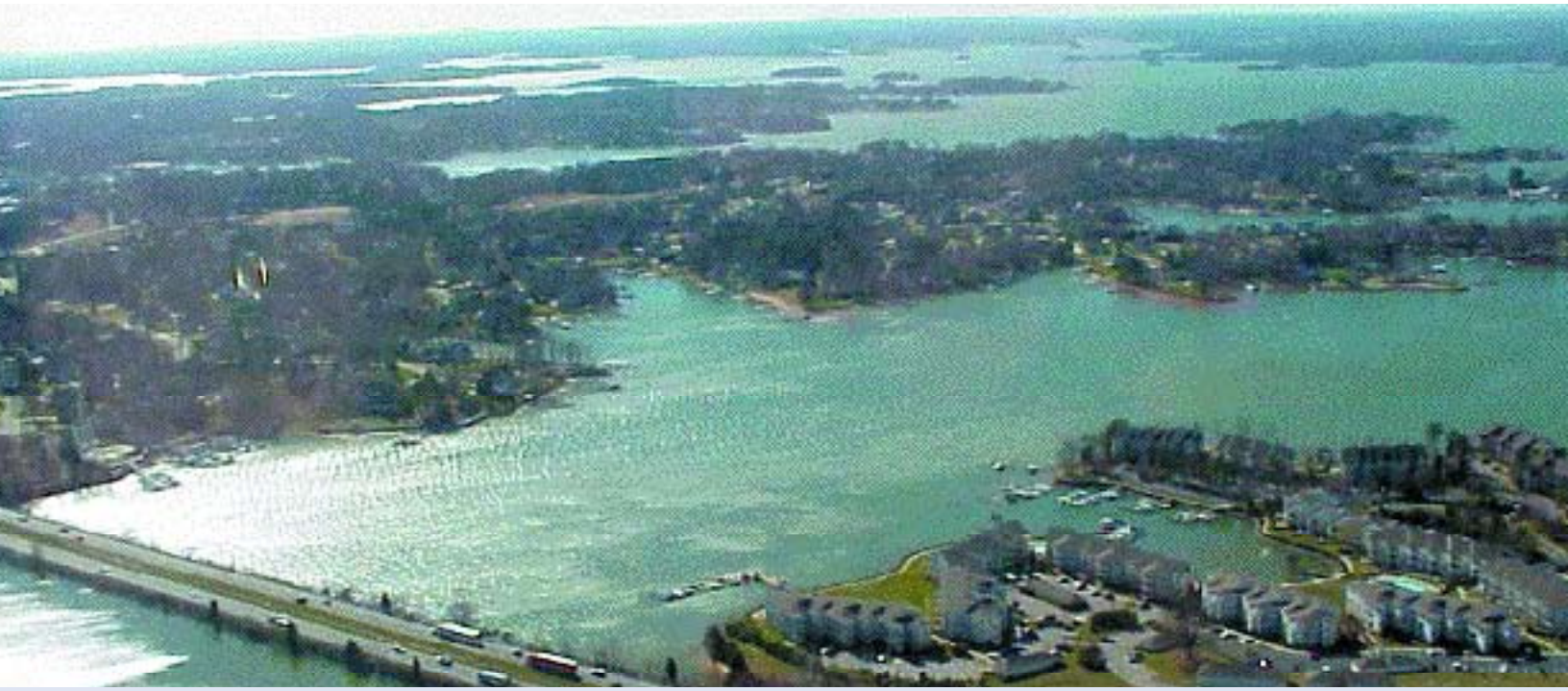
APPENDIX A

WATERSHED BUFFER GUIDELINES for MECKLENBURG COUNTY, NC



Mecklenburg County Water Quality Program
Land Use and Environmental Services Agency

700 N. Tryon Street, Suite 205
Charlotte, NC 28202

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http://waterquality.charmeck.org

Revised 1/05

Appendix A: Table of Contents

I. Background

In 1992, the State of North Carolina adopted the Water Supply Watershed Protection Rules, which outlined minimum requirements for protecting water supplies. The rules also required all local governments having land use jurisdiction within water supply watersheds to adopt and implement water supply watershed protection ordinances that met or exceeded the State minimum rules. As a result of this rule, Mecklenburg County, the City of Charlotte, and the Towns of Davidson, Cornelius and Huntersville adopted and implemented watershed protection rules within their jurisdictions. The rules apply to properties that are within drinking water supply watersheds and generally become more restrictive as you get closer to raw drinking water intakes. Currently, Water Supply Watershed Protection Rules apply to all areas of Mecklenburg County that drain to Lake Norman, Mountain Island Lake, and Lake Wylie, all of which have drinking water intakes. The rules limit the type of development, the Built-Upon Area (BUA) of development, and also require buffers along lakes and perennial streams. BUA is defined as impervious or partially impervious material. Local ordinance adoption dates are as follows:

