3.6 pounds per acre per year to 2.2 pounds per acre per year to address forthcoming Jordan Lake and Falls Lake Nutrient Sensitive Waters Strategies. A jurisdiction-wide phosphorous export limit was added as an interim measure, pending availability of a new accounting tools being developed for Jordan Lake to calculate nitrogen and phosphorous loading from development sites. The threshold for low density development was reduced from 24% to 16% impervious cover, and the range under which both TSS and nutrient controls are required was expanded to 16% to 42% IC. Provisions were added regarding BMP selection in watersheds subject to bacteria TMDLs.

A section-by-section description of the changes is provided below.

70-736 Purpose, definitions, and applicability

1. Add phosphorus and bacteria to Purpose.
2. Add regional stormwater facilities to definition of Common Plan of Development.
3. Add effective date for phosphorus, 1-year peak control, and 2- and 10-year peak control.
4. Applicability section expanded this to include utility permits and construction drawings where a site plan is not required.

70-737 Pollutant and Nutrient Control Requirements

1. Low density provision. 85% TSS treatment required for all non vegetated conveyances (piped) for projects < 16% (previously 24%) impervious.

2. Expanded the range over which TSS treatment is required. 85% TSS treatment for all impervious surfaces required for projects 16% to 42% (previously 24% to 37%) impervious.

3. Nitrogen (2.2 lb/ac/yr) and Phosphorus (0.5 lb/ac/yr) control required for projects with >16% impervious.

4. Land Bank Donor Option – phosphorus added.

5. Onsite Requirements – For projects that do not qualify for an exception, the onsite requirement for nitrogen is 40% (previously 30%). Note that the Falls Rules may require 50% or 60% onsite before offsite methods are used. 40% onsite reduction required for phosphorus added.

6. For projects that qualify for the greater than or equal to 90% impervious and located in the Compact Neighborhood or Downtown Tiers or in a Suburban Transit Area, 20% onsite Nitrogen and 20% onsite Phosphorus reduction required (previously 0% nitrogen treatment onsite).

7. For projects that qualify for the between 70% and 90% impervious and located in the Compact Neighborhood or Downtown Tiers or in a Suburban Transit Area, 30% onsite Nitrogen and 30% onsite Phosphorus reduction required (previously 15% nitrogen onsite).

8. Added that location of Land Bank donor parcel must be within the City of Durham or Durham County.

9. Expanded the area that counts as 100% from 50' to 100' to from 50' to 150' stream buffer area. Clarified that area outside of a 150 ft (previously 100') stream buffer counts as less. Only 80% of the property outside the 150' buffer shall be credited if it is within a designated headwater area. Added if the area is located outside a designated headwater area and outside the 150' stream buffer area then only 65% of the property shall be credited.

10. Add that Nutrient Banks must provide an additional 5% above the required amount unless the Nutrient Bank is located within the City.

11. Alternate nitrogen and phosphorus control – Added that the existing load for nitrogen must be reduced by 60% (previously 40%) and the existing phosphorus load must be reduced by 65%.

12. Added that if your project is within an area that is subject to a TMDL for bacteria then if you are required to provide a BMP, at least one of the provided BMPs must be rated as medium or high for its ability to remove bacteria. Refer to the Table 4-1 in the NCDENR Stormwater BMP Manual.

Section 70-738 Peak runoff control requirements

1. Delete 10% allowance on the 1-year storm.

2. Added control of other design storms such as the 100-year storm (previously 1-, 2-, and 10-year storm) can be required when circumstances such as flooding exist. This item was already in the Reference Guide for Development.

70-739 BMP Design and Approval Requirements

1. Added language from the UDO on BMP ownership, agreements, and assurance of maintenance and construction.

2. Added voluntary BMP definition and requirements. Voluntary BMP that in the future are used for requirements will be required to comply with all applicable permit fees and bonding requirements.

70-740 BMP Maintenance

1. No changes.

70-741 Buffer Requirements

1. New UDO stream buffer requirements will be going into effect in the next few months. They have been submitted to NCDENR for review. They incorporate Jordan

Lake Buffer Rules, Neuse Buffer Rules and EEUDO changes. A draft for the UDO changes can be found at:

http://www.durhamnc.gov/council/ord_changes/

ARTICLE X. STORMWATER PERFORMANCE STANDARDS FOR DEVELOPMENT

Sec. 70-736. Purpose, definitions, and applicability.

(a) *Purpose*. The purpose of Article X is to further the health, safety and general welfare and convenience of the public through:

(1) Protecting receiving waters in the Neuse River Basin (which includes the Falls Basin) and Cape Fear River Basin impacted by stormwater runoff discharged from development within the City of Durham and complying with rules adopted to protect those basins. .
(2) Complying with the City of Durham's municipal stormwater National Pollutant Discharge Elimination System permit, issued under the authority of Section 402(p) of the Clean Water Act and implementing regulations at 40 CFR Part 122.26.
(3) Complying with the various general statutes of North Carolina regarding water quality including but not limited to Article 4A 113A-70, 113A-71, and Article 15A 02B .0265.
(4) Continuing the City's compliance with Neuse River Basin nutrient sensitive waters management strategy, 15A NCAC 02B.0235 *et seq.*
(5) Controlling pollutant loads in stormwater runoff from development by establishing performance standards for total suspended solids, phosphorus, bacteria, and nitrogen, by protecting buffers, and by managing peak flows that cause or contribute to stream erosion.
(6)Reducing the impact on downstream properties of peak runoff from land disturbing activities.

(b) *Definitions*. For the purposes of this Article, the terms and phrases below shall be defined as follows and shall apply within this Article regardless of capitalization:.

Best management practice or BMP means stormwater and runoff pollution control devices or practices designed to reduce the amount of flow, pollutants, or nutrients contained in discharges to the stormwater conveyance system and receiving waters, which meet standards set by the City of Durham Public Works Department;

Cape Fear River Basin or Cape Fear Basin means land that drains to the Cape Fear River as determined by the Durham Planning Department and as shown on a map that shall be maintained by the Durham Planning Department.

Common Plan of Development means construction or land disturbance in which a development plan or site plan has been approved for a development that is then built in stages or phases, not necessarily by the same owner, or individual activities are coordinated. It may be identified through indicia such as signs, notices, advertising, loan applications, drawing, plats, blueprints, marketing plans or sales pitch, contracts, permit applications, zoning request, or computer design; or physical demarcation including but not limited to boundary signs, lot stakes, or surveyor markings indicating that construction activities may occur on a specific plot. It can include one or more owners and/or operators. It can include properties served by a regional stormwater facility.

Development means any land disturbance that requires site plan or subdivision approval or similar approvals from the Durham City-County Planning Department, or construction drawing approval where a site plan is not required, or a building permit, or issuance of a utility permit. Development shall not include agriculture, mining or forestry activities.

Director of Public Works means the Director of the Public Works Department of the City of Durham, or designee.

Effective Date for the 1-year peak flow control means March 9, 2001 for land in the Neuse River Basin, and March 17, 2009 for land in the Cape Fear Basin.

Effective Date for the 2-year and 10-year peak flow control means April 23, 1997 for land in the Neuse River Basin and for land in the Cape Fear Basin.

Effective Date for Nitrogen Control means March 9, 2001 for land in the Neuse River Basin, and March 17, 2009 for land in the Cape Fear Basin.

Effective Date for Phosphorus Control means June 15, 2010 for the land in the Neuse River Basin and the Cape Fear Basin.

Land Disturbance means a change in the topography of land, and includes but is not limited to grubbing, stump removal, removal of topsoil, coarse or fine grading, and disturbance to the subgrade.

Low Density Project means development that has less than 16% impervious area and provides for the use of vegetated conveyances to the maximum extent practicable. Piped stormwater flow in Low Density Projects is limited to road crossings and driveway access.

Neuse River Basin or Neuse Basin means land that drains to the Neuse River as determined by the Durham Planning Department and as shown on a map that shall be maintained by the Durham Planning Department.

(c) *Applicability, Implementation, and Coordination with other ordinances.*

(1) Unless otherwise exempted by the particular subdivisions of this Article, this Article shall apply to all Development in which the application to the City for approval is made on or after the respective Effective Dates for Nitrogen and Phosphorus Control where the Development consists of:

a. single-family detached, duplex, park, or recreational development that will result in land disturbance of greater than one acre; or

b. other residential (including multifamily and townhomes), office, industrial, institutional, and commercial development that will result in land disturbance of greater than one-half acre; or

c. projects that are part of a common plan of development that where the successive plans cumulatively exceed the above thresholds.

(2) Where these requirements conflict with or differ from other regulatory requirements including, but not limited to, the Unified Development Ordinance for the City of Durham, the stricter of the requirements shall control.

(3) Development plans proposed for rezonings in the City of Durham shall include, at a minimum, conceptual information ensuring compliance with these Stormwater Performance Standards.

Sec. 70-737. Pollutant and Nutrient control requirements.

(a) *Suspended Solids Control Requirement Where Impervious Area is Less than 16%.*

(1) Development described in Sec. 70-736(c)(1) that is less than 16% impervious and does not qualify as Low Density, including projects that discharge to existing stormwater systems, shall provide treatment of all stormwater runoff from impervious surfaces conveyed in non-vegetated conveyances with such treatment designed to treat runoff from the first 1-inch of rainfall to remove eighty-five percent (85%) Total Suspended Solids. Non-vegetated conveyances do not include piping to achieve road or driveway crossings.

(2) For impervious areas that cannot be reasonably treated such as non-NCDOT offsite transportation improvements or small areas at the edge of the site, overtreatment of onsite areas and/or treatment of runon from offsite right-of-way areas can be provided for 85% Total Suspended Solid removal for an equivalent impervious area, in accordance with guidelines approved by the Director of Public Works.

(b) *Suspended Solids Control Requirement Where Impervious Area is 16 to 42%.* Development described in Sec. 70-736(c)(1) that is between 16% and 42% impervious shall provide treatment of all stormwater runoff from impervious surfaces from the first 1-inch of rainfall to remove eighty-five percent (85%) Total Suspended Solids. Impervious areas for which treatment cannot be reasonably provided as described in (a)(2) above may treat an equivalent area as therein described.

(c) *Nitrogen and Phosphorus Control Requirement.* Development described in Sec. 70-736(c)(1) that is greater than 16% impervious must achieve a nitrogen export limit of 2.2 lb/ac/yr and a phosphorus export limit of 0.50 lb/ac/yr. These limits may be met on site and, in addition, through the following measures:

(1) *Neuse Offset Payment.* Development within the Neuse River Basin shall have the option of partially offsetting nitrogen loads as allowed by State regulation (15A NCAC 02B.0235 or a successor regulation), with payment of a nutrient offset payment calculated under State requirements (15A NCAC 02B.0240 or a successor regulation). Nutrient offset payments cannot be used in combination with use of non-contiguous land bank parcels within the Neuse Basin.

(2) *Land Bank Donor Option.* Development within the Neuse and Cape Fear Basins shall have the option of including non-contiguous Land Bank "donor" parcels on the site plan for the purpose of reducing nitrogen and phosphorus load.. Nitrogen and phosphorus loading can be reduced by the addition of one or more parcels ("donor parcels") that are not contiguous to the developing parcels ("receiving parcels") which can be utilized in the reduction of nitrogen and phosphorus loading subject to the following provisions:

a. Meet minimum onsite treatment requirements for nitrogen and phosphorus reduction. The percent of onsite required nitrogen and phosphorus reduction from the post development loading shall be met in accordance with Table 1 below:

Table 1

Receiving Parcel Post Construction Impervious and/or Nitrogen and Phosphorus Loading	**Minimum Percent of Nitrogen and Phosphorus Loading Reduction Required Onsite. *** (Reduction is from Post Construction Nitrogen and Phosphorus Loading)	**Notes**
1. Produces ≥ 3.66 lbs/ac/yr unit nitrogen loading or produces ≥ 0.83 lbs/ac/yr phosphorus	40% onsite for Nitrogen 40% onsite for Phosphorus	See Exceptions 1., 2., and 3. Below.
2. Produces < 3.66lbs/ac/yr unit nitrogen loading	100% onsite for both Nitrogen and Phosphorus	*Commentary: A 40% reduction to 3.66 lbs/ac/yr is 2.2 lbs/ac/yr, the required unit nitrogen loading. All reduction of Nitrogen and phosphorus loading must be done through onsite methods.*

Exceptions:

Receiving Parcel Post Construction Impervious and/or Nitrogen and Phosphorus Loading	**Minimum Percent of Nitrogen and Phosphorus Loading Reduction Required Onsite. *** (Reduction is from Post Construction Nitrogen and Phosphorus Loading)	**Notes**
1. ≥ 90% Impervious And Project is located in the Compact Neighborhood, Downtown Tiers or in Suburban Transit Area found in the latest version of the Durham Comprehensive Plan.	20% onsite Nitrogen 20% onsite Phosphorus	Treatment devices for onsite treatment can be placed in adjacent right of way and may be allowed to treat portions of right of way. Maintenance of the treatment device will remain the responsibility of the adjacent property owner

2. Produces > 3.66 lbs/ac/yr unit nitrogen loading or > 0.83 lbs/ac/yr phosphorus And Is >70% impervious and < 90% impervious And Project is located in the Compact Neighborhood, Downtown Tiers or Suburban Transit Area found in the latest version of the Durham Comprehensive Plan.	30% onsite Nitrogen 30% onsite Phosphorus	Treatment devices for onsite treatment can be placed in adjacent right of way and may be allowed treat portions of right of way. Maintenance of the treatment device will remain the responsibility of the adjacent property owner
3. Projects using the Alternative Nitrogen and Phosphorus Control option	Projects using the Alternative Nitrogen and Phosphorus Control option must provide onsite treatment in accordance with 70-737(d)(3) and (4)	

* Minimum onsite treatment requirements do not necessarily address all required reduction requirements. See Section 70-737 (c).

b. *Location of parcel.* Both parcels must be in the same River Basin and the Land Bank "donor parcel" shall be located in the same water supply watershed overlay or a more protected water supply overlay as the receiving parcel and must be within the City of Durham or Durham County

Commentary: For example, A zone can donate to A or B zone or non water supply areas, B zone can donate to B zone or non water supply and non water supply can donate only to non water supply.

c. *Protection of Donor Parcel(s).* The portion of the Land Bank donor parcel which is restricted from development shall remain in a vegetated or natural state. It shall be protected from all future development through the use of a permanent conservation easement approved by the City of Durham in favor of either the City of Durham or Durham County or a land trust or similar conservation-oriented non-profit organization with the legal authority to accept such easements. The organization shall be bona fide and in perpetual existence and the conveyance instruments shall contain an appropriate provision for the retransfer to the City of Durham or Durham County in the event the organization becomes unable to carry out its functions. If the entity accepting the easement is not the City of Durham or Durham County, then a third party right of enforcement favoring the City or County, as appropriate, shall be included in the easement.

d. *Calculations.* The nitrogen and phosphorus load reduction calculations shall be reviewed and approved by the Director of Public Works as part of the site plan or subdivision or other permit review process, in the discretion of the City.

e. *Approval.* The Land Bank donor parcel including its size and number must be approved and accepted by the Director of Public Works and, if appropriate, Durham County. The parcel must be within areas identified by the City of Durham as beneficial to water quality and shall not be currently in use to provide for nutrient reduction. Thereafter it may not be used for any future development calculations directly or indirectly related to water quality or quantity, (*no double counting*).

f. *Legal description.* The Land Bank donor parcel shall have a legal description that meets the requirements of the guidelines established by the Director or Public Works.

g. *Excluded lands.* A Land Bank donor parcel may only be credited for land that is outside a designated Floodway, non-encroachment area or 50 foot stream buffer.

h. *Additional credits.* Credit to the donor parcel for property not excluded in item g. above is available at the maximum rates as shown in Table 2 below.

Table 2

Location	Percent of land area available for credit
Floodway	0
Non-encroachment area	0
Between 0' to 50' stream buffer	0
Between 50' to 150' stream buffer	100
Outside of 150' stream buffer and inside headwaters designated areas	80
Outside of 150" stream buffer and outside headwater designated areas	65

(3) *Nutrient Banks.* Projects that meet minimum onsite treatment requirements in Table 1 above may also use approved Nutrient Banks to reduce nitrogen or phosphorus load in accordance with City policy as approved by the Director of Public Works and any applicable state requirements. An additional 5% above the required amount (lbs) must be provided to the City unless the Nutrient Bank is located within the City.

(4) *Inclusion of Streets.* Loading calculations shall include increases in nitrogen and phosphorus load from increases in impervious surfaces associated with any required offsite improvements to City streets.

(d) *Alternate nitrogen and phosphorus control standard for development with preexisting impervious area in the Neuse and Cape Fear River Basins.*

(1) This option is available for other residential, office, industrial, institutional, or commercial development described in Sec. 70-736(c)(1) that contains at least 60% impervious area which preexisted the respective Effective Date for Nitrogen and Phosphorus Control in each basin. Such development shall be deemed to meet nitrogen and phosphorus control requirements if nitrogen load is reduced by 60 percent from the nitrogen load and 65-percent from the phosphorus load that existed on the Effective Date. On-site treatment must be utilized for increases in impervious area over the area that existed on the Effective Date. Treatment for the preexisting impervious area may be provided through a combination of on-site treatment and Land Bank and Nutrient Bank options as further described in paragraphs (3) and (4) below. Impervious surface shall be considered as preexisting if such area was constructed in accordance with a site plan or similar plan approved on or before the Effective Date and was not subsequently removed, or if aerial photography from the Effective Date or years preceding the Effective Date or other documentation deemed acceptable by the Director of Public Works shows such impervious area.

(2) Sites that have a valid demolition site plan may count in their impervious area impervious surfaces that existed on the Effective Date but were removed since that time if the demolition site plan has not expired as of the time of application.

(3) Development qualifying under (1) and (2) above with a preexisting impervious area of 90% or more may use options for noncontiguous land bank donor parcels or Nutrient Banks described in Section 70-737(c) to meet all or a portion of the nitrogen or phosphorus reduction requirement for their preexisting impervious area.

(4) Development qualifying under (1) and (2) above with a preexisting impervious area of 60% to 90% must provide onsite treatment equal to the inverse proportion of the preexisting impervious percentage of the development. The remaining treatment may be achieved through options for noncontiguous land bank donor parcels or Nutrient Banks described in Section 70-737(c). (*Example: Development with 80% preexisting impervious area and no increase in impervious area from Effective Date must provide nitrogen reduction of 20% of the preexisting load on site, and may use Section 70-737(c) options for remainder of treatment.)*

(e) *Bacteria Control.* All projects located in an area that is subject to a Total Daily Maximum Load requirement for bacteria and have stormwater discharges that require BMPs shall be required to have at least one BMP for each stormwater discharge that is rated as medium or high for its ability to remove bacteria from stormwater in the most recent version of the NCDENR Stormwater BMP manual or as approved by the Director of Public Works.

(f) *Exemption for Low Density Projects*. Low Density Projects are exempt from the requirements of Sec 70-737(a) through (e) above. However, requirements under the City of Durham UDO still apply.

(g) *Procedures*. Pollutant loading calculations shall be made using procedures approved by the Director of Public Works. Approved methodologies for calculating pollutant loading may be obtained from the Public Works Department.

(h) *Time of submission*. The applicant shall submit pollutant loading calculations for the pre- and post-development conditions and demonstrate compliance with this section prior to the approval of a subdivision or site plan of any type, as part of plan submission, or where applicable to individual buildings, as part of its application for a building permit, construction drawings where a site plan is not required, or issuance of a utility permit.

(i) *Approved BMPs*. The BMPs that may be used to reduce pollutants in stormwater runoff include, but are not limited to, the following: wet detention ponds, constructed wetlands, open channel practices (water quality swales), riparian buffers, vegetated filter strips with level spreader, bioretention cells, cisterns, and sand filters. The BMP pollutant removal calculations shall be as approved by the Director of Public Works.

Sec. 70-738. Peak runoff control requirements.

(a) *Purpose.* Properties and waterways downstream from development may be adversely impacted from increases in volume, velocity; and peak flow rates caused by such development. Any projectmay be required to provide BMPs or make other improvements to the existing drainage system to address water quantity concerns, water quality concerns, or both if the proposed development will increase potential flood damages to existing properties or significantly increase pollutant levels in downstream receiving waters as determined in accordance with City calculations. Increases in impervious area of less than 200 square feet, calculated cumulatively from the Effective Date, are excluded from this requirement. In particular,

(1) *One Year Storm.* Development may not increase the post-development peak runoff rate from the one-year storm over the pre-development peak runoff rate. If the post-development peak runoff rate does increase, stormwater management facilities shall be provided such that there is no net increase.

(2) *Two and Ten Year Storms.* Land disturbance that increases the peak runoff rate from either the 2-year or the 10-year storm may be required to install BMPs to address the impact, as determined in accordance with standards of the City's Engineering and Stormwater Division.

(3) *Other Design Storms.* In certain circumstances (i.e. when there are existing flooding concerns, potential to flood existing structures, etc.), Development that increases the peak runoff from other design storms such as the 100-year storm may be required to install BMPs to address the impact, as determined in accordance with standards of the City's Engineering and Stormwater Division.

(b) *Calculations.* The peak flow calculations shall be made using procedures in the City of Durham Reference Guide for Development.

(c) *Time of submission; stormwater impact analysis*. The applicant shall submit peak flow calculations for the pre- and post-development conditions as part of plan submission and application for a subdivision or site plan approval of any type, construction drawing approval where a site plan is not required, utility permit issuance, or application for a building permit for development. Where such calculations show an increase in peak runoff rate from the 2, 10, or 100- year storm, a stormwater impact analysis for downstream properties and structures that complies with standards of the Engineering and Stormwater Services Division shall also be submitted and approved prior to any of the approvals referenced above.

Sec. 70-739. BMP Design and Approval Requirements.

(a) Structural BMPs that fall under the jurisdiction of North Carolina Department of Environmental Resources Division of Land Resources shall, in addition to the City's requirements, be designed in accordance with North Carolina Dam Safety Laws which include NCGS 143-215.23-37, as it may be modified in the future, and all associated administrative codes. Structural BMPs that are exempted from the North Carolina Dam Safety Laws and all other proposed structural BMPs shall be designed in accordance with the City of Durham Reference Guide for Development. Existing ponds that are proposed to remain within the proposed site shall be brought into compliance with all applicable City of Durham Reference Guide for Development and the North Carolina Dam Safety Laws. These existing ponds shall be considered structural BMPs and shall be permitted like any other structural BMPs in the City of Durham. Existing ponds must comply with all applicable buffer requirements. If a particular BMP is not required to meet an ordinance requirement, the BMP shall be deemed a "voluntary BMP" and shall be permitted as indicated below. The City may require a fee for the permit for a structural BMP in an amount set by City Council. Unless otherwise approved, ownership of the structural BMPs shall remain with the property owner or, in the case of residential development that is not multifamily such as apartments, provision shall be made for the timely transfer to a homeowner or property owner's association, which shall be responsible for the continued maintenance, repair, and reconstruction of such controls.

(b)

(1) Except as allowed in paragraph (c). below, no building permit shall be issued for development until the City Public Works Director or designee, has approved plans and specifications for the proposed structural BMPs and the property owner has entered into an agreement and covenants for ownership and long term maintenance, repair, and reconstruction in accordance with (a) above and the terms established by the City Public Works Director, or designee; and

(2) The property owner has posted one or more performance bonds, other surety instruments, or other payment satisfactory to the City, in an amount

determined by the City Public Works Director, or designee, to assure construction, maintenance, repair, and/or reconstruction necessary for adequate performance of the structural BMPs.

(c) For office, institutional, commercial, industrial and multi-family projects, building permits may be issued but construction drawing approval or water or sewer permit approval shall be withheld until compliance with paragraphs a. and b. above.

(d) No certificate of compliance shall be issued for any structure constructed within a site proposed for development until the City Public Works Director, or designee, has approved construction of the structural BMPs and after review and approval of submitted "as-built" drawings. Notwithstanding this requirement, the Stormwater Division of the City may allow for delay in approval of construction of stormwater controls and submission and approval of as-built drawings for single family housing, duplexes, and townhouses in accordance with adopted policies of the City.

(e) Structural BMPs that are not required by City ordinance are considered voluntary structural BMPs. These voluntary BMPs will require an operation and maintenance agreement and covenants which meet department standards. No permit fee or performance bond or other surety instrument will be required. Should a voluntary structural bmp become required at some future time, permit fees and performance bond or other surety shall be required.

Sec. 70-740. BMP Maintenance.

All structural BMPs shall be maintained in compliance with City of Durham maintenance protocols, policies, procedures, and requirements as outlined in the latest version of the City of Durham's "Owner's Maintenance Guide for Stormwater BMPs Constructed in the City of Durham."

Sec. 70-741. Buffer Requirements.

(a) *Buffer*. Subdivision and site plans of all types shall show 50-foot wide riparian buffers directly adjacent to surface waters (perennial and intermittent streams, lakes, ponds and estuaries) in the Neuse River Basin. For the purpose of this section, a surface water shall be present if the feature is shown on either the most recent United States Geological Survey 7 1/2 minute quadrangle topographic maps or the most recent United States Department of Agriculture Soil Survey of Durham County, North Carolina.

(b) *Calculation next to streams.* For intermittent and perennial streams, the buffer shall begin at the most landward limit of the top of bank and extend landward on all sides of the surface water, measured horizontally on a line perpendicular to the surface water.

(c) *Calculation next to other waters.* For ponds, lakes, and estuaries, the buffer shall begin at the most landward limit of the normal water level and extend landward, measured horizontally on a line perpendicular to the surface water.

(d) *No impact/determination.* Applicants shall demonstrate as part of site plan or plat submission that the development does not impact the Neuse buffer or that the North Carolina Division of Water Quality has approved the activity that impacts the Neuse buffer.

(e) *Relief.* Relief from buffer requirements in the Neuse River Basin may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 02B.0233(3)(a) as determined by the North Carolina Department of Environment and Natural Resources (NCDENR). The City Public Works Director, County Engineer, or designees, as appropriate, may allow relief from buffer requirements outside the Neuse River Basin pursuant to the applicable City or County standards and procedures.

(f) *Relationship to other Buffer Requirements.* These requirements do not supersede any existing buffer requirements found elsewhere in local ordinance or state law or regulation. In the event of conflict, the strictest requirements shall control."

Section 2. This Ordinance shall be effective June 15, 2010, and shall replace the above-cited sections of the City Code.

APPENDIX G
City of Durham
NEUSE ANNUAL REPORT
EXCERPTS RELATED TO LAND DEVELOPMENT & BMPS
(REVISED SEPTEMBER 2010)

Excerpts Follow:

City of Durham Annual Report
Neuse River Stormwater Management Report

I. New Development Controls

Below is a summary of the projects approved between October 1, 2007 and September 30, 2008. Durham requires all projects that change impervious surface provide calculations of predevelopment and post development nitrogen loading. The table below includes loading data for all such projects, including those that fell below the disturbed area threshold, and that therefore did not have to comply with nitrogen control or peak flow requirements.

Table G-1
Nitrogen Controls for New Development
October 1, 2007 – September 30, 2008

Development Approvals in the Neuse Basin	All Projects in Neuse River Basin	Subject to Neuse Nitrogen Control
Number of projects approved	40	25
Plan Areas	Area, All	Area, Applicable**
Site Area (acres)	562.30	513.47
Total post-development impervious surface (acres)*	143.83	123.80
Impervious surface added (acres)	114.71	113.52
Reported COs (acres)***	1,522	1,522
Loading for Approved Plans	N Loading	N Loading
Pre-Development Nitrogen (lb N/yr)	718.85	370.25
Post-Development (prior to applying BMPs) (lb N/yr)	2,442.68	2,090.67
Post-Development (with BMPs applied) (lb N/yr)	2,342.65	1,990.64
Offset Pounds Purchased (lb N/yr)	393.74	393.74
Post-Development/Post Buy-down (lb N/yr)	1,948.91	1,596.90
Loading Rate for Approved Plans	N Loading Rate	N Loading Rate
Pre-Development Nitrogen (lb N/ac/yr)	1.28	0.72
Post-Development (prior to applying BMPs) (lb N/ac/yr)	4.34	4.07
Post-Development (with BMPs applied) (lb N/ac/yr)	4.16	3.88
Post-Development/Post Buy-down (lb N/ac/yr)	3.47	3.11
Offsets	Offset Fees Paid	lb N (30 years)
Offsets Purchased from EEP	$207,826.61	5,487.16
Offsets Purchased from Nutrient Banks	$138,370.00	6,324.96
Offsets Purchased from Other	$0.00	0
Summary of BMPs proposed (Site Plan)		
Swale (0)		
Wet Pond (3), 3 incorporate peak flow control as well		

Bioretention (1)
Sand Filter (1)
Level Spreader (1)
Wetland (0), 0 incorporate peak flow control as well
Underground Detention System (0) peak flow control only
Underground Cistern for Water Reuse (1)
Dry Detention Pond (13) peak flow control only
Extended Dry Detention Ponds (1), 1 incorporate peak flow control as well
Buffer (0)
Summary of BMPs approved and constructed
(5) wet pond, (9) dry pond, (0) wetland, (0) underground, (2) sand filter, (3) bioretention, (0) swales, (7) level spreader
Summary of maintenance activities conducted on BMPs
Mowing, removing trash, dredging, repairing erosion, removing trees and other woody vegetation from dams and repairing pipe systems and end structures are typical maintenance activities that occur during the year. Over 410 BMP inspections occurred during the year. 73% were maintenance inspections and 27% were construction inspections. Note that the total number of inspections includes BMPs that are in the Neuse River Basin and the Cape Fear River Basin. The City of Durham's jurisdiction spans both the Neuse River Basin and the Cape Fear River Basin. Of the over 500 BMPs within our jurisdiction, 57.9% are located in the Neuse River Basin. If it is assumed that BMP inspections are evenly distributed, then approximately 240 BMPs were inspected in the Neuse Basin.
Summary of any BMP failures and how they were handled
BMPs are considered failures in the City of Durham if an **Engineering Modification Plan (EMP)** is required to be submitted to the Stormwater Services Division (SSD). An EMP is an engineering plan for the construction, reconstruction, significant modification, or rehabilitation of a BMP that was either not completed, or was "completed" in a manner that significantly differs (negatively) from that detailed in the original design plans, or is in such a state of disrepair or functional failure that a Maintenance Certification cannot be provided reasonably within a 90-day threshold. The EMP is submitted as part of an Engineering Modification Report submittal package. It should be noted that an EMP is a scaled drawing that details the construction, reconstruction, or modification items required to bring a BMP facility into reasonable compliance with the original construction drawings and that only a registered NCPE will be permitted to submit an EMP in the City of Durham. It is recommended that an NCPE preparing an EMP consult the City's Reference Guide for Development for general requirements concerning construction drawing submittals in the City of Durham. Since an EMP submittal will be different from a new development construction drawing submittal, consultation with SSD regarding the extent and detail required for an EMP is required. The eventual Maintenance Certification of such a "modified" BMP may, at the discretion of SSD, require the inclusion of an as-built of the modified BMP. Consultation with SSD regarding the extent and detail required for such an as-built is required. Further information regarding the BMC Program may be found at http://www.ci.durham.nc.us/departments/works/stormwater_bmp.cfm During the reporting period, 2 wet detention ponds required an EMP in the Neuse River Basin. SSD is currently working with the property owners to resolve these failures.
A description of BMP demonstration projects together with monitoring data.
None occurred during this year.

* Includes impervious surface that may have existed in pre-development.
** Projects not subject to Neuse Nitrogen Control (i.e. Disturbance threshold less than 1-acre single family residential, and ½-acre all others).
*** Prior to the implementation of the Land Development Office Software (LDO), this information is not available. Implementation of LDO began 10/22/2007. The Reported COs (acres) above encompass almost the entire reporting year and is based upon approximately 672 COs issued. The acreage listed above is within plus or minus 5%. It is not possible to distinguish between the COs that are and are not subject to Neuse Nitrogen Control.

List of All Projects Approved in the Neuse River Basin*

Alexander Industrial Park****	Voyager Academy
Page Road	SECU Turn Lane**
Duke Community Congregate Living	Summer Meadow Phase 5
Durham Elementary School B (Brightleaf School)	Summit Church
Durham School of the Arts - Tennis Court Renovation**	Walltown Recreation Center
Ellerbee Retail Substation	Joyland Foundation 21st Century Daycare**
Ellington Place	Pig Out Express**
Fire Department Generator**	Technology Park North (Davidson)****
Ethiopian Church	West Main Street – Shell**
Goodwin Crossing	Trosa Commercial**
King's Daughter Inn**	Oxford Hall**
Latta Road CVS	Horton Hills Phase 9
Tidewater Fiber Corp**	Nextreme**
Page Road Business park	Durham Athletic Park
Intellicom	Golden Belt
Evangel Assembly	Walgreens # 12132
Cricket/Roxboro Monopine**	Rose of Sharon
New Downtown Police Substation**	Duke Energy Tower 5
New Haven at the Park, Lots 2 and 4	Duke Federal Credit Union**
North Carolina Specialty Hospital	West Village Cobb Building**

*For detailed project information, refer to Neuse Loading.xlsx spreadsheet.
** Projects not subject to Neuse Nitrogen Control (i.e. Disturbance threshold less than 1-acre single family residential, and ½-acre all others).
*** Projects accounted for in another annual report.
****Payments made to Nutrient Banks other than EEP.

APPENDIX H

DELEGATION OF AUTHORITY TO IMPLEMENT NPDES STORMWATER PERMIT PERMIT # NCS000249

DURHAM

1869

CITY OF DURHAM | NORTH CAROLINA

Date: February 12, 2007

To: Kathryn Kalb, Public Works Director

From: Patrick W. Baker, City Manager

Subject: Delegation of Authority to Implement NPDES Stormwater Permit
Permit # NCS000249

This memo is to formally delegate to the Director of Public Works the authority to act on behalf of the City concerning all applications and requests necessary to implement the NPDES Stormwater Permit.