Lake Norman

Mecklenburg County	June 20, 1994
Davidson	October 1, 1993
Cornelius	September 20, 1993

Mountain Island Lake

Mecklenburg County	March 8, 1993
Charlotte	June 21, 1993
Cornelius	September 20, 1993
Huntersville	October 1, 1993

Upper Lake Wylie

Mecklenburg County	June 20, 1994
Charlotte	June 21, 1993

Lower Lake Wylie

Mecklenburg County	July 10, 2001
Charlotte	September 17, 2001

II. Purpose

The purpose of these guidelines is to provide further guidance and clarification relating to the watershed protection buffer requirements in Mecklenburg County and the City of Charlotte, as well as the Towns of Davidson, Cornelius and Huntersville Zoning Ordinances. Although these Guidelines are referenced in many of the above Zoning Ordinances, the Watershed Administrator or their designee for each jurisdiction has the final authority regarding regulations found in the Zoning Ordinances. Any interpretation of the watershed protection regulations or variance granted by local government bodies must at least adhere to the minimum North Carolina regulations, which can be found in North Carolina Administrative Code section 15A NCAC 02B.0216.

III. Buffer Function

Undisturbed buffers along lakes and streams provide seven basic functions:

1) Provides an area for storm water to filter through, decreasing velocitiy and removing pollutants prior to discharge into a waterbody.
2) Provides stability to lake and stream banks by preserving trees and vegetation, thereby reducing erosion and bank failure.
3) Provides shading to waterbodies, thereby reducing water temperatures and improving aquatic habitats.
4) Provides woody debris in waterbodies, thereby increasing aquatic habitat.
5) Provides wooded corridors and wildlife habitat.
6) Provides open space for recreation, wildlife habitat, general aesthetics, and an improved quality of life.
7) Preserves floodplains, which are critical to reducing downstream flooding.

IV. General Requirements and Prohibitions

Buffer Widths

Watershed Protection Buffers apply to all three lakes within Mecklenburg County including Lake Norman, Mountain Island Lake and Lake Wylie. The buffers also apply to all perennial streams within the designated watershed protection areas. The ordinances define perennial streams as streams designated by a solid blue line on a current United States Geological Survey (USGS) topographic map or by local government studies. The buffer widths are defined in the following table:

Lake Norman Watershed

Zone Feet	Zoning Jurisdiction	Allowable Built Upon Area[1]	Lake/Stream Buffer
Critical Area (CA)	Davidson	< 24% - Low Density < 50% - High Density	40 Feet 100 Feet
Critical Area (CA)	Cornelius	< 24% - Low Density < 50% - High Density	50 Feet 100 Feet
Critical Area (CA)	Huntersville	< 24% - Low Density < 50% - High Density	50 Feet 100

Mountain Island Lake Watershed

Zone is greater)	Zoning Jurisdiction	Allowable Built Upon Area[1]	Lake/Stream Buffer
Protected Area (PA)	Cornelius	< 24% - Low Density < 70% - High Density	50 Feet 100 Feet
Protected Area 1 (PA1)	Huntersville	< 24% - Low Density < 70% - High Density	50 Feet 100 Feet
Protected Area 1 (PA1)	Charlotte/Mecklenburg	< 24% - Low Density < 50% - High Density	50 Feet 100 Feet
Protected Area 2 (PA2)	Huntersville	< 24% - Low Density < 70% - High Density	30 Feet 100 Feet
Critical Area 1 (CA1)	Huntersville	< 6% - Low Density	100 Feet or 100 yr. Floodplain (whichever is greater)
Critical Area 1 (CA1)	Charlotte/Mecklenburg	< 6% - Low Density	100 Feet or 100 yr. Floodplain (whichever is greater)
Critical Area 2 (CA2)	Huntersville	< 12% - Low Density	100 Feet or 100 yr. Floodplain (whichever is greater)
Critical Area 3 (CA3)	Huntersville	< 12% - Low Density	100 Feet or 100 yr. Floodplain (whichever is greater)
Critical Area 4 (CA4)	Huntersville	< 24% - Low Density	100 Feet
Critical Area 4 (CA4)	Charlotte/Mecklenburg	< 24% - Low Density	100 Feet or 100 yr. Floodplain (whichever

Upper Lake Wylie Watershed

ZoneFeet	Zoning Jurisdiction	Allowable Built Upon Area[1]	Lake/Stream Buffer
Protected Area (PA)	Charlotte/Mecklenburg	< 24% - Low Density < 70% - High Density	40 Feet 100 Feet
Critical Area (CA)	Charlotte/Mecklenburg	< 24% - Low Density < 50% - High Density	100 Feet 100

Lower Lake Wylie Watershed

Zonet[2]	Zoning Jurisdiction	Allowable Built Upon Area[1]	Lake/Stream Buffer
Protected Area (PA)	Charlotte/Mecklenburg	< 24% - Low Density < 70% - High Density	40 Feet 100 Feet
Critical Area (CA)	Charlotte/Mecklenburg	< 20% - Low Density < 50% - High Density	50 Feet 100 Fee

(1) Structural water quality best management practices are required for all developments exceeding the low density option.