Council action was taken on May 19, 2003 to authorize the City Manager or designee to act on behalf of the City concerning all applications or requests necessary for implementation of the City of Durham's NPDES Stormwater Permit.

cc: Lee Murphy, Public Works
Theodore L. Voorhees, Deputy City Manager

APPENDIX I

City of Durham

KEY POSITION CONTACTS

As of September 2011, refer to Annual Reports for updates

City Manager – Thomas J. Bonfield
Deputy City Manager, Administrative & Support – Wanda Page
Deputy City Manager, Community Building – Keith Chadwell
    Durham One Call – Marcelle Brawner, Manager
Deputy City Manager, Operations - Theodore L. Voorhees

Public Works Director – Marvin G. Williams
    CADD/GIS Administrator – David Cates
    Street and Stormwater Maintenance Supervisor – Michael Balzarano
    Street Maintenance Administrative Analyst – Curtis Kenney
    Street Cleaning Supervisor – Benita Quick
    Engineering and Stormwater Division Manager – Ed Venable
    Development Review Manager – Rob Joyner
    Assistant Stormwater Manager – Paul Wiebke
    Infrastructure Manager – Christy Sokol
    Water Quality Manager – John Cox
    Assistant Water Quality Manager – Michelle Woolfolk
    Water Quality Specialist, Ambient Monitoring & IDDE – Maverick Raber
    Water Quality Specialist, Benthic Monitoring – Robert Louque
    Stormwater Education Coordinator – Laura Smith
    Pollution Prevention Coordinator – Abigail Ferrance-Wu
    Industrial Stormwater Inspector – James Azarelo
    Senior Eng Tech, BMP Maintenance Assessment – Mike Fuller

General Services Director - Joel Reitzer, Jr
    General Services Facilities Operations Manager - Kevin Lilley
    Keep Durham Beautiful Executive Director – Dorothea Pierce
Parks and Recreation Director - Rhonda B. Parker
    Assistant Director, Park Planning, Maintenance and Envir Ed – Beth Timson
    Parks Superintendent –Vacant
Water Management Director – Don Greeley
    Water Distribution and Collection Superintendent – Tom Lucas
    Assistant Water Distribution and Collection Superintendent – Steve Miller
    Superintendent, North Durham WRF – John Dodson
    Superintendent, South Durham WRF – Robert Dodson
    Regulatory Compliance Officer - Reggie Hicks
    Pretreatment Coordinator – Gerald Hicks
Solid Waste Director – Donald Long
    Assistant Director - Bruce Woody
    Solid Waste Disposal Manager, HHW – Chris Marriott
    Code Enforcement - Mike Simpson, Supervisor
Fire Department - Chief Bruce T. Pagan, Jr.
    Hazardous Materials Team (HazMat)
Neighborhood Improvement Services - Constance Stancil

Impact Team Manager– Daryl Hedgspeth
Code Enforcement Manager – Burton Rauch
Code Enforcement Manager – Michelle Sellers
Fleet Management – Kent Cash, Director

Durham City-County Departments
Durham City/County Planning – Steven L. Medlin, Director
Planning Supervisor for Zoning Enforcement – Grace Smith
Durham City/County Inspections – William E. (Gene) Bradham, Director
Durham City/County Sustainability Office – Tobin Fried, Manager

County Departments/Divisions
Health Department, Division of Environmental Health
Water & Waste Supervisor- Robert Brown, R.S., L.S.S.
Engineering and Environmental Services Department – Glen Whisler, P.E. County Engineer
Sedimentation & Erosion Control Division – Chris Roberts, PE, Division Manager
Utility Division - Joseph R. Pearce, P.E., Division Manager
Compliance Manager - Stephanie Brixey
Maintenance & Collection System Manager - Vacant
Emergency Management – Jeff Batten, Fire Marshall
Local Emergency Planning Committee (LEPC)
CodeRED® Emergency Notification System

State of North Carolina Agencies
North Carolina Department of Transportation, Roadside Environmental Unit – Ted Sherrod, PE (permitting and inspection of NCDOT construction sites)
North Carolina Division of Land Quality - John Holley, Jr., Regional Engineer (permitting and inspection of publicly funded construction sites other than NCDOT)

APPENDIX J
City of Durham
TARGET POLLUTANTS, SOURCES & AUDIENCES
DISCUSSION

General Information

Section B(2)(a) of the City's NPDES permit requires that the City identify target pollutants and their sources so that the public education program can address and discuss why those pollutants are an issue. Section B(2)(b) requires the City to identify target audiences likely to have significant stormwater impacts in regards to the target pollutants. The City is also required to explain why these targets were selected.

Given that there are a number of pollutants known to impact water quality in local waters and/or serve as stressors that impact aquatic life support, the number and range of pollutants to consider can be overwhelming. However, the intent of the public education program is to improve public awareness and to couple increased awareness with changes in behavior. Public awareness is generally low. Even more problematic is that people generally resist change. Education campaigns must focus on simple messages that are repeated and reinforced in order to be effective. It is not necessary or desirable to target every pollutant that could be impacting water quality because too many messages would dilute their effectiveness. In order to be effective, campaigns must identify and target specific activities such as owner maintenance of vehicles. Campaigns with general audiences must have fairly simple messages whereas campaigns that target a specific business sector, such as restaurants, can be more detailed.

Given the general resistance to change, selection of target pollutants and audiences must consider the feasibility of communicating enough information in order to effectively change awareness. The likelihood that changes in awareness will lead to changes in behavior must also be considered. Target selection also is determined by measureable short-term success that can be built upon. Some sources are amenable to control through illicit discharge prohibitions. Targeting these areas may increase the feasibility of changing behavior through the threat of enforcement penalties.

Because of all of this, the City may elect to focus more attention on a select portion of the target pollutants, their sources, and/or audiences in a given year.

Sources of Information Used to Assess Pollutants and Sources

The City is subject to Nutrient Sensitive Waters designations for the Neuse River Basin, Falls Lake, and Jordan Lake. In all three water bodies nitrogen has been established as the limiting nutrient. The City is subject to TMDLs for downstream receiving waters for nitrogen and phosphorous. In addition, local TMDLs have been established for fecal coliforms and turbidity. Pollutants in local stream segments on the 303(d) list for which TMDLs have not yet been developed include biological impairment (benthic macroinvertebrates) and dissolved oxygen.

The City has gained extensive experience in investigating pollution, in evaluating stormwater quality, and in assessing water quality conditions in the City's urban streams. The City conducted storm event sampling from 1992 to 1999 to characterize stormwater quality from a range of land uses. Earliest efforts at monitoring urban streams began in 1992. Benthic monitoring began in 1999. To date the City has conducted more than 2,100 illicit discharge investigations. The City has also conducted field monitoring for dissolved oxygen, temperature, pH and turbidity in more than 3,000 samples. It has also analyzed 3,300 stream samples for fecal coliforms, 1,700 stream samples for nutrients and selected metals, and 170 benthic samples for aquatic life support.

The City is aware that its monitoring does not necessary cover every possible pollutant. In evaluating potential target pollutants, the City has review publications by the USGS (e.g. Circular 1291, SIR 2007–5113) that included monitoring of herbicides, insecticides, and other pesticides in urban streams in North Carolina. The City has also reviewed numerous guidance documents published by the Center for Watershed Protection, the National Research Council and the US Environmental Protection Agency.

Pollutants Identified in City Waters

<u>Pollutants Identified in 303(d) List and TMDLs</u>
The pollutants/impairments identified on the 303(d) list and in TMDLs include:

- <u>Nitrogen</u> associated with atmospheric deposition, human sewage, leaves, grass clipping, fertilizer application, and pet and wildlife wastes;
- <u>Phosphorous</u> which is attached to soil from historic fertilizer use, sewage, leaves, grass clippings, fertilizer application, pet and wildlife wastes, and soil erosion;
- <u>Fecal Coliforms</u>, pathogen indictors, from pet wastes, urban wildlife, sewage (details further below), seasonal re-growth in wet organic matter (e.g. leaves in gutters) , soil and stream sediment;

- Low Dissolved Oxygen (DO) from organic matter in stormwater runoff (e.g. leaves in gutters) and sewage, particularly problematic in stream segments that have been dredged to form a deep pool;
- Turbidity from clay sediment entering waterways, construction sites, and in stream erosion;
- Biological Impairment from multiple stressors (details below).
- Zinc (added to 2010 list based on historical data were portions of Ellerbe Creek and Northeast Creek downstream of WWTPs, and portions of New Hope Creek and Third Fork Creek for exceedances of Action Limit for total zinc); and
- Copper (added to 2010 list based on historical data were portions of Third Fork Creek and Northeast Creek for exceedances of Action Limit for total copper).

Pollutants Identified in City Stream Monitoring

The water quality problems identified in monitoring of the City's urban streams include:

- Fecal Coliforms (very high frequency of occurrence in monitoring samples);
- DO (high frequency of occurrence in monitoring samples);
- Turbidity (moderate frequency of occurrence in monitoring samples);
- BOD (limited occurrence often associated with specific sources);
- Dissolved Zinc (found at one location downstream of an industrial site); and
- Dissolved Copper (found at one location downstream of an industrial site).

Pollutants Identified in USGS Studies

The water quality problems identified by the USGS in monitoring of urban streams nationwide and in North Carolina include:

- Herbicides such as diuron, simazine, atrazine (low frequency of occurrence, elevated in 10 to 14% of samples of urban streams nationwide).
- Insecticides such as diazinon[1], carbaryl, and chlorpyrifos (low frequency of occurrence in urban streams nationwide); and
- Hydrocarbons/PAHs (Polycyclic Aromatic Hydrocarbons) such as anthracene (anthraceen had low frequency of occurrence but exceeded toxicity benchmarks in a few North Carolina streams).[2]

[1] Diazinon and chlorpyrifos are no longer available to the public. Recent data show diazinon has declined in some urban streams - further decline should occur as use is curtailed. In urban streams in North Carolina diazinon was not found to exceed aquatic life toxicity screening benchmarks.

[2] As a group, PAHs were the most frequently detected. Other studies indicate that sealcoats used to resurface roads and parking lots are likely the dominant source of PAHs in many streams. Coal tar-derived sealcoats used more commonly in the eastern US and have higher PAH concentrations than asphalt-based sealcoats.

The City's land use-storm event sampling found fecal coliform, copper and zinc frequently exceed threshold criteria while total nitrogen, BOD, and TSS were of concern at some land uses. Comparison of the storm event data for fecal coliform with available ambient data from urban stream monitoring found that concentrations were often significantly higher in the City's urban streams than in stormwater runoff. The City reported this in its 1999 permit renewal and concluded that the urban streams were impacted by illicit discharges. While illicit discharges may contribute more fecal coliform and BOD than does stormwater runoff, runoff is nevertheless a significant source.

Further Pollutant/Impairment Information: Nitrogen

The most significant source of nitrogen appears to be atmospheric deposition. Atmospheric reactive nitrogen is found in rainfall. Atmospheric reactive nitrogen appears to derive from three sources: mobile sources (cars trucks, lawn mowers, etc.), stationary point emissions (e.g. power plants), and volatilization from agricultural use of manures and ammonia fertilizers. Its concentration is particularly high in urbanized areas. Reactive nitrogen is found also in particulate matter and occurs as dry deposition. Wet and dry deposition that lands on vegetated areas may be taken up by plants either through leaf surfaces or through root systems. Deposition on directly-connected impervious surfaces has less opportunity for biological interaction before entering streams.

Other sources of nitrogen include illicit discharges involving untreated sewage; nutrient leaching from leaves and yard wastes placed in street gutters and waterways; runoff from lawns and landscaping, especially lawns on compacted urban soils; and pet wastes.

Further Pollutant/Impairment Information: Fecal Coliform

Household pets, urban wildlife, landscaping and composting are potential sources of fecal coliform. Household pets are an obvious source. Urban wildlife may be equally important because they are generally much more densely located in suburban areas than in rural areas. Suburban gardens and landscaping provide abundant food for deer, raccoon, opossum and rabbits. Some homeowners put out feeders to attract birds. All of these sources can contribute to fecal coliform in urban streams and creeks.

Further Pollutant/Impairment Information: PAHs

PAHs may derive from vehicle leaks, parking lot sealcoats, wood burning, power plant emissions, and fuel spills. Seal-coating of roads and parking lots has been found to be the dominant source in some studies. The City does not use coal-tar seal-coating on roads. Additional information is needed to assess whether seal-coating contractors in the area use coal-tar or asphalt-based products on parking lots. A ban on the use of coal-tar sealants may be more effective than education of contractors.

Further Pollutant/Impairment Information: Copper and Zinc
Because copper and zinc exceeded thresholds in stormwater runoff, the City began assessing the potential for aquatic toxicity in its stream monitoring program. The City monitors dissolved copper and zinc in urban streams and in higher quality reference streams. The City compares monitoring results to EPA's continuous chronic criteria (CCC), which is calculated based on measured hardness. Monitoring indicates that dissolved zinc rarely exceeds EPA's continuous chronic criteria except downstream of one industrial facility, Brenntag Southeast. The City has been coordinating with state regulators and consultants on appropriate permitting for this facility.

Dissolved copper exceeds the EPA's CCC in less than half the urban streams monitored. Further, copper exceeds the EPAs CCC more frequently in the high quality reference streams than in the City's urban streams. It is possible that these exceedances do not indicate a problem. EPA's copper CCC is intended to protect species in a wide variety of habitats. The Clean Water Act procedures allow for recalculation of the CCC to develop a criteria specific to warm water streams found in Durham that excludes toxicity results for sensitive cold water fish like salmon and trout. The City has not yet undertaken recalculation. However, the higher frequency of exceedance of the unadjusted copper CCC in the reference streams implies that exceedances of the unadjusted CCC may not be contributing to toxicity at most locations. Only Stirrup Iron Creek has dissolved copper concentrations that exceed our estimate of a warm water copper CCC; this site is downstream from an industrial facility that has very high stack emissions of copper. Control of this source would require action by the NC Division of Air Quality (which does not regulate emission of metals in air stacks).

It appears likely that dissolved copper and zinc are localized issues that do not explain impaired aquatic life support. It is possible that particulate metals may accumulate in stream sediment and exert influence on those benthic organisms more closely associated with sediment. Particulate metals may be addressed through generalized controls on suspended sediment.

Pollutant Sources

Sources Identified in Staff Investigations
The pollutant sources identified most often in the City's illicit discharge investigations are:

- Sewage from overflows, leaks, private service lines, failing septic systems, and discharging sand filter systems;
- Food wastes and cooking grease from restaurant waste disposal and cleanup;

- Petroleum products and automotive fluids from vehicle maintenance;
- Sediment from construction and maintenance activities that cause flow alteration; and
- Lawn care chemicals (such as fertilizer, pesticides, and herbicides) along with leaves and grass clippings.
- Utility crossings which cause habitat alteration.

Further Pollutant Source Information: Sewage Discharges

Sewage is more common than all of the other pollutant sources combined. It is far and away the primary target pollutant source type. Sewage sources include clogged private service lines, sanitary sewer overflows, breaks and leaks. Frequency and impacts of sewage issues are greatest in the oldest developed areas of the City. The City's Water Management Department pretreatment program has been successful in controlling sewer overflows caused by grease from commercial facilities; residential users improperly disposing of grease continues to be a problem. Water Management reports that 67% of all blockages in Fiscal Year (FY) 2008 were caused by grease.

Many small overflows occur in private service lines connected to the City's system. The City has found that rental housing with clogged private service lines presents unique challenges. Absentee landlords may be difficult to contact and may be reluctant to undertake remediation or to quickly unclog service lines. Outreach is needed to educate property owners and property management companies of their responsibility under the City's ordinance to promptly eliminate discharges by removing clogs from sewer service lines. Owners are also responsible for remediating discharges; the cost of remediation may increase the longer a discharge persists.

The City's grease management campaign includes an extensive sewer cleaning program that flushed 170 miles of pipe or approximately 14% of the system in FY08. The City also replaced 15,000 feet of sewer main. Grease management also includes education, prevention, and enforcement.

When an overflow does occur, Water Management coordinates with Stormwater Service to identify the extent of contamination so that impacts can be remediated. Citizen reporting of discharges is critical because responding early can limit impacts and reduce the need for remediation.

Reports of poorly operating or failing on-site residential wastewater treatment systems have been declining within the City. Poorly functioning, older, residential wastewater systems have been a chronic problem throughout Durham County (as reported in local news media). Many of the problem systems are single-pass sand filter systems that were designed to discharge to surface drainage. Coordinated efforts involving Durham County Environmental

Health, NC Division of Water Quality, and to a lesser extent, the City of Durham Stormwater Services have resulting in many of these systems being identified. These sources are then required to hook up to available sanitary sewer or become covered under an NPDES permit requiring a tablet chlorinator at the discharge point.

Further Pollutant Source Information: Vehicle Maintenance

Issues with owner-maintenance of vehicles continue to be a problem with the City. Such problems include spillage and/or improper storage and disposal of petroleum products and other automotive fluids. Similar issues at automotive service facilities have been declining as a result of pollution prevention requirements in the City's Stormwater Pollution Control Ordinance. Continued effort is needed to maintain a high awareness of the requirements by automotive service facilities, towing operators, and junk-yards. It may be affective to periodically work with trade groups such as the Independent Garage Owners Association.

Further Pollutant Source Information: Restaurants

Durham County Environmental Health conducts routine inspection of food service businesses, and coordinates with City of Durham Pretreatment and Stormwater Service when necessary. Exterior restaurant trash areas and practices of mat washing outside are reported to be sources of fecal coliforms. Restaurants can also be a source of food wastes and cooking grease clogging sanitary sewers and causing overflows although the City's Water Management Department pretreatment program has largely been successful in controlling grease from commercial facilities

Further Source Information: Sediment and Erosion

Triassic Basin clay soils, such as those found within Durham, are highly erodible. Sediment continues to be an issue within the City's waters. Durham County Sedimentation and Erosion Control reviews plans for private land development sites and inspects these sites at least monthly. NC Division of Land Quality reviews and inspects publicly funded projects. The City works with these agencies to promote compliance with existing requirements. Sediment controls on construction sites may fill with sediment. Such controls need regular maintenance and care to work properly. Draft national Effluent Guidelines for the Construction Industry will require more advanced control measures than those currently used. Current practices rely heavily on settling which does not provide adequate control for turbidity unless chemicals are used.

Further Pollutant Source Information: Habitat Alteration

The City uses the North Carolina Biotic Index (NCBI), developed by the state to determine pollution tolerance, to assess conditions in the City's streams.

Benthic monitoring indicates that all urban and many rural streams are impacted. The reasons for this are likely to vary from stream to stream but important factors may include:

Hydrologic modification – Increase runoff volume and peak flow rate from impervious surfaces contribute to making flow in urban streams "flashy." The general result is higher peak flows and flooding during rain events and lower base flows during dry periods. This flashiness is magnified when the stormwater is routed through piping systems that "efficiently" carry away stormwater runoff. All of the City's urban streams are incised, meaning they have down-cut and are therefore access floodplains much less frequently. Many streams have clearly been channelized to further confine flows to the main channel. While streams being incised and channelized directly impact aquatic habitat, alteration in flow has secondary impacts to habitat that are significant. With less access to floodplains that provide temporary storage of runoff, the flow in these confined channels results in higher velocities, further enhancing the flashiness. Frequent high flow velocities in these straightened, incised, and channelized streams tends to flush some exposed organisms downstream. High velocities also causes stream bed and bank erosion. Instead of moving sediment gradually over a range of flow conditions, these streams tend to move a lot of sediment during only high flow events. The altered sediment transport tends to bury some organisms. Lower baseflow also leads to more frequent stagnant conditions with lower reaeration.

Thermal Fluctuations – Thermal effects are likely to be more significant in smaller streams. Reduced shading leads to higher water temperatures. Rainwater running off sun-warmed streets and parking lots can cause sudden changes in temperature leading to thermal shock.

Food Supply – The food chain has been greatly altered in many streams. Leaves deposited on roadways leach nutrients and dissolved organic matter into streams. The leaves themselves tended to get washed into streams only after being finely ground. Food supply has changed from leaf packs to dissolved and fine particulate matter.

Lawn Chemicals - Monitoring by USGS in urban streams in North Carolina has found herbicides used in "weed-and-feed" fertilizers, occasional occurrences of insecticides, and other chemicals used in yard maintenance. Urban streams may be subject to many sub-lethal 'stressors' that cumulatively impact aquatic life, however, pesticides, herbicides, and insecticides are likely one of the largest stressors.

Target Pollutants, Sources, and Audiences

Selected Target Pollutants/Impairments
Because of the reasons discussed above, pollutants and impairments of concern include: fecal coliform bacteria, nitrogen, phosphorus, low DO, turbidity, BOD, zinc, copper, hydrocarbons/PAHs, thermal pollution, and hydrologic modification. These pollutants and their sources will be addressed through education and outreach to the target audiences listed below.

Selected Target Sources
Selected target pollutant sources include:

Illicit Discharges – Illicit discharges both generally and specifically including improper cleaning, improper storage, and improper disposal of pollutants;

Sewage – Sewage from private and public components of the gravity sewer collection system that may include overflows and blockages caused by *food wastes and cooking grease* from problem restaurants and from residents of the City;

Vehicle Maintenance - Petroleum products and automotive fluids from owner-maintenance of vehicles and from automotive service facilities;

Construction Sites – Sediment and/or erosion from construction sites;

Lawn Care – Lawn care including the use of pesticides, herbicides, and insecticides along with improper yard waste disposal; and

Utility Easement Maintenance – Current utility easement maintenance practices damages and/or alters important habitats in our rivers and streams.

Such sources will be addressed through education and outreach to the target audiences listed below.

Target Audiences
Based on the identified target pollutants and their sources, the target audience of this program are:

General Public – The general public may be educated to recognize and report illicit discharges. The general public has been selected because of the widespread impacts of routine human activities and the general lack of awareness of the impacts of stormwater runoff.

Homeowners - Desired behaviors (or behavior changes) from educating this audience include activities involving lawn maintenance and stormwater runoff.

Lawn Maintenance –Desired lawn maintenance behaviors include having soil tested before applying fertilizers, reading instructions on any chemicals (including fertilizers, pesticides, and herbicides) before applying them to a lawn or garden, not applying lawn chemicals before it rains, minimizing fertilizer usage (especially "weed-and-feed" fertilizer), using slow-release organic forms of nitrogen fertilizer, using a composting lawnmower that can help reduce fertilizer usage, using integrated pest management rather than broad spectrum pesticides on a regular basis, and keeping leaves and grass clippings out of the street gutter by properly disposing of or composting them. It also includes items such as having lawns aerated, encouraging practices that help establish deep root systems for lawns, and putting rain gardens (all of which will help encourage water infiltration).

In addition, homeowners that live next to a stream will be encouraged to not mow stream banks. We also would like them to establish vegetative buffers and plant trees along stream edges that will provide shade, help anchor soil in stream banks, filter nutrients from shallow groundwater, and provide a source of leaf packs that will help keep the food chain stabilized in the river or stream.

Stormwater Management – We would like homeowners to disconnect rooftop drains from the MS4 by directing them to lawns (which might include rain gardens) or connecting them to larger rain barrels or cisterns. In addition, homeowners could regularly clean organic debris from their gutters (this helps keep too much organic matter from entering our streams). Homeowners can also plant trees that will shade driveways and other paved surfaces that can lead to hot water flashes with a rain event.

Other Activities – dispose of grease properly to keep it from entering and clogging the sanitary sewer system, properly dispose of household hazardous waste, keep lids on garbage bins tightly closed to keep out animals, wind, and rain that could cause litter or "garbage juice."

Vehicle Owners – Vehicle owners will be encouraged to properly dispose of any wastes from home maintenance, regularly maintain vehicles so that they don't leak fluids, and to wash their vehicles in such a manner that the run-off doesn't enter storm drains.

Pet Owners – Should pick up after and properly dispose of their pet's wastes.

Businesses – Target business sectors will include:

Automotive Maintenance Facilities – With this group we want to advance the proper usage, storage, and disposal of automotive fluids and other wastes such as tires. We will also educate this group about their responsibilities regarding spill cleanups and notification of the correct officials.

Rental Property Owners and Managers – We hope to leverage this group to educate their tenants through information distribution. In addition, we will educate property owners and managers about their responsibilities for repairing and maintaining sewer service lines and remediating sewage discharges.

Landscape Professionals – This group can be educated about proper choice and application of lawn chemicals such as pesticides, herbicides, and fertilizers. We can also encourage ideas such as using native plants, grouping plants with similar watering needs, and rain gardens. This group would also be an ideal way to help encourage proper vegetative buffers and stream bank maintenance.

Restaurants – Restaurant employees will be educated about proper grease disposal and other equipment cleaning procedures.

Structural BMP Owners – Will continue to be educated about proper BMP maintenance and their responsibilities.

Students/Young People - Some long-held practices, activities and behaviors have been shown to contribute to water quality degradation. Younger people are less resistant to changing their behavior and can help initiate such changes in the rest of society.

Public Education and Outreach Efforts

The City is a member of the Clean Water Education Partnership (CWEP), a consortium of approximately 30 local governments that fund a regional mass media campaign. Selection of target pollutants and audiences for annual TV

and radio campaigns is by consensus of CWEP members. As the second largest contributor, the City is very active in helping select target pollutants and audiences. CWEP's approach is generally to couple an awareness message with an action message.

The City conducts extensive efforts of its own, and has used a variety of outreach methods and messages as indicated in the SWMP and annual reports.

APPENDIX K

City of Durham

REGULATORY REVIEW DRAFT
POST-CONSTRUCTION ORDINANCE
For
Falls Lake NSW Strategy Rules and
Jordan Lake NSW Strategy Rules

(note: additional supporting materials were submitted for consideration by NC Division of Water Quality staff and by the NC Environmental Management Commission)

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CITY OF MEDICINE

CITY OF DURHAM
Department of Public Works
Stormwater Services Division
101 City Hall Plaza | Durham, NC 27701
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www.durhamnc.gov

Hand Delivered

August 10, 2011

Jason Robinson, PE
North Carolina Department of Environment and Natural Resources
Division of Water Quality, Planning Section
512 N. Salisbury Street
Raleigh, NC 27604

Subject: Falls and Jordan Lake New Development Rules Program and Ordinance

Dear Mr. Robinson:

In accordance with the Falls and Jordan Lake New Development Rules, we are forwarding herewith the City of Durham Falls and Jordan Lake New Development Program and Ordinance. The submittal includes a binder with the hard copy, a disk that includes Appendix D and E, and a disk with the submittal in digital format.

Please do not hesitate to call or email me at 919-560-4326 Ext. 30286 or sandra.wilbur@durhamnc.gov if you have any questions or comments.

Sincerely,

Sandra Wilbur, PE
Project Manager
Stormwater Services

c: Mr. Paul Wiebke, Assistant Stormwater Manager
Mr. Ed Venable, Engineering and Stormwater Manager
Mr. Marvin G. Williams, Director of Public Works

Good Things are Happening in Durham

AN ORDINANCE AMENDING THE STORMWATER PERFORMANCE STANDARDS FOR DEVELOPMENT, DURHAM CITY CODE CHAPTER 70, ARTICLE X, SECTIONS 70-736 THROUGH 70-749

WHEREAS the City Council of the City of Durham finds that:
The health, safety and general welfare and convenience of the public will be furthered through:
1) Protecting receiving waters impacted by stormwater runoff discharged from development within the City of Durham through maintaining performance standards for total suspended solids, nitrogen, phosphorus, and bacteria for such development;

2) Complying with the City of Durham's municipal stormwater National Pollutant Discharge Elimination System permit, issued under the authority of Section 402(p) of the Clean Water Act and implementing regulations at 40 CFR Part 122.26 *et seq.*;

3) Complying with the General Statutes of North Carolina, including but not limited to Article 4A 113A-70 *et seq.* and with implementing regulations for such state statutes, including but not limited to the statutes and regulations implementing nutrient management requirements in Neuse, Falls, and Jordan Basins;

4) Limiting potential flooding of downstream properties and protecting streams and other waterways from erosion by ensuring that development manages the increases in peak flows that result from changes in land cover;

NOW, THEREFORE, BE IT ORDAINED, by the City Council of the City of Durham that:

SECTION 1. Existing Sections 70-736 through 70-741 are replaced and amended as follows:

"Sec. 70-736. Purpose and definitions.
(a) *Purpose*. The purpose of Article X is to further the health, safety and general welfare and convenience of the public through:

(1) Protecting receiving waters impacted by stormwater runoff discharged from development within the City of Durham through maintaining performance standards for total suspended solids, nitrogen, phosphorus, and bacteria for such development;
(2) Complying with the City of Durham's municipal stormwater National Pollutant Discharge Elimination System permit, issued under the authority of Section 402(p) of the Clean Water Act and implementing regulations at 40 CFR Part 122.26 *et seq.*;
(3)Complying with the various General Statutes of North Carolina including but not limited to Article 4A, GS 113A-70 *et seq.* and implementing regulations for such state statutes, including but not limited to the statutes and regulations implementing nutrient management requirements in Neuse, Falls, and Jordan basins;
(4) Limiting potential flooding of downstream properties and protecting streams and other waterways from erosion by ensuring that development manages the increases in peak flows that result from changes in land cover;

(b) *Definitions*. Within this Article, the following terms and phrases, regardless of capitalization, shall have the meanings set forth below:

Baseline Date or Applicable Baseline Date means the following dates for the basins indicated:
Jordan Basin Dec. 31, 2001
Falls Basin Dec. 31, 2006
Lower Neuse Basin March 9, 2001

City Stormwater Standards means written standards related to Stormwater adopted by the Department of Public Works. They include but are not limited to the Reference Guide for Development and Reference Guide for Development/Stormwater; other written and adopted specifications for the design, construction, maintenance, and operation of Stormwater Control Measures or Stormwater Conveyances; and all state standards related to stormwater or state approved alternatives to such standards that have been adopted by the City's Department of Public Works.

Common Plan of Development means staged or coordinated Development pursuant to an approved plan such as a development plan or site plan whether or not by the same owner, or successive improvements over a period of years initiated by the owner(s) of and conducted on a parcel or contiguous parcels of land for the benefit of such parcel(s). Factors to be considered in determining whether a Common Plan of Development exists include but are not limited to: ownership; scope, content, and history of approved plans; other information regarding the development such as contracts, advertisements, or marketing materials; equitable factors; and common or joint use of infrastructure such as roads or utilities.

Department means the Department of Public Works of the City of Durham.

Development means Land Disturbance which increases impervious surface on a property, or alters its location, or results in an increase in runoff from a property or a decrease in infiltration of precipitation into the soil. It includes both existing development and new development. It does not include agriculture, mining, or forestry activities.

Director means the Director of the Public Works Department of the City of Durham, or such person(s) as designated in writing by the Director to perform all or a portion of the functions set forth in this Article.

Division of Water Quality or DWQ means the Division within the North Carolina Department of the Environment and Natural Resources (NC DENR).

Downtown Area means the Downtown Tier, Compact Neighborhoods, and Suburban Transit Zones as shown on the Durham Comprehensive Land Use Plan most recently approved by the Durham City Council.

Existing Development means Development that, prior to the effective date of this ordinance has either been lawfully constructed, or has established a vested right under North Carolina law to construct a proposed project, or portion thereof. With regard to application of this ordinance, a vested right will be recognized as follows:

a) for Development that does not require a state permit, a vested right shall exist for any portion of a Development that has an approved or a completed application for a site plan or subdivision plat covering that portion, or in the event a site plan or subdivision plat is not required, a building permit or a construction drawing for that portion of the Development. An approved development plan does not accord vested rights in the absence of an approved or completed application for the above-

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described plans or permits. A "completed application" is one that meets all application requirements, including payment of all required fees and submission of all required information, prior to the effective date of this ordinance. A vested right shall expire if the validity of an approved or completed application or approval is not continuously maintained as otherwise required under the Unified Development Ordinance or City Code;

b) for Development that requires a state permit, vested rights shall be recognized if the project meets all the requirements of a) above, and additionally has received necessary state permits required for the use or for construction.

Falls Basin means the area that drains to the Falls Reservoir as determined by the Durham Planning Department.

Impervious Surface means a surface that because of its composition and/or its use impedes the natural infiltration of water. It includes but is not limited to buildings, roofs, solid decks, driveways, parking areas, patios, sidewalks, and compacted gravel areas. It does not include areas that are part of permitted stormwater controls or the open surface water such as swimming pools.

Jordan Basin means the area that drains to Jordan Lake as determined by the Durham Planning Department.

Land Disturbance means a change in the natural cover or topography of land that may result in sedimentation, and includes but is not limited to grubbing, stump removal, removal of topsoil, coarse or fine grading, and disturbance to the subgrade.

Limited Residential means development that is single-family detached, duplex, park, or recreational development.

Lower Neuse Basin means the area that drains to the Neuse River but not to the Falls Basin as determined by the Durham Planning Department, which area is generally shown on a map maintained by such department.

Multifamily and Other Development means development not included in Limited Residential, and includes but is not limited to multifamily and townhomes, and office, industrial, institutional (including local government institutional), and commercial development.

New Development means Development that does not qualify as "Existing Development."

Redevelopment means Development on a site where structures or impervious surface already exists. It is a category of new development.

Stormwater Control Measure, or SCM, means a device or practice that is designed to trap, settle out, filter, or otherwise reduce pollutants from stormwater runoff, and/or to alter or reduce runoff velocity, amount, timing, or other stormwater characteristics. The term includes all measures formerly known as "best management practices" or "BMPs". Such measures include but are not limited to stormwater detention facilities, constructed wetlands, vegetative areas, filter strips, buffers, and vegetated swales, and appurtenant drainage facilities.

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Stormwater Conveyance means a physical feature, including constructed devices, that conveys stormwater. A conveyance may also serve as a Stormwater Control Measure.

Stormwater Facilities means Stormwater Control Measures and Stormwater Conveyances.

Stormwater Pollutant or Pollutant means nutrients (nitrogen and phosphorus), bacteria, total suspended solids, and any other substance that can be transported via stormwater and that is identified in this Article or City Stormwater Standards as requiring regulation.

Sec. 70-737 General; prior requirements; additional standards; interpretations.

(a) *Applicability.* This Article contains requirements for the control of Stormwater Pollutants and the management of peak flows from stormwater discharges from Development in the City of Durham. All Development shall be subject to the requirements of this Article unless specifically exempted.

(b) *Approval contingent upon compliance.* No site plan, preliminary or final subdivision plat, construction drawing for a street or for utilities, or utility permit shall be approved until the applicant has submitted information required by the City Stormwater Standards sufficient to determine compliance with this Article, and review for compliance has been conducted.

(c) *Prior requirements, violations continue.* Prior stormwater requirements that have been superseded by the requirements of this Article shall continue to apply to Existing Development approved and constructed under such prior requirements, in the event that the requirements of this Article do not apply. Existing Development, or portions thereof, that is not required to comply with this Article must continue to manage Stormwater Pollutants and peak flow in accordance with the stormwater requirements appearing on approved plans for the development and the requirements in effect when such plans were approved. Violations of superseded stormwater requirements shall continue as violations and be subject to enforcement under this Article unless this Article explicitly allows the Development or action that constitutes the violation.

(d) *City Stormwater Standards.* The Department of Public Works is authorized to promulgate technical standards for use in the administration of this Article, which standards may be amended from time to time. Technical standards may include but are not limited to requirements for design, construction, performance, financial security, review, and professional certification of stormwater facilities. City Stormwater Standards are considered requirements of this Article. They shall be in writing, and approved and signed by the Director, and shall be maintained in the City's Reference Guide for Development or in other written documents. If such standards conflict with technical standards that have been adopted pursuant to other portions of the City Code, the Director shall be authorized to resolve such conflicts. Any such resolution shall be consistent with the requirements of this Article.

(e) *Maps.* The watershed maps for the Falls Basin, the Jordan Basin, and the Lower Neuse Basin maintained by the Durham City County Planning Department, as supplemented by particular drainage information that may be required pursuant to City Stormwater Standards or the Unified Development Ordinance, shall be used to determine the drainage basin in which a property is located and other determinations regarding drainage.

(f) *Final decisions/interpretations.* The Director shall be authorized to render all interpretations of, and final decisions under, this Article. No interpretation shall be binding unless it is in writing and signed by the Director.

(g) *Requirements Supplementary; Conflict.* The requirements in this Article supplement other statutory, regulatory, and contractual requirements including, but not limited to, requirements for buffers, water protection (watershed) overlays, and controls for sedimentation and erosion that are contained in the Unified Development Ordinance. In the event of conflict between the requirements of this Article and such other requirements, the stricter of the requirements shall control. In addition, this Article does not prohibit establishing stricter requirements in authorizations or agreements for particular projects, including but not limited to committed elements in development plan rezonings, the terms of utility extension agreements, or recorded maintenance agreements regarding individual facilities.

(h) *Fees.* The City is authorized to charge fees to recoup all estimated direct and indirect costs of administering this Article, and such fees shall be reviewed and approved on a periodic basis by the Durham City Council.

(i) *Severability.* If any portion of this Article is determined to be invalid by a court of competent jurisdiction, such determination shall not affect or invalidate the remaining portions of this Article.

Sec. 70-738. Peak runoff control requirements.

(a) *Purpose.* The purpose of this section 70-738 is to ensure that the increases in volume, velocity, and peak flow of stormwater discharges from Development are addressed, in order to mitigate the impacts on downstream properties and receiving waters. All Development, including Development that may be exempt from pollutant reduction requirements set forth in remaining sections of this Article, is subject to the requirements of this section unless exempted in (b) below.

(b) *Applicability; calculation of prior impervious area.* Subsection 70-738 applies to all Development where changes are made to impervious conditions, where either: i) impervious area is relocated; or ii) impervious area is increased by 200 square feet or more, cumulatively, from pre-development conditions, calculated as follows:

(1) For purposes of applying peak flow requirements for the 2 and 10 year storms, the land cover (including type and location) existing as of April 23, 1997 shall be considered the "pre-development conditions";

(2) For purposes of applying the peak flow requirement for the 1 year storm, the land cover (including type and location) that existed as of March 9, 2001 for land in the Falls Basin and Lower Neuse Basin, and as of March 17, 2009 for land in the Jordan Basin shall be considered the "pre-development conditions";

(3) For purposes of calculating the 200 square foot threshold, Development that is part of a Common Plan of Development shall be assessed with other portions of such common plan that have not previously complied with peak flow requirements.