(2) For Lower Lake Wylie Watershed only, buffer width is increased 50% for lots with an average slope greater than or equal to 50%. This applies only to new development proposed along the lakeshore, and using the high density option.

Measuring Buffers

Stream buffers are measured horizontally from the top of the stream bank on a line perpendicular to the surface water. Lake buffers are measured horizontally from the full pond elevation of each lake, as follows: Lake Norman – 760 feet above sea level, Mountain Island Lake – 648 feet above sea level, Lake Wylie – 569.4 feet above sea level. The buffer line follows the contour line and is not influenced by property lines. The buffer should be recorded on all development plats and individual deeds.

Additional Buffer Regulations in Mecklenburg County

Since the adoption of the Drinking Water Supply Watershed Protection Buffers, several additional buffer regulations have been passed. When other buffer regulations apply, the more restrictive regulation will always apply.

S.W.I.M., Surface Water Improvement & Management™ Buffers - All jurisdictions within Mecklenburg County have adopted S.W.I.M. buffers. These buffers apply only to streams and are often more restrictive than the drinking water supply buffers. For more information on these regulations, go to http://waterquality.charmeck.org or call (704) 336-5500.

North Carolina Catawba River Basin Riparian Buffers – These regulations were adopted by the State of North Carolina and apply to the entire main stem of the Catawba River from Lake James to the South Carolina border. This includes the entire shoreline of Lake Norman, Mountain Island Lake and Lake Wylie. Generally, the locally adopted Drinking Water Supply Watershed Protection Buffers in Mecklenburg County are more restrictive than these rules. The regulations are found in the North Carolina Administrative Code Section 15A NCAC 02B.0243. For more information on these regulations, go to *www.dem.ehnr.state.nc.us* or call (704) 663-1699.

General Buffer Prohibitions

The Drinking Water Supply Watershed Protection buffers are generally undisturbed to protect their water quality function. The following are general prohibitions within the buffer:

- No permanent structures, built upon areas, septic tank systems or any other disturbance of existing vegetation is allowed. This also refers to sidewalks, patios, gazebos, brick or concrete walls and out buildings. Pervious asphalt, concrete, any type of gravel and pavers are also considered “built-upon area” and cannot be placed in the buffer.
- No trees larger than 2-inch caliper (measured six inches above the ground) may be removed or damaged.
- No grading, clearing or filling is allowed in the buffer.
- No ponds or structural Best Management Practices (BMPs) are allowed in the buffer.

- No burial of roof drains or other drainage of any type is allowed. All storm water pipes must stop prior to the buffer and discharge as sheet flow.
- No new turf grass can be planted in the buffer (Grass existing prior to the adoption of the ordinance may be maintained).

General Buffer Allowances

The following activities are allowed within the buffer:

- Minimal hand clearing of small undergrowth and removal of trees 2-inches in caliper or smaller (measured 6 inches above the ground) as approved by the Mecklenburg County Water Quality Program the Mecklenburg County Water Quality Program.
- Stream bank or shoreline stabilization and dredging is allowed if approved by the Mecklenburg County Water Quality Program and Duke Power (for lakes). Note: An application with a buffer restoration plan is required to be submitted and approved prior to beginning work (see Attachment 3).
- The removal of dead or diseased trees, as approved by the Mecklenburg County Water Quality Program.
- The limbing of trees, up to half the distance of their height.
- Pathways that adhere to the Pathway Guidelines (Attachment 1) and are approved by the Mecklenburg County Water Quality Program.
- Irrigation systems that adhere to the Irrigation Installation Guidelines (Attachment 2).
- Piers may encroach in the buffer provided no trees greater than 2-inch caliper (measured 6 inches above the ground) are removed or damaged, slatted decking is used to allow rainwater to pass through, and no roofed structures are placed within the buffer.
- Fences, provided that no trees greater than 2-inch caliper are removed or damaged and are constructed with chain link, split rail or wood slat. No brick or concrete walls are allowed.
- The addition of new trees / shrubs.
- Temporary disturbances of the buffer may be allowed with prior approval from the Mecklenburg County Water Quality Program and shall be evaluated on a case-by-case basis.