(c) *Requirements.*

(1) *Stormwater impact analysis.* Development that is not exempt under (b) above shall submit a Stormwater Impact Analysis or approved alternative to such analysis that complies with City Stormwater Standards as part of the application for site plan or subdivision plat approval, or if such is

not required, as part of submittals for construction drawings or utility permit approval. Calculations shall be made in conformance with City Stormwater Standards. No subdivision plats, site plans, utility permits, or construction drawings shall be approved in the absence of a determination by the Stormwater Division that required submissions have been made and approved.

(2) *One year storm.* Development that increases the peak runoff rate from the 1-year storm from pre-development conditions shall provide stormwater management facilities in accordance with City Stormwater Standards such that there is no net increase in peak runoff rate.

(3) *Two and ten year storms.* Development that increases the peak runoff rate from either the 2-year or the 10-year storm from predevelopment conditions may be required to provide stormwater management facilities to address the impact, as determined in accordance with City Stormwater Standards.

(4) *Other design storms.* Development that increases the peak runoff from other design storms such as the 100-year storm may be required to install stormwater management facilities to address the impact, as determined in accordance with City Stormwater Standards.

Sec. 70-739. Stormwater Pollutant standards; exemptions.

Sections 70-739 through 70-741 set forth requirements for Stormwater Pollutants, which include nitrogen, phosphorus, total suspended solids, and bacteria. All Development shall comply with these standards unless exempted as set forth in this subsection 70-739.

(a) *Exemptions for limited disturbances.* Development in which Land Disturbance, calculated cumulatively as of the Applicable Baseline Date, is less than the thresholds in Table 1 below is exempt from the standards in subsections 70-740 and 70-741, subject to paragraphs (1) and (2) below.

TABLE 1 THRESHOLDS FOR APPLICATION OF STORMWATER POLLUTANT REQUIREMENTS

Project Location	Land Disturbance	
	Limited Residential	Multifamily and Other
Jordan Basin	1 acre	0.5 acre
Falls Basin	0.5 acre	12,000 sq. ft.
Lower Neuse Basin	1 acre	0.5 acre

(1) *Common Plan of Development.* Development that is part of a Common Plan of Development shall be included in the calculation. If the applicable threshold set forth in Table 1 is exceeded, all other portions of the Common Plan are subject to the requirements of this Article;

(2) *Redevelopment and Existing Development; maintenance of treatment.* Redevelopment and Existing Development that are exempt under these thresholds must continue to maintain and reconstruct all SCMs in compliance with approved plans, prior ordinance requirements, and City Standards.

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(b) *Other exemptions.* Additionally, Development is exempt if:

A. it qualifies in its entirety as Existing Development; or

B. it is located in the Downtown Area and does not increase impervious area over the Applicable Baseline Date; or

C. it is undertaken by a state or federal entity. (*Note:* Review and approval by the state must be demonstrated); or

D. it is a City transportation project in the Jordan basin.

Sec. 70-740. Required reductions for nutrients and TSS; alternatives; calculations

(a) *Nutrient Loading Limits.* Development not exempt under subsection 70-739 shall construct and implement SCMs so as to limit the post construction loading of nitrogen and phosphorus from the project area to the limits set forth in Table 2 below, or shall comply with an allowed alternative as set forth in (b) through (d) below. A portion of the reduction requirements for nitrogen and phosphorus may be met through off site measures or payments as set forth in 70-741.

TABLE 2 NUTRIENT EXPORT LOAD LIMITS

Project Location	Export Limit lbs/acre/year	
	Nitrogen	Phosphorus
Jordan Basin	2.2	0.82
Falls Basin	2.2	0.33
Lower Neuse Basin	3.6	not required

TABLE 3 PERCENTAGE REDUCTION OPTION FOR REDEVELOPMENT.

Project Location	Percent Reduction from Pre-Dev Load	
	N	P
Jordan	35%	5%
Falls	40%	77%
Lower Neuse	30%	N/A

(c) *Alternative percentage reduction option for Redevelopment that does not increase impervious area.* Redevelopment not exempt under 70-739 that is outside the Downtown Area and does not increase impervious area shall reduce pre-development nutrient load, calculated as of the Applicable Baseline Date, by 10% if reductions are achieved onsite, and by 15% if reductions cannot be entirely achieved onsite.

(d) *Alternative for low impact development in Falls basin.* Development in the Falls Basin will be considered compliant with the nutrient reduction obligations of this Section 70-740 if it demonstrates that it meets the post development hydrologic criteria set forth in Chapter 2 of the North Carolina Low Impact Development Guidebook dated June of 2009, as it may be amended from time to time.

(e) *TSS Reduction.* When the impervious percentage of a Development that is not exempt under Sec. 70-739 equals or exceeds 16% in the Falls or Jordan Basins, or 24% in the Lower Neuse Basin,

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TSS removal is required as further described in this subsection (e). All impervious surfaces, as reasonably practical, must drain to an SCM that is designed to provide a minimum of 85% TSS removal and is sized to capture runoff from the first 1 inch of rainfall from all surfaces that drain to the SCM. These requirements are expanded, and/or modified as follows:

(1) *Piped Areas in Low Density Projects.* Projects that are do not require construction of SCMs because their impervious percentage is less than that described in the paragraph above must treat TSS from stormwater runoff that is conveyed in non-vegetated conveyances, such as stormwater pipes, but excluding road and driveway crossings.

(2) *Overtreatment to address untreatable areas.* Where treatment for TSS is not reasonably practicable, as determined by the Department, such as when impervious areas include offsite transportation improvements or small noncontiguous areas at the edge of a project, additional reductions of TSS may be required in treatable areas, such as overtreatment in other project areas or treatment of offsite runon.

(f) *Calculations for Nutrient Loading and TSS Removal.* Pollutant loading calculations shall be made using City Stormwater Standards. All increases in impervious surfaces shall be included, including but not limited internal and off site transportation improvements. Approved methodologies for calculating pollutant loading shall be maintained in writing by the Public Works Department, and shall include those methodologies and calculations required to be used by the Division of Water Quality or DWQ-approved alternate methodologies.

(g) *Submittals.* An applicant shall submit pollutant loading calculations for the pre- and post-development conditions as part of its application for approval of a subdivision or site plan, utility permit, or construction drawings for a street or utility.

Sec. 70-741 On-site treatment requirements; offsite purchase and credit options; bacteria control.

(a) *On site nutrient treatment requirements.* Nitrogen and phosphorus reduction requirements may be met, in part, through offsite management measures or the purchase of nutrient credits. At a minimum, however, in the Jordan and Falls Basins a percentage of the required nitrogen and phosphorus reductions must be achieved through onsite treatment, in the amount shown in Table 4 below. In addition, in the Jordan and Lower Neuse Basins, nitrogen export load from the site must not exceed 6 lbs. per acre per year for Limited Residential, and 10 lbs per acre per year for Multifamily and Other. (*Note:* offsite credit purchases do not meet TSS removal requirements which must be met onsite.)

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TABLE 4 ONSITE NUTRIENT TREATMENT REQUIREMENTS

Project Location	Minimum Onsite Nutrient Treatment	
	Nitrogen	Phosphorus
Jordan - General	*40% of required reduction	*40% of required reduction
Falls - General	*50% of required reduction	*50% of required reduction
Falls and Jordan within Downtown Area	*30% of required reduction	*30% of required reduction
Falls and Jordan exceeding thresholds but with less than 1 acre land disturbance	*30% of required reduction	*30% of required reduction

*The "required reduction" is the difference between the post development loading in pounds per acre per year multiplied by the site area in acres before treatment minus the loading target, in pounds per acre per year multiplied by the acres. The percentage shown in the chart above is applied to that difference and the resulting number is the amount in pounds/year of nutrient reduction that must be achieved onsite.

(b) *Offset Payments to state approved nutrient mitigation banks.* Development and Redevelopment shall have the option of purchasing nutrient credits from state-approved nutrient banks to partially offset nitrogen and/or phosphorus loads as allowed by State law and regulation, including but not limited to 15A NCAC 02B.0235, 15A NCAC 02B.0282, and 15A NCAC 02B.0240, as they may be amended from time to time. The number of pounds for which credits are purchased shall be increased by 5% if the nutrient bank is not located in the City of Durham. The following additional requirements shall apply:

1. *Location of nutrient banks.* Development in the Falls Basin must use nutrient banks located in the upper Falls portion of the Falls Basin – the portion that is north and/or west of Highway 50. Development in the Jordan Basin must use nutrient banks located in the Upper New Hope arm of such basin, as defined in state regulations.

2. *Certification of Nutrient Bank Provider.* Offset credits may only be obtained from nutrient banks certified by the state.

3. *Utilization of NC Ecosystem Enhancement Program.* Credits may also be obtained from the NC Ecosystem Enhancement Program if such credits are available, and if applicable state requirements regarding utilization of private nutrient banks are first met.

4. *Certification of credits.* Credits purchased pursuant to this subsection (b) shall be verified by the State and proof of such verification that meets City requirements shall be presented prior to approval of a final plat, or if no plat is required, prior to issuance of the first building permit within the project, or such earlier deadline as may be required by City Stormwater Standards.

(c) *Combination with noncontiguous donor parcels.* Development that has met the onsite treatment requirement in Section 70-741 may include within the proposed Development noncontiguous properties (hereafter "donor parcels") deemed beneficial to water quality by the Department and made available for nutrient reduction through an agreement recorded prior to

October 1, 2011 that perpetually protects the donor parcels from development. Such parcels must meet the requirements detailed in the Public Works Operating Policy on the Review Criteria for Acceptance of Conservation Easements for Non-contiguous Donor Parcels. Use of donor parcels is also subject to the following additional restrictions:

(1) The donor and receiving parcels must be within the same reservoir basin;

(2) The donor parcels must be perpetually restricted from development though the recorded legal easement referenced above that can be enforced by the City or County of Durham;

(3) Areas within the donor parcels that the Department has determined to be undevelopable such as areas within the floodway or within required 50 riparian foot stream buffers may not be used for credit;

(4) The amount of credit shall be as determined by the Department through a legally binding agreement approved prior to October 1, 2011;

(5) All purchases or commitments for use of donor parcels shall be made prior to October 1, 2015.

(d) *Bacteria removal; control of other identified Stormwater Pollutants.* All Development which constructs Stormwater Control Measures in order to comply with this Article and which is located in an area that is subject to a state approved Total Maximum Daily Load for bacteria shall be required to have at least one SCM for each stormwater discharge that is rated as medium or high for its ability to remove bacteria from stormwater. Ratings shall be those that appear in the most recent version of the NCDENR Stormwater SCM manual or as determined or approved by the Director. In addition, SCMs required to be constructed under this Article must also treat any other pollutant for which a Total Maximum Daily Load has been identified for the area within which the SCM is located.

Sec. 70-742. Design, construction, and completion of SCMs and stormwater conveyances.

The owner(s) and/or the developer(s) of any Development for which SCMs and/or Stormwater Conveyances have been approved, and persons or entities that have contracted to perform all or a part of an owner's or developer's obligations, shall be responsible for complying with the requirements set forth below.

(a) *Design.* Stormwater Facilities required by this Article shall be designed in accordance with City Stormwater Standards. Dams, as defined by the North Carolina Dam Safety Law, including but not limited to NCGS 143-215.23 *et seq.*, and associated state administrative codes, as they may be amended in the future, are subject to the above-cited state requirements. Stormwater Facilities that are not required by this Article shall be subject to applicable City Stormwater Standards.

(b) *Approvals for Stormwater Facilities.* Stormwater Facilities required under this Article or any other requirement of City Code or the Unified Development Ordinance shall be constructed in accordance with City Stormwater Standards. Plans for such work, and any other work that may be identified in City Stormwater Standards, shall be submitted to the Department for review and approval on such timetable as required in City Stormwater Standards. City Stormwater Standards may require that permits be obtained for such work.

(c) *Construction plans, fees, maintenance, financial guarantees.* For a Development in which construction of one or more Stormwater Control Measures is required, the owner(s) and/or developer(s) must ensure compliance with (1) through (5) below prior to i) transfer of any ownership interest or any lot within the development; ii) issuance of a building permit for construction within

the development; iii) issuance of a utility permit for the development; and iv) construction drawing approval for any infrastructure within the development:

(1) Review and approval of the Stormwater Impact Analysis;

(2) Review and approval of plans and specifications for the SCMs and Stormwater Conveyances within the development;

(3) Payment of permit and review fees required by the Department;

(4) Approval and recordation of an agreement and/or covenants that meet City Stormwater Standards and that provide, among other things, for the construction and long term maintenance, inspection, repair, and reconstruction of the SCMs in accordance with City Standards. In the case of residential development intended for home ownership, a homeowners' association shall be created prior to recordation of such agreement and covenants and shall be a necessary party to such agreement;

(5) Provision of financial guarantees to ensure the long term maintenance, inspection, repair, and reconstruction of stormwater control measures in accordance with City Code Section 70-751, the Unified Development Ordinance, and City Stormwater Standards.

(d) *Completion of construction.* Construction of SCMs and stormwater conveyances shall be completed, and final inspection and as-built drawings submitted to and approved by the City, in accordance with timelines set forth in City Stormwater Standards, unless a performance guarantee to ensure completion is approved pursuant to (e) below.

(e) *Performance Guarantees.* The owner or developer of a Development in which the requirements of (d) above have not been completed shall provide a performance guarantee of a type as set forth in City Stormwater Standards. The amount provided shall be as set forth in City Stormwater Standards, or as determined by the Director, which shall at a minimum require that all direct and indirect costs of completion and compliance with City requirements be guaranteed. City Stormwater Standards shall also include deadlines for completion of facilities for which performance guarantees have been provided. Deadlines may be modified by the Director to better ensure the protection of the City and the public, or to address special circumstances. A performance guarantee provided under this subsection may be used for any purpose not otherwise prohibited by law or the specific terms of such guarantee.

(f) *Conditional Certificates; Reduction of Guarantees.* The City is authorized to issue conditional certificates of compliance for buildings for which stormwater guarantees have been provided and completion ensured consistent with City Stormwater Standards. In addition, City Stormwater Standards may allow for reduction of performance guarantees as approved by the Department as Stormwater Facilities are completed and requirements are met.

(g) *Obligation to complete facilities; City use of land.* The owner of property for which a stormwater facility has been approved as part of a Development, and any parties that have obligated themselves to construct such facilities under approved plans, permits, or agreements, are legally obligated to construct the facilities approved, or to pay for the construction of such facilities, if any land disturbing activity has occurred in the Development. An owner that applies for and receives approval to construct a stormwater facility in a Development agrees, without further written agreements or conditions, to allow the City and its agents to enter and construct such facilities and to a reasonable right of entry to such land for the City and its agents, without compensation for such entry or use, to construct facilities required under this Article. Such agreement applies to all properties within the Development that are conveyed by such owner, and to all persons or entities

that utilize an approved plan requiring construction of a stormwater facility for further development. . This provision does not: i) require the City to take any action, acquire any property, or construct any facility; or ii) create any right or entitlement for any persons or entities other than the City; or iii) limit the City's ability to require other persons or entities not identified in this subsection (g) to construct stormwater facilities that have not been constructed; or iv) limit the City's ability to utilize any other authority it may have under law to recoup the cost of construction of stormwater facilities, including but not limited to authority to assess properties served by such facilities.

(h) *Rights under contracts.* The City is entitled to enforce any third party rights for the benefit of the public or itself that may be expressly or implicitly created in contracts for the design and construction of SCMs or Stormwater Conveyances. Contractors that have not performed in accordance with such contracts may be considered responsible parties under this Article.

Sec. 70-743 Inspection, Maintenance, Repair, and Reconstruction.

(a) *Private maintenance responsibility.* The inspection, maintenance, repair and reconstruction of Stormwater Control Measures and Stormwater Conveyances not located in city right of way shall be the responsibility of i) the owner of the property on which such SCMs and conveyances are located; and ii) any person or entity that has legally agreed to be responsible for the SCMs; and iii) the non-City properties served by the SCMs or conveyances, as determined by reference to site plans, plats, and construction drawings for the SCMs or conveyances.

(b) *Level of maintenance.* Every SCM and Stormwater Conveyances shall be maintained, repaired, and reconstructed so as to continue its functionality to the level for which it was designed for the control and/or conveyance of stormwater and for the treatment of Stormwater Pollutants. Maintenance, repair, and reconstruction shall be performed in compliance with City Stormwater Standards. Standards for maintenance include but are not limited to the specific operation and maintenance agreement that may exist for particular facilities on file with the City Public Works Department, and the most recent version of the "Owner's Maintenance Guide for Stormwater SCMs Constructed in the City of Durham."

(c) *Annual private inspection.* An annual inspection report that meets City Stormwater Standards shall be provided for each Stormwater Control Measure by the persons or entities responsible for such facility, identified in (a) above. The report shall be submitted on such schedule as approved by the Department. In addition, such persons or entities shall maintain inspection and repair reports regarding the SCMs as required by City Stormwater Standards.

(d) *City right to inspect.* The City may inspect Stormwater Control Measures and Stormwater Conveyances located on private property. Inspection may include but is not limited to testing of structures, water, or vegetation as the City determines may be useful to determine the history or performance of the SCM or conveyance.

Sec. 70-744 Remedies for Violation

Noncompliance with this Article is a violation of the City Code and is subject to all civil and criminal penalties allowed, in addition to those specifically set forth below. Persons and entities identified in Sec. 70-742 and 70-743(a) as responsible for compliance with this Article shall be

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responsible for any violation. Remedies are cumulative, and may be exercised separately, together, or in any order.

(a) *Withholding of Permits, Approvals, and Certificates of Occupancy/Compliance.* In the event of violation of this Article, the City may withhold any approval or permit for any development activity occurring on the property served by an SCM or Stormwater Conveyance which is in violation of this Article, and may withhold any permit or certificate of occupancy/compliance for any structure served by such SCM or stormwater conveyance.

(b) *Stop work order.* The City may issue a stop work order to any person or entity performing work on property on which an SCM or Stormwater Conveyance is in violation of this Article.

(c) *Injunction; Nuisance; Costs as Lien.* The City may institute an action in a court of competent jurisdiction for an injunction, order of abatement, or any other equitable remedy not prohibited by law to remediate a violation of this Article. The City may also maintain an action under GS 160A-193 to remedy a condition prejudicial to the public health and safety. Costs of correction sustained by the City may be assessed as a lien against property, as allowed by law.

(d) *Incorporation of 70-538 et seq.* In addition, all remedies and procedures set forth in Sections 70-538 through 70-542 of the City Code shall apply to violations of Section 70-743.

SECTION 2. This Ordinance shall be effective upon adoption and shall replace the above-cited sections of the City Code.

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APPENDIX L

City of Durham

INVENTORY OF MUNICIPAL FACILITIES, ACTIVITIES AND OPERATIONS

Permit NCS0000249 requires the City to "maintain an inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff." Other NPDES permits issued within the City of Durham are included in Table L-1. Table L-2 lists other major permits.

Stormwater Services has identified the following typical activities as having potential to discharge pollutants to the drainage system:

Vehicle repair	Building repair
Vehicle fueling	Building maintenance
Vehicle washing	Parking lot maintenance
Vehicle storage	Turf management
Outdoor loading	Landscaping
Outdoor storage	Swimming pool discharges
Waste management	Grading, land development & construction

These activities were used to generate a list of City facilities that have potential to contribute polluted stormwater runoff. Pollution potential is based on the activities taking place at a facility.

The following activities area associated with specific departments:

- Building repair: General Services
- Building maintenance: General Services
- Parking lot maintenance: Lanier Parking Solutions (contract operator)
- Turf management and landscaping: General Services and Parks & Recreation
- Swimming pool discharges: General Services
- Water, sewer, and stormwater utilities maintenance: Public Works and Water Management
- Grading, land development & construction:- General Services, Public Works, and Water Management

Below is a list of typical municipal facilities that have the potential to contribute polluted stormwater runoff together with information about those facilities within the City of Durham (a city facility that has multiple uses may be listed under several types):

- Composting facilities – none[1]
- Asphalt plants - none
- Concrete plants - none
- Equipment storage and maintenance yards – General Services, Public Works Operations Center, and Water Management Administration Facility
- Hazardous Waste Handling and Transfer Facilities – none
- Household Hazardous Waste Collection – no storage, only drop off[2]
- Incinerators and landfills - none
- Solid Waste Transfer Station – Waste Disposal and Recycling Center (Transfer Station)
- Materials Storage Yards – General Services Facility, Public Works Operations Center, and Water Management Administration Facility
- Municipal Golf Courses – none[3]
- Public Works Yards – Public Works Operations Center
- Vehicle Maintenance Yards – Fleet Maintenance, Public Works Operations Center, Solid Waste Vehicle Wash, and DATA Transit Maintenance (DATA is under private management and operation)
- Vehicle Fueling - Fleet Maintenance, Public Works Operations Center, and DATA Transit Maintenance (DATA is under private management and operation)
- Water and Wastewater Treatment Facilities – North Durham Water Reclamation Facility, South Durham Water Reclamation Facility, Williams Water Treatment Facility, and Brown Water Treatment Facility
- Fire Training Center – Durham Fire Training Academy
- Other Public Buildings – City Hall and ancillary buildings; Police and Fire Stations; there are no municipal libraries (low potential for pollution.)
- Other City Facilities – 4 parking decks and 6 public parking lots with 60 or more spaces

The city facilities included above are summarized below. Listing order is generally north to south to facilitate finding facilities on a map that is in preparation.

- Brown Water Treatment Facility, 1615 Infinity Rd
- Water Management Administration Facility, 1600 Mist Lake Dr
- Waste Disposal and Recycling Center (Transfer Station), 2115 E. Club Blvd
- Household Hazardous Waste Center, 1900 E. Club Blvd (across from NDWRF)
- North Durham Water Reclamation Facility, 1900 E. Club Blvd
- Durham Fire Training Academy, 2008 E. Club Blvd
- Fleet Maintenance, 1900 Camden Av
- Solid Waste Vehicle Wash Station, 1833 Camden Av

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[1] Yard waste is currently is disposed of in a landfill in Brunswick County, VA. Application has been submitted for a permit to construct and operate a compost facility. The permit will require that compost leachate be addressed as a wastewater. Preliminary plans are to use authorized Pump-and-Haul to transfer the leachate to the city's North Durham WRF. A SWPPP will also be prepared. Construction may begin in FY 2009.

[2] HHW drop-off is available at 1900 E Club Blvd. City contracts with EcoFlo for collection and disposal services. EcoFlo packs and removes HHW daily.

[3] Hillandale Golf Course is not operated by the City; the land it is on was donated to the City in return for public access to the course, but it must remain as a golf course. The City is not involved in course operation.

- DATA Transit Maintenance (contract operator), 1907 Fay St
- General Services Facility, 2011 Fay St
- Hillandale Golf Course (public access course under private operation), 1600 Hillandale Road
- Williams Water Treatment Facility, 1405 Hillandale Rd
- Public Works Operations Center, 1100 Martin Luther King Pkwy
- South Durham Water Reclamation Facility, 6605 Farrington Road

The following are recreational facilities, some of which have potential for contributing polluted stormwater runoff (beyond landscaping) but are implementing mitigation measures as listed:

Dog Parks:

- Pineywood Park (400 E Woodcroft Parkway, at Woodlake Dr)
- Northgate Park (Lavender Ave)

Dog Parks are open to dogs whose owners have paid City of Durham Department of Parks and Recreation (DPR) dog fees and are wearing their "Dogapalooza" DPR Tag. Owners are required to clean up after their dogs. 'Mutt Mitt' type clean-up stations are provided.

Outdoor Pools

- Forest Hills, 1639 University Drive
- Hillside, 1300 South Roxboro Street
- Long Meadow Pool, 917 Liberty Street

Open Mid-June to mid August, filter backwash discharges to the sanitary sewer system.

Recreation Centers (with indoor pools)

- Edison Johnson Recreation Center, 500 West Murray Av, (919) 560-4270, Audrey Gill
- I. R. Holmes Sr. Recreation Center at Campus Hills, 2000 South Alston Av, (919) 560-4444. Brian Rhea

The pools have filter backwash discharges to the sanitary sewer system.

Other Recreation Centers

- Lyon Park Recreation Center, 1309 Halley St, (919) 560-4288, Jeff Forde
- W.D. Hill Recreation Center, 1308 Fayetteville St, (919) 560-4292, Andre White
- Weaver Street Recreation Center, 3000 Weaver St, (919) 560-4294, Nikiya Cherry-Sanders

Neighborhood Centers (based out of 400 Cleveland Street, (919) 560-4355)

- East Durham Neighborhood Center (2615 Harvard Ave.), 560-4278
- E.D. Mickle Neighborhood Center (1204 N. Alston Ave.), 560-4284
- T.A. Grady Neighborhood Center (531 Lakeland St.), 560-4280
- W.I. Patterson Neighborhood Center (2641 Crest St.), 560-4560
- Walltown Neighborhood Center (1300 Club Blvd.), 560-4296
- Club Boulevard Neighborhood Center, 2415 Glennbrook Dr, 560-4355
- Hoover Road Neighborhood Center, 1129 Hoover Rd, 560-4355, ext. 210

- Morreene Road Neighborhood Center, 1100 Morreene Rd, 560-4405
- Liberty Street Neighborhood Center, 131 Commerce St, 560-4355, ext. 210

Regional Parks

- West Point on Eno, 5101 N. Roxboro Rd, 471-1623

(Environmental education at this site, may fall under state park system in future)

Privately Operated Facilities

- Historic Durham Athletic Park (DAP)
- Durham Bulls Athletic Park (DBAP)

(These facilities are under private operation, maintenance and management.)

Other Facilities

- Armory, 212 Foster St, 560-4514
- CCB Plaza, 201 N. Corcoran St, 560-4355
- Forest Hills Clubhouse, 1639 University Dr, 560-4782

Parks –There are 21 community parks, 41 neighborhood parks and miniparks; 14 miles of greenways and trails existing out of a planned system of 118 miles. The City has 16 acres of public open space per 1000 residents, including lake surfaces, or 6 acres per 1000 excluding water surfaces. Dispensers of bags to pick up pet wastes (e.g. 'Mutt Mitt' type clean-up stations) have been provided in parks and on trails and greenways.

Other locations of interest include:

Fire Station Locations

Station #1, 139 E. Morgan Street, 560-4245
Station #2, 1001 Ninth Street, 560-4251
Station #3, 822 S. Miami Blvd., 560-4255
Station #4, 1818 Riddle Road , 560-4257
Station #5, 2212 Chapel Hill Blvd., 560-4261
Station #6, 3700 Swarthmore Road, 560-4264
Station #7, 3919 N. Duke Street, 560-4266
Station #8, 225 Lick Creek Lane, 560-1405
Station #9, 2012 E. Club Blvd., 560-4271
Station #10, 1805 Cole Mill Road, 560-4311
Station #11, 2800 W. Cornwallis Road, 560-4463
Station #12, 1230 Carpenter Fletcher Road, 560-4260
Station #13, 2901 S. Miami Blvd., 560-4907
Station #14, 1327 Umstead Road, 560-1126
Station #15, under construction
Station #16, Farrington Rd, 560-1450

High priority facilities with tanks include:

- Brown Water Treatment Facility, 1615 Infinity Rd
- North Durham Water Reclamation Facility, 1900 E. Club Blvd
- Fleet Maintenance, 1900 Camden Av
- DATA Transit Maintenance (contract operator), 1907 Fay St
- Williams Water Treatment Facility, 1405 Hillandale Rd
- Public Works Operations Center, 1100 Martin Luther King Pkwy
- South Durham Water Reclamation Facility, 6605 Farrington Road,

Table L-1

Facilities Requiring NPDES Industrial Stormwater Permits*			
Facility	**Permit Type**	**Permit Number or Certificate of Coverage**	**Facility Contact**
South Durham Water Reclamation Facility	Industrial Stormwater-NCG11	NCG110082	Bob Dodson, Superintendent, Department of Water Management
North Durham Water Reclamation Facility	Industrial Stormwater-NCG11	NCG110092	John Dodson, Superintendent, Department of Water Management
Fleet Maintenance	Industrial Stormwater-NCG8	NCG080771	Kent Cash, Director, Department of Fleet Maintenance
Solid Waste Vehicle Wash Facility	Industrial Stormwater-NCG8	NCG080773	Corenta Evans, Supervisor, Department of Solid Waste
Public Works Operations (PWOC) Center/Water Management/Fuel Island	Industrial Stormwater-NCG8	NCG080776	Tom Lucas, Water Distribution and Collection Specialist, Department of Water Management
DATA Bus Maintenance Facility, 1903 Fay Street	Industrial Stormwater-NCG8	NCG080788 issued to contract operator DCTC	Jeff Meadows, DCTC; Jim Frei, consultant

***** Each listed facility has developed and is implementing a Stormwater Pollution Prevention Plan (SWPPP).

Table L-2

Permits Other Than Stormwater Issued to the City or County			
Facility or	**Permit Type**	**Permit Number or Certificate of Coverage**	**Facility Contact**
South Durham Water Reclamation Facility	Major Wastewater	NC0047597	Bob Dodson, Superintendent, Department of Water Management
North Durham Water Reclamation Facility	Major Wastewater	NC0023841	John Dodson, Superintendent, Department of Water Management
City of Durham Sewer Collection System	Non-discharge	WQCS00005	Tom Lucas, Water Distribution and Collection Specialist, Department of Water Management
County of Durham Sewer Collection System	Non-discharge	WQCS00038	Joseph R. Pearce Utility Division Mgr, Durham County Engineering Department

APPENDIX M

RESERVED FOR FUTURE USE

APPENDIX N

City of Durham

AGREEMENT FORMING THE CLEAN WATER EDUCATION PARTNERS

Original Agreement between City of Durham and partners to form the Clean Water Education Cooperative

Durham

SUPPORT SERVICES AGREEMENT BETWEEN TRIANGLE J COUNCIL OF GOVERNMENTS AND LOCAL GOVERNMENTS AND OTHER FUNDING PARTNERS ESTABLISHING THE CLEAN WATER EDUCATION PARTNERSHIP PROGRAM

THIS AGREEMENT made and entered into this 24th day of April 2003 by and between the undersigned local governments and organizations, hereafter collectively referred to as the "Clean Water Education Partnership Program Partners" or the "CWEP Partners", and Triangle J Council of Governments (TJCOG).

WITNESSETH:

1. Establishment of Clean Water Education Partnership and Program. The Clean Water Education Partnership Program Partners hereby acknowledge that economic and environmental benefits can be achieved through establishment of a cooperative, coordinated and cost-effective public education and awareness program relating to stormwater management and nonpoint source pollution control in the Neuse and Cape Fear River Basins. The CWEP Partners hereby commit to jointly develop and implement a Clean Water Education Partnership Program ("the Program") for the purpose of:

   (a) meeting, and exceeding where appropriate, the local stormwater program education requirements established under North Carolina Department of Environment and Natural Resources Neuse River Basin Nutrient Sensitive Waters Management Strategy rules applicable to local stormwater management (15A NCAC 2B .0235), and the subsequent guidance provided in the "Neuse River Basin: Model Stormwater Program for Nitrogen Control" dated August 30, 1999;
   (b) meeting certain stormwater program public education and awareness requirements applicable under the Federal NPDES Phase II stormwater requirements;
   (c) building public awareness and understanding of stormwater management issues and challenges, and developing a sense of responsibility and place relating to stormwater management and nonpoint source pollution control; and
   (d) strengthening and building on collaborative efforts relating to stormwater management and nonpoint source pollution control.

2. Establishment of Program Steering Committee. The CWEP Partners hereby agree to establish a Program Steering Committee that shall manage the business and affairs of the Program and develop and approve the annual work plan for the Program. Each CWEP Partner shall be entitled to have one (1) vote on all official matters that are considered by the Steering Committee. Each CWEP Partner's manager shall appoint it's jurisdiction's respective voting member (and any designated alternate members) to serve on the Steering Committee. The Committee may adopt formal organizational documents as it deems necessary and appropriate. All official actions taken by the Steering Committee shall be recorded in writing and provided to each CWEP Partner's voting member on the Steering Committee.

3. Engagement of TJCOG and Scope of Services. The CWEP Partners and TJCOG hereby agree that TJCOG shall provide administrative and management support services relating to the establishment of the Program. TJCOG shall, in a satisfactory manner as determined by the Program Steering Committee, perform the tasks necessary for overall administration of the Program. The project management and administrative services (the "Program Services") to be provided by TJCOG include:

   (a) coordination and staff support for meetings, communications and projects relating to the Program;
   (b) assistance with development of the Annual Work Plan for the Program;
   (c) liaison with state agencies and technical consultants retained for the Program;
   (d) management of any contracts issued for the Program, and oversight of contractor services;
   (e) administration of Program finances, including record keeping, collection and disbursement of funds, and compliance with fiscal control practices required of local governments;
   (f) establishment and maintenance of a Program web-site, subject to approval of web-site content by the Program Steering Committee;
   (g) pursuit of supplemental funding assistance for the Program; and
   (h) other services consistent with the purpose of the Program, as requested by the CWEP Partners through the Program Steering Committee.

4. Period of Performance. The initial period of this Agreement shall be from July 1, 2001 through June 30, 2002; provided, however, that this Agreement may be renewed upon mutual agreement of the CWEP Partners (acting through the Program Steering Committee) and TJCOG. Any CWEP Partner may, at its discretion, decide whether or not to continue participating in the Program beyond the current term. Each CWEP Partner agrees that, on or before May 1st of each year this Agreement is in effect, it will notify TJCOG in writing as to whether the CWEP Partner will or will not participate in the Program for the next year.

5. Program Funding Level. The CWEP Partners hereby agree to initially fund the Program in the amounts shown in Exhibit A. Each CWEP Partner's respective share of the Program cost shall be based on the total of two factors: (a) a uniform base participation charge which shall recover 30% of the projected cost for the Program, and (b) a variable rate charge that shall recover 70% of the projected cost for the Program, and that is based on the respective CWEP Partner's proportionate share of the total estimated population of the CWEP Partners; provided, however, that local governments and agencies that are not subject to the Neuse River Basin stormwater rules may participate in the Program subject to the payment of applicable cost-share amounts as shown on Exhibit A, and which may from time-to-time be revised by the Program Steering Committee.

   The initial annual Program payment, and any subsequent annual Program payments, shall be paid to TJCOG at the beginning of the fiscal year, and shall be based on:

   (a) the estimated cost for all Program materials, advertisements and related services;

(b) the cost for TJCOG to provide the Program Services for the fiscal year; and
(c) estimated direct costs such as mileage and lodging.

Interest earnings shall be credited to and used solely for the benefit of the Program.

6. Compensation and Payment. For Fiscal Year 2002, the costs for TJCOG's Program Services shall be $8,250 plus direct costs such as mileage, printing, and travel. In future years, annual costs for TJCOG's Program Services shall be calculated and agreed to between TJCOG and the Program Steering Committee. Payment for TJCOG's Program Services shall be a budgeted expense of the Program, and shall be paid to TJCOG in advance at the beginning of each fiscal year from annual revenues received from the Program Partners, or from supplemental funds received by the Program.

7. Access to Records. TJCOG shall maintain all official records relating to the Program, and shall in a timely manner provide the Program Steering Committee and CWEP Partners with written minutes of official meetings of the Steering Committee. The CWEP Partners shall have access to any books, documents, papers and records that are pertinent to the execution of this Agreement, for the purpose of making audits, examinations, excerpts and transcriptions.

8. Amendments. This Agreement may, upon mutual consent of the parties hereto, be amended at any time provided that such amendments specifically reference this Agreement, and are executed in writing, signed by each party.

9. Suspension or Termination. The CWEP Partners, acting through the Program Steering Committee, or TJCOG may suspend or terminate this Agreement upon 60 days written notice in whole or in part for cause. Cause shall include the following:

(a) ineffective or improper use of funds;
(b) failure to comply with the terms and conditions of this Agreement; and
(c) if for any reason the carrying out of this Agreement is rendered impossible or infeasible.