Buffer Plans

Site-specific Buffer Plans must be submitted to the Mecklenburg County Water Quality Program for review and approval in the following situations, to include but not limited to:

1) When stream bank or shoreline stabilization is proposed (this plan must be submitted and approved before the Mecklenburg County Water Quality Program will grant approval, see Attachment 3 for **Application for Temporary Buffer Disturbance**);
2) When removal of any trees greater than 2-inch caliper (measured 6 inches above the ground) is proposed;
3) During new development or the expansion of existing development if the buffer requires enhancement;
4) When any disturbances of existing vegetation is proposed within the buffer;
5) When any land disturbance is proposed or has occurred within the buffer (i.e. grading, cutting, filling, building, soil tilling, etc.). Plan approval will be based on the direct application of these Guidelines as appropriate and on the ability of the buffer to protect water quality.
6) New subdivision plans, which include a watershed buffer must include specific notes relating to the buffer, as specified in Attachment 5.

V. Maintenance of Existing Buffer Vegetation

Groundcover

Existing, trees, shrubs, ground covers, natural grasses or perennials should be left in place. Where there is not enough vegetation to control runoff and erosion, a mulch cover of 2 inch minimum depth should be maintained over the entire buffer area. This should be, whenever possible, made up of natural leaf litter as is typically found in an undisturbed wooded area. Where this natural litter is not present at a sufficient depth, it should be supplemented with natural organic mulch such as leaves, leaf mold, wood chips, tree bark or pine needles. Removal of natural leaf fall from within the buffer is prohibited as natural leaf litter provides beneficial results such as enriching the soil, protecting tree roots and absorbing water runoff. Perennial ground cover as specified in Attachment 6 can be used in place of mulch as approved by the Mecklenburg County Water Quality Program.

Existing Tree Cover

The minimum desired existing tree cover should be retained at a minimum density of at least 10 healthy trees of a minimum 6-inch caliper per 1000 square feet of buffer area. This minimum tree density should be more or less uniformly distributed over the entire buffer area. Pruning of trees within the buffer is limited to the removal of only lateral limbs from no more than the lower 50 percent of the tree's total height. Topping is not allowed. The Ordinances state, "No trees larger than 2-inch caliper are to be removed except for dead or diseased trees." Combinations of larger and smaller trees can also provide an effective buffer. For example, where an adequate density of natural tree cover exists, but there are too few trees of the minimum 6-inch diameter size class, then two trees of at least a 1 1/2-inch caliper may be counted for each deficiency of a larger tree. As an example, if a buffer contained 2500 square feet, the normal standard would be a minimum of 25 six-inch trees. If the buffer had only 10 trees over six inches and the rest were smaller, then the standard would be met with the 10 six-inch trees and 30 (2x15) trees above 1 1/2-inches in caliper.

Land Clearing

The removal of selective native vines, shrubs, ground covers and small trees (<2-inch diameter) to facilitate a better view or a more aesthetically pleasing natural landscape may be allowed. This thinning operation should be done with hand tools and/or minimal use of herbicides. No grubbing of tree stumps is allowed; however, stump removal with a stump-grinding machine, which causes minimal soil disturbance, is allowed. Natural leaf litter, humus and soil should remain. Additional tree thinning may be permissible with prior approval where thick cover exists and it is desirable to promote a healthy tree cover and produce the most effective buffer. With prior approval from the Mecklenburg County Water Quality Program, the minimum desired tree density standard might be reduced in order to reduce crowding to below 10 trees per 1000 square feet, if the buffer contains a majority of large diameter trees. For every three trees that have a diameter at chest height of over 12 inches, the total number of trees desired within the buffer is reduced by one tree. As an example, if a buffer is 2500 square feet, it should contain a minimum of 25 healthy trees of a minimum 6-inch diameter. Should 15 of these trees be 12 inches in diameter or above, then the minimum desired standard would drop to 20 trees with the lower density being found in the area where the larger trees were predominant.

VI. Buffer Restoration / Planting New Vegetation in Buffer

New Tree Cover

In the event that a buffer must be restored or planted with new vegetation due to a violation, shoreline stabilization project, dredging, site mitigation, or other disturbance, the required tree density shall be 10 trees per 1000 square feet and all trees shall have a minimum caliper of 1 1/4-inches measured at 6 inches above the root ball. Larger trees may be required depending on the site conditions. Equivalent combinations of tree, shrub and groundcover may be substituted following the Mecklenburg County Water Quality Program's approval of a site-specific buffer plan (see Attachment 4). All vegetation must be on the approved plant list (Attachment 6).

New Shrubs and Groundcovers

Planting of additional shrubs, ground covers and perennials is desired if done so with minimal disturbance to root systems of existing trees. Addition of nutrients (fertilizers) into these buffer areas is discouraged except at planting time when mixing nutrients and soil amendments with the backfill soil is acceptable. In the event of buffer restoration or mitigation, the buffer plan should illustrate acceptable ground cover such as two inches of mulch or other approved material.

VII. Approved Plants for Watershed Buffers

A list of approved trees shrubs and groundcover has been provided in Attachment 6. This list is not comprehensive, but includes species that are native to the Piedmont and tolerate dry to wet conditions. Prior to developing a planting plan, care should be taken in selecting species appropriate for the soil, moisture and light conditions of your specific site. The Mecklenburg County Water Quality Program encourages the planting of native species, however variations from this list may be permitted with prior approval from the Mecklenburg County Water Quality Program. *(The use of invasive, exotic species will not be considered for buffer restoration projects.)*

Attachment 1

PATHWAY GUIDELINES FOR WATERSHED BUFFERS

Pathways made of concrete, asphalt, pavers, rock or gravel are not allowed in buffers. Pathways made of materials other than topsoil, mulch, or approved pervious material must meet the following stipulations and must be pre-approved by the Mecklenburg County Water Quality Program. Pathways for handicap access are evaluated on a case-by-case basis.

Boardwalk:

- Wooden boardwalks are allowed but spaces must be at least 1/4 inch apart between boards. The ground beneath the boardwalk must be comprised of pervious material.
- No trees can be cut or damaged during installation.
- The total impervious area of property may not exceed the amount required by the watershed ordinance. (Boardwalks are not considered impervious areas.)

Stepping Stones:

- The pathway may be no more than 3 feet wide at any location.
- The rock sections may be no larger than 225 square inches.
- Spaces between all rock sections must be a minimum of 2 inches. Only soil, sand, mulch or vegetation may be installed between or around the rock sections (no gravel).
- The base material must be composed of only soil, sand, mulch or vegetation.
- The pathway should meander through the buffer around trees and should be sloped in a manner as to divert water away from the lake. No trees may be removed or damaged in order to install pathway.
- The total impervious area of property may not exceed the amount required by the appropriate watershed ordinance. (Stepping stones are considered impervious areas.)

Attachment 2

IRRIGATION SYSTEM GUIDELINES

1. Homeowners shall notify the Mecklenburg County Water Quality Program the Mecklenburg County Water Quality Program in writing of their intent to install an irrigation system through a buffer. Their name, address, telephone number, and proposed installation date should be included.
2. No trees larger than 2 inches in diameter may be cut from the buffer.
3. No heavy mechanical equipment such as trenchers may be used in the buffer. Only hand clearing and hand digging tools are allowed.
4. No fuel powered pumps are allowed in the buffer. Small electrical pumps are permitted.
5. No impervious pads (concrete, asphalt, etc.) are permitted in the buffer. Wooden frames may be placed around pumps for support.
6. All irrigation lines must be installed in such a way as to prevent the back flow of water to the lake. The use of back flow prevention and foot valves is recommended.
7. Irrigation lines, which are installed through the buffer, should disturb as little area as possible.
8. Erosion control devices such as silt screening should be installed and maintained if the ground is disturbed longer than 24 hours, or if rain is predicted at any time during construction.
9. After installation the disturbed area should be covered with mulch or pine straw.

Attachment 3
Application for Temporary Buffer Disturbance

Please complete the following application and submit with the buffer restoration plan

I. Applicant / Property Owner Information

Name

Mailing Address

Telephone

II. Location of Proposed Buffer Disturbance

Address

Subdivision Name Lot #

III. Reason for Proposed Buffer Disturbance

a. Shoreline / stream stabilization
b. Dredging

c. Other, explain

IV. Proposed Work Schedule

Estimated Project Start Date

Estimated Project Completion Date (including buffer restoration)

V. Contractor Information *(please list all parties involved in proposed disturbance and restoration activities)*

Name

Address

Telephone

Name

Address

Telephone

Application for Temporary Buffer Disturbance (continued)

VI. Buffer Disturbance and Restoration Plan

(see Attachment 4 of the Watershed Buffer Guidelines for Mecklenburg County for a sample buffer plan).