If the CWEP Partners, acting through the Program Steering Committee, withhold payment or intend to suspend this Agreement, said Committee shall advise TJCOG of such action and specify in writing the actions that must be taken and a reasonable date for compliance as a condition precedent to the resumption of payments. If TJCOG intends to suspend this Agreement, it shall advise the CWEP Partners and the Program Steering Committee and specify in writing the actions that must be taken and a reasonable date of compliance in order to avoid suspension of the Agreement.

10. Entire Agreement. The CWEP Partners and TJCOG agree that this document constitutes the entire agreement between the parties, and may only be modified by a written mutual agreement approved and signed by the parties. Modifications may be evidenced by telefacsimile signatures. Unless and until further modified, this Agreement shall consist solely of this document.

IN WITNESS WHEREOF, duly authorized officers of the CWEP Partners and Triangle J Council of Governments have executed this Agreement as of the date first above written.

TRIANGLE J COUNCIL OF GOVERNMENTS

ATTEST TO:

BY: Mary Jane Chagnon
Clerk

Dee A. Freeman, Executive Director

(PLEASE NOTE THAT CWEP PARTNER SIGNATURES ARE ATTACHED)

LOCAL GOVERNMENT PARTNERS

ATTEST TO:

BY: _____ _____

Clerk City of Durham

SUPPLEMENTAL PROVISIONS RELATING TO SUPPORT SERVICES AGREEMENT BETWEEN TRIANGLE J COUNCIL OF GOVERNMENTS AND LOCAL GOVERNMENTS AND OTHER FUNDING PARTNERS ESTABLISHING THE CLEAN WATER EDUCATION PARTNERSHIP PROGRAM

The Support Services Agreement Between Triangle J Council of Governments and Local Governments and Other Funding Partners Establishing the Clean Water Education Partnership Program, dated June 27, 2001, is hereby amended as follows:

A. The last sentence of Paragraph 4, "Period of Performance," is revised to read as follows:

"Each CWEP Partner agrees that, on or before May 1st of each year this Agreement is in effect, it will notify TJCOG in writing as to whether the CWEP Partner intends to participate in the Program for the next year. If, following the local budget approval process, a CWEP Partner decides not to participate in the program, that Partner shall provide written notice to TJCOG on or before July 15th of that same year."

B. In Paragraph 5, "Program Funding Level," the following new paragraph shall be inserted at the end of the first paragraph:

"The Program Steering Committee shall, by March 1 of each year, prepare and submit to each CWEP Partner a proposed CWEP work plan and program budget for the coming Fiscal Year."

TRIANGLE J COUNCIL OF GOVERNMENTS

ATTEST TO:

By: Mary Jane Chapman
Clerk

Dee A. Freeman
Dee A. Freeman, Executive Director

Date: 5-12-03

CITY OF DURHAM

ATTEST TO:

By: [signature]
Clerk

[signature]
ASSISTANT CITY MANAGER

Date: 4-24-03

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.

[signature] 4/15/03
FINANCE OFFICER DATE

APPENDIX O

WATER QUALITY RECOVERY PROGRAM TEMPLATE

(Annual Updates provided in annual reports)

7.10.1 Purpose

The purpose of the Water Quality Recovery Program (WQRP) Plan is to reduce levels of the pollutant of concern in accordance with the assigned MS4 NPDES regulated Waste Load Allocation (WLA) identified in the approved Total Maximum Daily Load (TMDL) for the (*****) Watershed.

7.10.2 Background

Identify the watershed and provide brief description including details such as vegetation, topography, climate, hydrology, geology, soils, current and future land use, industrial, municipal, and other point source dischargers, stream classifications, aquatic species, and relevant history. Provide a map or maps as necessary.

[Add maps: watershed location, land use maps, etc.]

[Add information about relevant TMDL. Approval date, affected streams, related NPDES permit info, etc.]

7.10.3 TMDL Implementation Team

Assemble a team of staff representatives from affected municipal agencies that conduct activities in the TMDL watershed. Identify other potential staff resources as necessary to serve on TMDL Implementation Team. Example municipal agencies could include stormwater (the MS4 permittee), wastewater, other public works, street maintenance, solid waste, etc. based on the pollutant of concern. The Permittee (MS4) will be responsible for interpreting data, judging BMP effectiveness, reporting to DWQ, and coordinating activities and reviews with the Implementation Team to meet the components and goals of the WQRP.

7.10.4 Water Quality Concerns

Discuss the pollutant or pollutants of concern (POC) in the TMDL watershed. Each approved TMDL will assign a regulated waste load allocation (WLA) for the POC. It may be necessary to design a WQRP for each pollutant of concern. Discuss any concerns related to the POC, state standards, water quality targets, etc. An assessment of actual and potential sources should also be included as described in the related TMDL.
In addition, discuss any other WQ concerns, issues, or contributing factors in the watershed.

7.10.5 MS4 Major Outfall Identification

Identify and map the location of known major outfalls (as defined in the MS4 NPDES permit) within the Permittee's jurisdictional area with the possibility of discharging the pollutant of concern (POC) to the impaired segments, its tributaries or to segments and tributaries within the watershed contributing to the impaired segments. Create a schedule to locate the position of unknown major outfalls that may discharge the POC to the impaired segment, its tributaries or to segments and tributaries within the watershed contributing to the impaired segments.

Add map of watershed showing streams & outfalls.

7.10.6 WQRP Monitoring Plan

Development of the WQRP monitoring plan will occur in year 3 of the 5-year NPDES permit term, per the MS4 NPDES permit and WQRP Implementation Schedule & Plan. The monitoring plan will be submitted to DWQ for approval.

The goals of the WQRP monitoring plan are:

1. Identify the significant sources of the pollutant of concern.
2. Evaluate the performance of BMPs utilized in the WQRP, where possible.
3. Assess progress toward the goals of the WQRP at the TMDL identified compliance point.

The following text from the MS4 NPDES permit details the requirements for developing the WQRP monitoring plan:

"Develop a monitoring plan for each pollutant of concern. The monitoring plan shall include the sample location by written description and latitude and longitude coordinates, sample type, frequency, any seasonal considerations, and a monitoring implementation schedule for each pollutant of concern. The monitoring plan shall include in-stream and/or major outfall monitoring at locations deemed necessary to support assessment of activities in the Water Quality Recovery Program to address the MS4 NPDES regulated Waste Load Allocation (WLA) identified in the TMDL. Where appropriate, the permittee may reduce the monitoring burden by proposing to monitor in-stream sites and/or major outfalls that the Division would consider substantially similar to other in-stream sites and/or major outfalls in the defined TMDL watershed. The monitoring plan shall be adjusted as additional in-stream sites and/or major outfalls are identified in accordance with the schedule required in the Storm Water Management Plan and as accumulating data may suggest."

7.10.7 BMP Identification

The results of the watershed and POC analysis should be utilized to develop the BMP strategies aimed at reducing the pollutant of concern. Employed BMPs should be assessed annually (beginning in year 5 of the current permit term) to determine BMP performance where possible. The assessment will include an evaluation to determine

if any additional BMPs should be employed to address the MS4 NPDES regulated Waste Load Allocation identified in the TMDL to the maximum extent practicable.

Initial targeted BMPs may include:

- Increased public education efforts
- Watershed specific website
- Increased public participation

Based on the initial WQRP plan assessment, additional targeted BMPs may include:

- Increased IDDE – stream walks, monitoring, etc
- Increased point source or industrial inspections
- Increased municipal operations, street sweeping, catch basin cleaning, etc

7.10.8 Implementation Schedule and Plan

Activities in the WQRP will be conducted in various years of the current MS4 NPDES 5-year permit term as follows:

- Develop WQRP Plan and submit to DWQ – by end of year 2
- Complete MS4 major outfall identification – by end of year 2
- Develop WQRP monitoring plan and submit to DWQ – by end of year 3
- Implement WQRP – beginning of year 4
- Conduct Year 4 WQRP plan assessment – by end of year 4
- Conduct Year 5 WQRP plan assessment – by end of year 5

7.10.9 WQRP Data Assessment

An assessment of activities conducted under the WQRP will be performed per the implementation schedule above. The assessment will include a review of programmatic management measures, existing WQRP data, watershed data, monitoring data and other relevant data. This assessment can be used, where possible, to evaluate the performance of existing BMPs and identify additional BMPs as necessary.

7.10.10 WQRP Reporting

Activities and assessments conducted under the WQRP will be reported to DWQ along with the annual report submitted each year for the MS4 NPDES permit. At a minimum, this will include:

- As assessment of available data collected under the monitoring plan for each pollutant of concern
- An assessment of the performance of BMPs employed, where possible
- A map showing the location of major outfalls in TMDL watersheds with the potential for discharging the POC

- A schedule for locating currently unknown major outfalls that may potentially discharge the POC in TMDL watersheds
- Identification of in-stream and outfall sampling locations
- Identification of additional BMPs, if necessary

APPENDIX P

City of Durham BMP CERTIFYING ENGINEER (BCE) PROGRAM

[*Note: This information taken from Section 8.6, "BMP Certifying Engineer (BCE) Program for Stormwater BMPs in the City of Durham," of the City of Durham Reference Guide for Development (RGD)*]

I. Program Description

A. Background

A registered North Carolina Professional Engineer (NCPE), who designs a stormwater Best Management Practice (BMP) facility, is required to submit a BMP As-Built Certification ("Certification") of the constructed BMP after it has been completed. It is understood that sometimes the certifying engineer may not be the same engineer that designed the original BMP. The Certification consists of the provision of as-built drawings and information demonstrating that the BMP was constructed in a manner that accomplishes its designed functions. These Certifications must be submitted in accordance with the City of Durham's (City's) BMP Certifying Engineer (BCE) Program and must be reviewed and approved by the City's Stormwater Services Section (S3) of the Engineering and Stormwater Services Division.

B. Program Objectives

The overall objectives of the City's BCE Program are three-fold:

1. To improve the quality of BMP facilities being designed and constructed in the City.
2. To improve customer service by decreasing S3 review times for Certifications.
3. To reduce the work load of construction compliance assessments to be provided by the City.

C. BMP Certifying Engineer Qualifications

The City will certify as a "BMP Certifying Engineer", or "BCE", any registered NCPE, who demonstrates a thorough knowledge of the evaluation of stormwater BMP construction by providing two complete Certifications that are approved by S3 on the first submittal.

For engineers that wish to submit Certifications in the City, enrollment in this program is mandatory.

D. Effective Dates of Program

For dry ponds, wet ponds, constructed wetlands, and pocket wetlands, this program went into effect on July 1, 2006, and applies to all Certifications received after that date.

For all other stormwater BMPs, this program becomes effective on October 1, 2010. If a site plan or preliminary plat has not been accepted for review by the City/County Planning Department by October 1, 2010, all Certifications associated with the BMPs on that site shall be governed by the BCE Program.

E. Benefits to the Development Community

Once an NCPE has completed the process to become a BCE and has been assigned a BCE number, that BCE will be granted approval to submit Certifications in the City. The City may, at its discretion, approve a particular Certification based on a review of the Certification alone. Even though field assessments will be performed from time to time, it will be the City's intent to limit the number of field assessments to approximately one out of every five or more Certifications. Field assessments will be randomized. For example, the City may field-assess three out of five Certifications from one BCE and one out of ten Certifications from another BCE. All BCEs should submit Certifications under the assumption that the City will perform a field assessment of the certified facility and will provide a comprehensive review of the Certification.

II. Certification Process

A. Certification as a BCE

To become a BCE, a registered NCPE will be provided four opportunities to submit two complete Certifications that are approved by S3 on the first submittal. One of the two Certifications shall be a BMP <u>that includes a dam</u>. NCPEs endeavoring to obtain certification as a BCE are urged to note the following submittal parameters:

1. Each Certification shall be hand-delivered, by scheduled appointment, to S3. A time block of at least four hours per Certification shall be allotted for the submittal meeting as each Certification will be reviewed and each BMP will be assessed in the field during that time. The submitting NCPE will review the Certification with S3 and will accompany S3 on a field assessment of each constructed BMP submitted for certification. As an aside, once an NCPE has been certified as a BCE, appointments with the City will not be required.
2. The Certification of a level spreader, vegetated water quality swale, or proprietary BMP device <u>shall not</u> count as one of the two out of four required Certifications to be approved by S3 at first submittal.
3. The submittal of an approved Certification of more than one BMP without a dam will not subtract from the four opportunities allotted for certification as a BCE; however, any Certifications, whether the BMP includes a dam or not, that are not approved by

S3 on the first submittal will subtract from the four opportunities allotted for certification as a BCE.

4. If the NCPE, after four first-submittal Certifications, is unable to achieve certification as a BCE, that individual will not be permitted to submit a Certification for at least six months from the date of the City's last Certification disapproval.

B. Acceptable Certifications

An acceptable Certification shall be defined by the City as indicated below:

1. The Certification must be complete. A complete Certification shall include the following documents in hard copy and CD formats (Note all documents on the CD must be in PDF Format unless indicated otherwise below):
   a. An executed "General Certification."
   b. One (1) copy of the approved construction drawings for the BMP.
   c. One (1) copy of the as-built drawings for the BMP with an executed General Certification on the drawings.
   d. One (1) copy of the survey plot, including all spot shots, of the BMP.
   e. One (1) copy of the drainage area map that delineates the drainage area to the BMP as presented in the construction drawings.
   f. One (1) copy of the revised drainage area map that delineates the drainage area to the BMP based on as-built conditions.
   g. One (1) copy of the summary sheet for the facility as presented in the construction drawings.
   h. One (1) copy of the revised summary sheet for the BMP based on as-built conditions.
   i. An original completed copy of the signed and sealed General Certification Assessment Checklist ("Checklist") required by the City. A complete Checklist shall contain no NC (e.g., Non-Compliant) items. Note: If, while completing the Checklist, an NC item is noted at a BMP by the certifying engineer, a Certification for that BMP should not be submitted until the NC item has been brought into compliance. If a BCE awards a score of anything less than 15 and submits a Certification to the City anyway, the City will reject the entire Certification.
   j. Color digital photographs of the completed BMP, including the dam, emergency spillway, riser, outfall structure, outfall area, impoundment area, access way, etc. (CD Format: .jpeg or .tiff).
   k. One (1) copy of the landscape company's letter certifying the installation of the specific plants required at the BMP.
   l. One (1) copy of an Operations and Maintenance Manual for the BMP (CD: Word Format).

m. One (1) copy of a cost accounting for the construction of the BMP (CD: Excel Format). Note: If the cost accounting results in an amount 10% or greater than the original construction estimate, an additional payment into the City's Stormwater Facility Replacement Fund will be required prior to Certification approval.

n. An original signed and sealed Geotechnical Certification with all supporting geotechnical and materials testing documentation.

o. An original signed and sealed Materials Certification, with all supporting documentation, for BMPs with filter media.

2. An additional Checklist completed by the City during the field assessment that scores at least 14. When completing a Checklist, the following parameters shall govern:

   a. If any item within a section is deemed NC, no points shall be awarded for that section.

   b. The minimum passing score shall be 14 out of 15. If the City scores the BMP as less than 14, the Certification will be deemed not acceptable.

C. Disciplinary Actions for BCEs

The following disciplinary actions will be taken against those BCEs that submit Certifications that do not comply with the requirements of the BCE Program:

1. If the City field assesses a BCE-certified BMP and, in completing the Checklist, scores the BMP with a 13 or less (out of 15 possible points), the Certification will be disapproved, and the certifying engineer's BCE number will be suspended until the following has occurred:

   a. The appropriate waiting period (see below) has elapsed; and

   b. The engineer has satisfactorily repeated the process for certification as a BCE.

2. Waiting Period: If a certified BCE submits a Certification that is disapproved by the City, that BCE's certification will be suspended, and the BCE will not be able to submit Certifications for six months for the first offense and one year for any succeeding offenses. The waiting period will always begin the date the City disapproves the Certification.

III. Certification Forms and Documents

These forms and documents can be viewed and downloaded from the City's website at http://www.durhamnc.gov.

APPENDIX Q

City of Durham
BMP MAINTENANCE CERTIFIER (BMC) PROGRAM

Background

The proper design and construction of an engineered stormwater BMP is essential to its ability to adequately remove pollutants from stormwater runoff. Equally important is the proper operation and upkeep of such a facility. Without proper maintenance, a BMP will not function as it is intended and may even cause a host of problems from dangers to the public to nuisance odors to reduced property values.

Like most jurisdictions in North Carolina, the City of Durham Stormwater Services Division (SSD) requires annual inspections (e.g., maintenance certifications) of all regulated BMPs in operation within the City limits. These annual maintenance certifications are required under the recorded agreement executed by the owner and the City during the construction drawing and permitting process for each Stormwater BMP. Noncompliance with the agreement may subject the owner to specific enforcement actions by the City as outlined in the agreement and in the City Code. The purpose of this document is to specify the inspection certification requirements and procedures for the BMP Maintenance Certifier (BMC) Program, which are to be followed by all who provide annual maintenance certifications of BMPs in the City of Durham.

Minimum Qualifications to Obtain a BMC Certification

In order for the City of Durham, North Carolina, to certify a registered North Carolina Professional Engineer or North Carolina Registered Landscape Architect as a "BMP Maintenance Certifier," or "BMC," the following qualifications and evidences must be submitted to SSD:

1. The applicant must submit an application to perform annual BMP maintenance certification inspections in the City of Durham. The applicant must have completed no less than 10 construction and/or maintenance BMP inspections in the last 12-months. The application is to include an attached professional resume of applicable BMP inspection (either construction or maintenance or both) experience. The resume must provide a list of the BMPs inspected (including the type, date, and location) during the aforementioned 12-month period. Applications can be obtained from SSD directly or can be downloaded off the City's webpage.
2. The applicant must be either a registered North Carolina Professional Engineer (PE) or a North Carolina Registered Landscape Architect (RLA). The applicant must provide his/her North Carolina PE or RLA seal on the application.
3. The applicant must complete an SSD approved BMP maintenance and inspection training workshop, similar to the workshop offered by Dr. Bill Hunt with North Carolina State University. Evidence of the training, such as a certification number or other certificate

demonstrating the successful completion of such a workshop, is to be included with the application. Certifications must be maintained in order to remain valid.