Please attach a plan which illustrates the following:

- Scaled map of lot showing buffer delineation (copy of survey is usually acceptable)
- Map or sketch of buffer area showing proposed disturbed area (should also show equipment access route)
- Square footage of proposed disturbed area in buffer
  **Note: Disturbed area would include all areas of the buffer where the natural ground cover or vegetation has been graded, removed or altered.*
- Proposed number of trees greater than 2 inches in diameter that will be removed from the buffer
- Proposed location, number, and species of all trees to be planted in disturbed area
  **Note: Buffer restoration must occur at a density of 10 trees per 1000 square feet of disturbed area. New trees must be a minimum caliper of 1 1/4 inches measured at 6 inches above the root ball. See Attachment 6 of the Watershed Buffer Guidelines for Mecklenburg County for a list of approved tree species.*
- Type of ground cover to be placed in disturbed area (i.e. mulch, pine straw, etc.)
- Proposed planting schedule and deadline for completion of restoration activities

Mail or Fax Application and Plan to:

Mecklenburg County Water Quality Program
Land Use & Environmental Services Agency

700 North Tryon Street, Suite 205
Charlotte, NC 28202
(704) 336-5500
Fax (704) 336-4391

Attachment 4

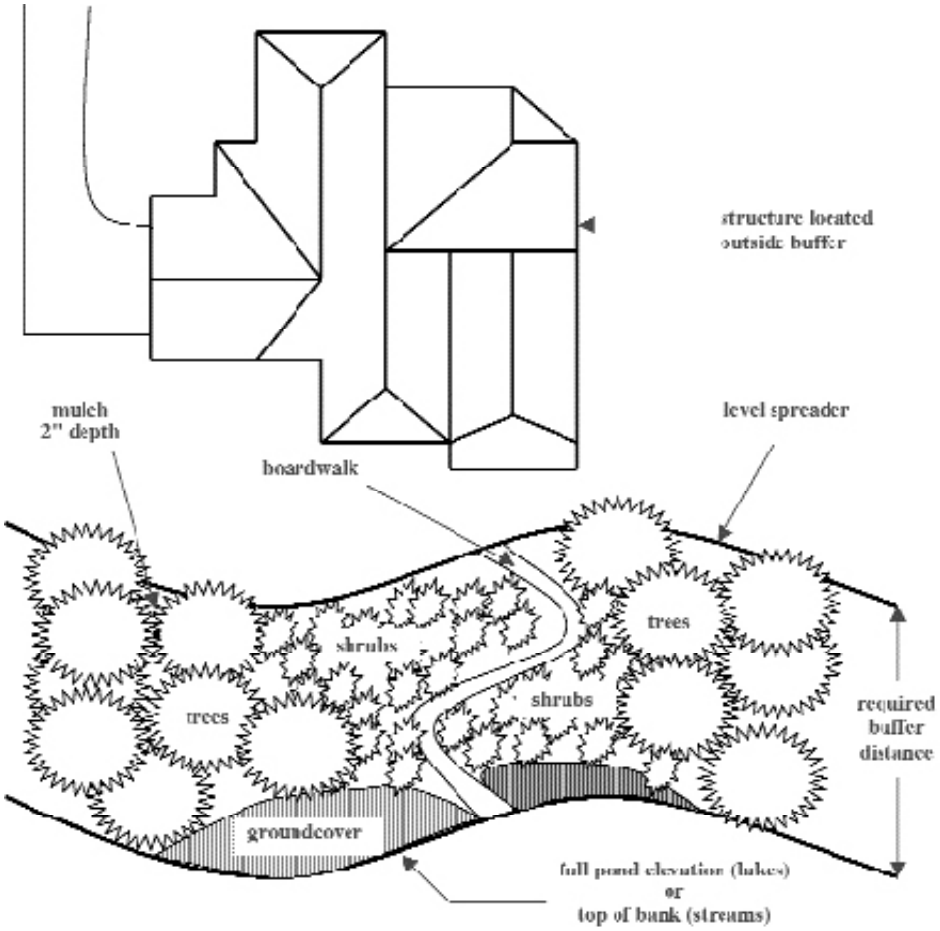
SAMPLE BUFFER RESTORATION PLAN

Specifications Which Must Be Included In The Buffer Plan:

- All plant species to be placed in the buffer must be identified.
- The distances between the different plantings must be specified.
- Unless otherwise specified by the Mecklenburg County Water Quality Program, all plantings must comply with the density and size requirements specified in Section VI **Buffer Restoration / Planting New Vegetation in Buffer** which is located on page 7.
- All plantings should be of a variety specified in Attachment 6 entitled **approved groundcovers, tree & shrubs for watershed buffers.**
- Mulch should be specified at a minimum depth of 2 inches.

If the plan is being submitted for shoreline stabilization or dredging, it should illustrate the following:

- Equipment access and staging area and the restoration plans for these areas.
- Existing trees to be removed.
- Width and length of total buffer disturbance, including rip rap or seawall location.



Attachment 5

SUBDIVISION PLAN REQUIREMENTS FOR WATERSHED BUFFERS

A Buffer Plan must be included in the Subdivision Plan package. Components of this Plan may be included on a separate plan sheet or it may be included as part of the grading and drainage plan sheets. The Buffer Plan must contain the following:

1. The entire buffer area clearly marked or shaded.
2. The point from which the buffer was measured.
3. Any activity or disturbance in the buffer should be identified and "magnified" on the Buffer Plan. Specific details should be given on pathways, boardwalks, shoreline stabilization, etc.
4. If a disturbance is proposed in the buffer, a restoration plan showing replantings should be included as part of the Buffer Plan. The restoration should follow the guidelines stated in Section VI **Buffer Restoration / Planting New Vegetation in Buffer**. Specifics should be stated such as groundcover, tree and shrub types and planting densities.

The Buffer Plan MUST CLEARLY STATE the following:

1. No disturbance whatsoever is allowed in the buffer.
2. No sediment basins, open channels, or piped storm water is allowed in or through the buffer. Drainage areas should be designed to allow water to sheet flow across the buffer to filter out pollutants. Plunge pools, level spreaders, diversion devices or wetland flow should be used to provide this sheet flow.
3. No heavy equipment is allowed in the buffer.
4. The buffer will be clearly marked by flagging or fencing prior to any construction at the site.
5. Any activity in the buffer will comply with the Watershed Buffer Guidelines for Mecklenburg County, NC.
6. The Mecklenburg County Water Quality Program will be notified of any changes to the approved Buffer Plan.
7. The buffer will be permanently marked on each individual lot using iron stakes in concrete.
8. Buffer restrictions will be placed on each individual deed.
9. Educational materials concerning the buffer will be distributed to each homeowner and builder prior to construction or occupancy.
10. All sub-contractors will be notified of the buffer regulations prior to development.

Attachment 6 - APPROVED GROUNDCOVERS, TREE & SHRUBS FOR WATERSHED BUFFERS

Ferns		Wildflowers		Woody Vines	
Braken fern	Maidenhair fern	Black cohosh	Eastern columbine	Cross vine	Virginia creeper
Broad beech fern	New York fern	Blackeyed Susan	Goatsbeard	Trumpet honeysuckle	Virgin's bower
Christmas fern	Royal fern	Cardinal flower	Green and gold		Yellow jessamine
Cinnamon fern	Sensitive fern	Coreopsis	Wild geranium		
Ebony Spleenwort	Southern lady fern	Creeping phlox	Yellow-root		

Attachment 6 - APPROVED GROUNDCOVERS, TREE & SHRUBS FOR WATERSHED BUFFERS

Groupartial shade-moist25 ft./1-2 ft.	Common Name	Botanical Name	Light Conditions	Soil Cond.	Ht. / Diameter
ConiferousTrees	Shortleaf Pine	*Pinus echinata*	sun/partial shade	dry	70-100 ft./2-3 ft.
	Virginia Pine	*Pinus virginiana*	sun	dry	40-70 ft./1-2 ft.
	Eastern Red Cedar	*Juniperus virginiana*	sun	dry/moist	40-60 ft./1-2 ft.
Deciduous Trees	Ash, Green	*Fraxinus pennsylvanica*	sun	moist	60-100 ft./1.5 ft.
	Basswood (Linden)	*Tilia heterophylla*	sun	moist	60-100 ft./ 2-3 ft.
	Beech, American	*Fagus grandifolia*	sun	moist	80-100 ft./3 ft.
	Bigleaf Snowbell	*Styrax grandifolius*	partial shade	moist	20 ft.
	Birch, River (Red Birch)	*Betula nigra*	sun/partial shade	wet	60-80 ft./1-2 ft.
	Blackhaw	*Viburnum prunifolium*	partial shade	moist	20-25 ft.
	Buckeye, Painted	*Aesculus sylvatica*	partial shade	moist/dry	20-25 ft.
	Carolina Silverbell	*Halesia carolina*	sun/partial shade	moist	50-60 ft.
	Cherry, Black	*Prunus serotina*	sun	moist	80 ft./2 ft.
	Cottonwood, Eastern (Carolina Poplar)	*Populus deltoides*	sun/partial shade	wet1	00 ft./5 ft.
	Dogwood, Flowering	*Cornus florida*	sun/partial shade	moist/dry	30-40 ft./12-18 ft.
	Dogwood, Silky	*Cornus amomum*	sun/partial shade	wet/moist	12 ft.
	Elm, Slippery (Red Elm)	*Ulmus rubra*	sun	moist	70-80 ft./2-3 in.
	Fringe Tree	*Chionanthus virginicus*	sun/partial shade	moist/dry	30 ft.
	Hickory, Bitternut	*Carya cordiformis*	sun	moist	60-80 ft./1-2 ft.
	Holly, American	*Ilex opaca*	partial shade	moist	15-30 ft.
	Hornbeam, American (Blue Beech, Ironwood)	*Carpinus caroliniana*	sun/partial shade	moist	35 ft./1 ft.
	Hornbeam, Hop	*Ostrya virginiana*	partial shade	dry/moist	35 ft.
	Maple, Ash-leaved (Boxelder)	*Acer negundo*	sun/partial shade	moist/we	t30-60 ft./2.5 ft.
	Maple, Red	*Acer rubrum*	sun	moist/dry	60-90 ft./3 ft.
	Mulberry, Red	*Morus rubra*	sun	moist	60 ft./2 ft.
	Oak, Southern Red	*Quercus falcate*	sun	dry	80-100 ft.
	Oak, Scarlet	*Quercus coccinea*	sun	dry	70-80 ft.
	Oak, Swamp Chestnut	*Quercus michauxii*	sun	moist	60-80 ft./2-3 ft.
	Oak, Water	*Quercus nigra*	sun	moist/wet	60-100 ft./2.5 ft.
	Oak, White	*Quercus alba*	sun/partial shade	dry/moist	80-100 ft./3-4 ft.
	Oak, Willow	*Quercus phellos*	sun	moist	.90-100 ft./1-2 ft.
	Paw Paw	*Asimina triloba*	sun/p		