Note 1: Applicants who maintain a valid BCE (BMP Certifying Engineer) certification on file with SSD will only have to provide evidence of qualification No. 3 with their application. As such, a resume of inspection experience will not be required.
Note 2: A BCE does not have to be a BMC, and a BMC does not have to be a BCE.

Disciplinary Actions

Conducting business with regards to the inspection of BMPs governed by the City's NPDES permit is deemed a privilege and should not be taken lightly. Currently, SSD does not have the resources to perform quality control for the annual maintenance inspection of every BMP in the City of Durham. However, it is anticipated that SSD will, on an annual basis, inspect approximately 25% of those BMPs in operation. If SSD performs such an inspection and discovers that a BMC has filed an egregiously false maintenance certification, the following penalties will apply (Note: An "egregiously false certification" includes, but is not limited to, the following examples: (1) Certification of a facility that was never built; (2) Certification of a facility that was never "completed" during the development/construction process; (3) Certification of a facility that contains significant functional and/or safety deficiencies that appear to have been in existence at the time the certification was submitted.):

1. The BMC, who filed the false certification, will have his/her certification revoked and will be unable to reapply for recertification for at least six months from the date the City revoked the certification. Note: If the BMC is also a BCE, that individual's BCE certification will also be revoked, and the individual will be required to follow the BCE protocol for BCE certification to become recertified as a BCE.
2. The BMC, who filed the false certification, will be reported to his/her respective licensing board for possible disciplinary action.
3. The owner of the BMP that was falsely certified may be deemed a violator of the City's illicit discharge ordinance and may be subject to the penalties and fines of Sec. 23-145 of the Durham City Code.

Program Application

For NCPEs and NCRLAs who wish to submit BMP annual maintenance certifications in the City of Durham, enrollment in this program is mandatory.

Program Implementation

This program will go into effect at 12:01 a.m., on November 1, 2007, and will apply to all BMP annual maintenance certifications received after that date.

BMP ANNUAL MAINTENANCE CERTIFICATION PROTOCOL (Protocol)

Background

The proper design and construction of an engineered stormwater BMP (Best Management Practice) is essential to its ability to adequately remove pollutants from stormwater runoff. Equally important is the proper operation and upkeep of such a facility. Without proper maintenance, a BMP will not function as it is intended and, in some instances, may cause a host of problems from dangers to the public to nuisance odors to reduced property values.

Like many jurisdictions in North Carolina, the City of Durham Stormwater Services Division (SSD) requires annual inspections (e.g., maintenance certifications) of all BMPs in operation within the City limits. These annual maintenance certifications are required under the recorded agreement executed by the owner and the City during the construction drawing and permitting process for each Stormwater BMP. Noncompliance with the agreement may subject the owner to specific enforcement actions by the City as outlined in the agreement and in the City's Code of Ordinances. The purpose of this document is to specify the annual maintenance certification requirements and procedures that are to be followed by all those who own and operate BMPs in the City of Durham.

Certification Procedures: A Step-by-Step Process for BMP Owners

Provided below is a summary of recommended steps that you, as a BMP owner in the City of Durham, should follow to have the BMP you own certified in the most cost-effective manner:

1. Determine the annual anniversary month (AAM) for your BMP. Much like the month each year when the safety inspection for your car is due, the AAM is the month each year during which the BMP you own (or are responsible for) is to be certified by a qualified professional. The AAM can be found near the top of the first page of the BMP Annual Maintenance Certification Letter (Letter) that was sent to you previously. If you are unsure as to what the AAM is for your BMP, please contact the City of Durham Stormwater Services Division at 919/560-4326 for assistance.
2. Use the "Protocol Reference Sheet," which was attached to the aforementioned Letter, to help you access important information about the BMP you own, such as, where to find a copy of the recorded maintenance agreement for your BMP, how to download a copy of the City's "Owner's Guide for the Operation and Maintenance of Stormwater BMPs Constructed in the City of Durham," and how to access sample BMP certification inspection forms. The "Protocol Reference Sheet" can be viewed or downloaded from the City's website at http://www.durhamnc.gov/departments/works/stormwater_bmp.cfm.
3. Contact and interview one or more qualified professionals who have been certified by the City of Durham to provide annual maintenance certifications in Durham. Stormwater Services Division maintains a comprehensive list of all professionals certified as BMP Maintenance Certifiers (BMCs) in the City of Durham.

4. Once you have selected a qualified BMC, that individual will be able to walk you through the technical steps of having your BMP inspected and, eventually, certified. BMCs certified in the City of Durham are not just familiar with the operational and maintenance requirements for a wide variety of stormwater BMPs, but are also very familiar with the BMP certification requirements unique to the City of Durham. It is recommended that you work closely with the BMC working for you as this will enable them to best serve your needs while meeting the City's certification requirements as painlessly as possible.

Certification Package: The Elements of a Complete BMP Certification Package

Provided below are the essential elements of a complete BMP Annual Maintenance Certification Package. It should be noted that two copies of the certification package are required to be submitted by a BMP Maintenance Certifier (BMC) to the City of Durham on or before the last day of the Annual Anniversary Month (AAM).

1. A sealed "BMP Annual Maintenance Certification" form (This form can down loaded from our website at http://www.durhamnc.gov/departments/works/stormwater_bmp.cfm);
2. A signed and sealed "BMP Inspection Report;"
3. A "Photographic Journal" of the BMP inspection;
4. An "Owner's Financial Disclosure" for the operation, inspection, and maintenance of the BMP; and
5. An up-to-date, signed and sealed "BMP Operation and Maintenance Manual."

Note: If a Conditional Certification or an Engineering Modification Report is to be submitted, items in addition to those mentioned above will be required. For a discussion of these additional items, please refer to the "Definitions, Requirements, and Procedural Elements" section below.

Definitions, Requirements, and Procedural Elements

Annual Anniversary Month: The Annual Anniversary Month (AAM) of a BMP is the month the construction of the BMP was deemed complete by the City of Durham. For example, if a BMP was deemed complete on April 11, 2004, the AAM is April, and the BMP Annual Maintenance Certification will be due by April 30 each year. It should be noted, though, that there are a number of older BMP facilities in Durham that have been assigned an AAM even though construction "completeness" has not been verified.

BMP (Structural): A "structural" BMP (Best Management Practice) facility is a stormwater treatment device that treats and manages stormwater prior to its discharge into a downstream drainage system. BMPs take on a variety of different forms from wet ponds to constructed wetlands to underground sand filters to rainwater harvesting devices.

The initial BMP inspection report can have one of three outcomes listed below:

1. **BMP Annual Maintenance Certification:** A BMP Annual Maintenance Certification, herein referred to as "Certification," is a sealed (e.g., stamped, signed, and dated) statement provided by a Qualified Professional that certifies that a particular BMP is functioning properly, that all components are in good working condition, and that all safety aspects of the facility are in compliance with the operational requirements of the City of Durham. The BMP Annual Maintenance Certification must contain the following:

   - Two original sealed BMP Annual Maintenance Certification Forms (This form can downloaded from our website at http://www.durhamnc.gov/departments/works/stormwater_bmp.cfm);
   - Two copies of sealed Inspection Report;
   - Two copies of Photographic Journal of the BMP inspection;
   - Two copies of Owner's Financial Disclosure; and
   - Two copies (each of both hard copy and in word format on CD) of a sealed up-to-date Operation and Maintenance Manual that provides specific guidance regarding the operation and maintenance of the facility for the next year.

   A Certification is required annually and is due each year by the last day of the Annual Anniversary Month for the BMP. If an Owner/Permittee fails to provide a Certification by the last day of the Annual Anniversary Month, that Owner/Permittee may be deemed a violator of the City's illicit discharge ordinance and may be subject to the penalties and fines of Chapter 70, Article V of the City of Durham Code of Ordinances.

2. **Conditional Certification:** A Conditional Certification is similar to a Certification except that it is conditioned on the completion of specific remedial repair items to be completed by the BMP Owner/Permittee in accordance with a sealed Implementation Schedule (not to exceed 90-days from the date of the Conditional Certification) that has been approved by the City. The Conditional Certification must contain the following:

   - Two original sealed Conditional Certification Forms (This form can downloaded from our website at http://www.durhamnc.gov/departments/works/stormwater_bmp.cfm);
   - Two copies of sealed Inspection Report;
   - Two copies of a sealed list of remedial items that must be completed by the Owner/Permittee to meet the standards for formal certification;
   - Two copies of a sealed Implementation Schedule, submitted for City of Durham review and approval;
   - Two copies of Photographic Journal of the BMP inspection; and
   - Two copies of Owner's Financial Disclosure.

   Once all remedial items have been completed, a Certification (with all items in Number 1 BMP Annual Maintenance Certification) will be required to be submitted. If an Owner/Permittee fails to provide a Conditional Certification by the last day of the Annual Anniversary Month or fails to provide a Certification within the time frame specified in the Implementation Schedule that Owner/Permittee may be deemed a violator of the

City's illicit discharge ordinance and may be subject to the penalties and fines of Chapter 70, Article V of the City of Durham Code of Ordinances.

3. **Engineering Modification Report:** An Engineering Modification Report, herein referred to as an "EMR," is an inspection report of a facility that was either not completed, or was "completed" in a manner that significantly differs (negatively) from that detailed in the original design plans, or is in such a state of disrepair or functional failure that a Certification cannot be provided reasonably within the 90-day threshold specified in the Conditional Certification definition above. An EMR must include the following:
   - Two original sealed Engineering Modification Report (EMR) Submittal Forms (This form can downloaded from our website at http://www.durhamnc.gov/departments/works/stormwater_bmp.cfm);
   - Two copies of the sealed Inspection Report;
   - Two copies of a Photographic Journal;
   - Two copies of a sealed (by an NCPE only) Engineering Modification Plan (e.g., a scaled drawing with any required details), to be reviewed and approved by SSD;
   - Two copies of a sealed Implementation Schedule, also to be reviewed and approved by SSD; and
   - Two copies of the Owner's Financial Disclosure.

   In no instance will the length of an EMP Implementation Schedule exceed two-years from the date of the "first" EMR. Until the BMP obtains Certification, an EMR will be required every 90-days to monitor and report on the progress of the Implementation Schedule. Each EMR will include a Photographic Journal, an updated Implementation Schedule, to be reviewed and approved by SSD, any proposed revisions to the EMP, also to be reviewed and approved by SSD, and an updated Owner's Financial Disclosure. It should be noted that only a registered North Carolina Professional Engineer (NCPE) will be permitted to submit an EMP in the City of Durham. Upon completion of the work outlined in the Engineering Modification Plan and Implementation Schedule, a Certification (including all items under Number 1 Annual BMP Maintenance Certification are required to be submitted. In addition, the eventual Certification of such a "modified" BMP may, at the discretion of SSD, require the inclusion of an as-built of the modified BMP in the Certification Package. Consultation with SSD regarding the extent and detail required for such an as-built is required. If an Owner/Permittee fails to provide an EMR by the last day of the Annual Anniversary Month, or fails to provide an EMR every 3-months after the first EMR (until the BMP has been Certified), or fails to provide a Certification, within the time frame specified in the most recently approved Implementation Schedule, that Owner/Permittee may be deemed a violator of the City's illicit discharge ordinance and may be subject to the penalties and fines of Chapter 70, Article V of the City of Durham Code of Ordinances.

Definitions of items in above submittal packages:

Engineering Modification Plan: An Engineering Modification Plan, herein referred to as and "EMP," is an engineering plan for the construction, reconstruction, significant modification, or

rehabilitation of a BMP that was either not completed, or was "completed" in a manner that significantly differs (negatively) from that detailed in the original design plans, or is in such a state of disrepair or functional failure that a Certification cannot be provided reasonably within the 90-day threshold specified in the Conditional Certification definition above. The EMP is submitted as part of an Engineering Modification Report submittal package. It should be noted that an EMP is a scaled drawing that details the construction, reconstruction, or modification items required to bring a BMP facility into reasonable compliance with the original construction drawings and that only a registered NCPE will be permitted to submit an EMP in the City of Durham. It is recommended that an NCPE preparing an EMP consult the City's Reference Guide for development for general requirements concerning construction drawing submittals in the City of Durham. Since an EMP submittal will be different from a new development construction drawing submittal, consultation with SSD regarding the extent and detail required for an EMP is required. The eventual Certification of such a "modified" BMP may, at the discretion of SSD, require the inclusion of an as-built of the modified BMP. Consultation with SSD regarding the extent and detail required for such an as-built is required.

Implementation Schedule: An Implementation Schedule is a sealed schedule, to be reviewed and approved by SSD, which specifically details the timeline a BMP Owner/Permittee is to follow in completing the corrective items required at his/her/their BMP. It is submitted as part of a Conditional Certification or an Engineering Modification Report.

Inspection Report: An Inspection Report is a report or checklist, sealed by a Qualified Professional, which documents specifically the professional's visual and mechanical inspection of the functional elements and safety aspects of a particular BMP. An Inspection Report is to be attached to any Certification, Conditional Certification, or EMR submitted to SSD. SSD has prepared generic inspection reporting forms that can be used when inspecting BMPs in the City of Durham. These forms can be obtained from SSD directly or can be downloaded from the City's webpage. Other inspection reporting forms can be used if approved by SSD.

Operation and Maintenance Manual: An Operation and Maintenance Manual, herein referred to as "O&M Manual," is a set of specific guidelines, sealed by a Qualified Professional, to be followed by a BMP Owner/Permittee with regards to the operation and maintenance items to be conducted during the year following each annual Certification. If there is no O&M Manual of record, a new manual shall be prepared. If there is an existing O&M Manual, the manual shall be updated and modified as appropriate for the activities to be accomplished and/or monitored in the upcoming year. In all cases, the manual shall be provided to SSD in hard copy form and in a *Microsoft Word* format on a CD.

Owner's Financial Disclosure: An Owner's Financial Disclosure, herein referred to as "OFD," is a copy of the Owner's (i.e., Permittee's, Responsible Party's, etc.) budget, expenditures, and accounts for the operation and maintenance of a stormwater BMP during the previous year. It should be noted that an OFD is for the operation, inspection, and maintenance of the BMP only. A copy of the OFD is to be attached to a Certification, Conditional Certification, or Engineering Modification Report. It should be noted that the detailed contents of an OFD shall be considered confidential information.

Other Definitions:

Owner/Permittee/Responsible Party: In accordance with the City's stormwater ordinance, the Owner of the property on which a BMP is located is required to enter into a Stormwater Facility Operation and Maintenance Permit Agreement, herein referred to as "Agreement," with the City of Durham regarding the perpetual ownership, operation, and maintenance of the BMP. The Owner of the property is to be the Permittee or Responsible Party on the Agreement. The Permittee on the Agreement is responsible for all aspects of the inspection, operation, maintenance, and liability of the BMP on his/her/their property.

"Owner's Maintenance Guide for Stormwater BMPs Constructed in the City of Durham": SSD has prepared an "Owner's Maintenance Guide for Stormwater BMPs Constructed in the City of Durham," herein referred to as "Maintenance Guide," that can be used by BMP Owners/Permittees, PEs, RLAs, and other individuals to aid in the maintenance of BMPs. The purposes of the Maintenance Guide are three-fold: (1) To acquaint BMP Owners/Permittees with the essential functional elements of the BMP on their property; (2) To help BMP Owners/Permittees identify the maintenance requirements for the BMP on their property; and (3) To help BMP Owners/Permittees establish and implement an effective BMP maintenance and inspection program for the BMP on their property. Each section of the Maintenance Guide addresses the functional elements and typical maintenance requirements for each type of structural BMP used in the City of Durham. It should be noted that this Maintenance Guide is intended to provide a general overview of the common maintenance items that will or may arise in the course of operating a particular type of BMP. While this Maintenance Guide can be used as a basis for the preparation of an O&M Manual for an actual constructed BMP, it should not be confused with an actual O&M Manual for such a BMP. A copy of the Maintenance Guide can be obtained from SSD directly or can be downloaded from http://www.durhamnc.gov/departments/works/pdf/doc11_maint_guide.pdf.

Qualified Professional: A Qualified Professional is either a registered North Carolina Professional Engineer (PE) or a North Carolina Registered Landscape Architect (RLA) who has been certified as a "BMP Maintenance Certifier," or "BMC," by the City of Durham. Please refer to the "BMP Maintenance Certifier (BMC) Program" document for the specifics regarding the BMC program.

Stormwater Facility Operation and Maintenance Permit Agreement/Stormwater Facility Agreement and Covenants: In accordance with the City's stormwater ordinance, the Owner of the property on which a BMP is located is required to enter into a Stormwater Facility Operation and Maintenance Permit Agreement/Stormwater Facility Agreement and Covenants, herein referred to as "Agreement," with the City of Durham regarding the perpetual ownership, construction, operation, inspection, and maintenance of the BMP. The Owner is the Permittee and Responsible Party on the Agreement. The Owner/Permittee/Responsible Party on the Agreement is responsible for all aspects of the construction, operation, inspection, and maintenance of the BMP on his/her/their property and assumes all liability for such activities.

Protocol Application

For all Owners/Permittees of regulated BMPs in the City of Durham, compliance with this protocol is mandatory.

Protocol Implementation

This protocol will go into effect at 12:01 a.m., on July 1, 2009, and will apply to all regulated BMPs in the City of Durham.

TECHNICAL COMPLIANCE REVIEW PROGRAM (TCR Program)

[*Note: This is an interim, "stop-gap," program.*]

Background

To provide for an effective annual inspection of SCMs that have not yet migrated into the BMC Program, the Technical Compliance Review (TCR) Program was created in January 2011. A TCR includes a field visit and an evaluation of the critical functional and public safety components of an SCM in question. Upon completion of a TCR, the SCM is assigned a grade. The grading is as follows:

Grade "A": The SCM would, most likely, be Certified (once it was migrated to the BMC Program).
Grade "B": The SCM would, most likely, be Conditionally Certified.
Grade "C": The SCM, while functional, includes significant maintenance issues.
Grade "D": The SCM includes major functional and maintenance issues (EMP would be required).
Grade "F": The SCM is in significant functional FAILURE or the constructed condition of the facility deviates significantly from the approved plans for the device.
Grade "NT": The SCM is not there.
Grade "ES": The SCM is an erosion and sediment control device only.