Group*ana*partial shademoist30-35 ft.	Common Name	Botanical Name	Light Conditions	Soil Cond.	Ht. / Diameter
	Persimmon	*Diospyros virginiana*	sun/partial shade	moist/dry	20-70 ft./ 1-2 ft.
	Redbud (Judas Tree)	*Cercis canadensis*	sun	moist	40 ft./8 in.
	Silverbell, Carolina	*Halesia carolina*	partial shade	moist	30-50 ft./1 ft.
	Sourwood	*Oxydendrum arboreum*	sun/partial shade	moist/dry	20-30ft./10-12in.
	Sycamore (Planetree)	*Platanus occidentalis*	sun	wet	60-100 ft./3-5 ft.
	Tulip Poplar (Yellow Poplar)	*Liriodendron tulipifera*	sun	moist	80-120 ft./3-4 ft.
	Tupelo, Black (Blackgum)	*Nyssa sylvatica*	sun	moist	50-100 ft./2-3 ft.
	Viburnum, Possumhaw	*Viburnum nudum*	partial shade	moist	15-20 ft.
	Willow, Black (Swamp Willow)	*Salix nigra*	sun/partial shade	wet	80-100 ft./2.5 ft.
Shrubs	Alder, Tag	*Alnus serrulata*	sun/partial shade	wet/moist	3-6ft.
	Azalea-Pinxter	*Rhododendron nudiflorum*	partial shade	moist	4-10 ft.
	Beautyberry, American	*Callicarpa americana*	sun/partial shade	moist/dry	5-10 ft.
	Buckeye, Bottlebrush *	*Aesculus parviflora*	sun/partial shade	moist	15-20 ft.
	Buttonbush	*Cephalanthus occidentalis*	sun/partial shade	wet/moist	3-6 ft.
	Mountain Laurel	*Kalmia latifolia*	partial shade	moist/dry	20-25 ft./8-10 in.
	Possum haw (Deciduous holly)	*Ilex deciduas*	sun/partial shade	dry/moist	20 ft.
	Red Chokeberry	*Sorbus arbutifolia*	sun/partial shade	wet/moist	6-9 ft.
	Rosebay Rhododendron	*Rhododendron maximum*	partial shade	moist	30 ft./8-10 in.
	Sparkleberry, Huckleberry	*Vaccinium arboreum*	sun/partial shade	moist/dry	6-10 ft.
	Spicebush	*Lindera benzoin*	shade	wet/moist	6-12 ft.
	St. John's Wort	*Hypericum hypericoides*	sun/partial shade	moist/dry	1-3 ft.
	Strawberry Bush	*Euonymus americanus*	shade	dry/moist	3-5 ft/
	Sweet Shrub	*Calycanthus floridus*	sun/partial shade	moist	6-10 ft.
	Waxmyrtle * (Southern Bayberry)	*Myrica cerifera*	sun/partial shade	dry/wet	30 ft.
	Willow, Virginia *	*Itea virginica*	sun/partial shade	dry/moist	6 ft.
	Witch-hazel	*Hamamelis virgini*			

** Native, but not necessarily to the Piedmont region of North Carolina*

References: Brown and Kirkman, *Trees of Georgia and Adjacent States*,
Radford, Ashe, Bell, *Manual of the Vascular Flora of the Carolinas*