



6.0 Natural Resources

6.1 Introduction

The Town of Holly Springs continues to take progressive steps to protect its environmental heritage. The Town continues to experience consistent growth patterns and will continue to implement and develop new programs to balance the competing goals of growth with progressive environmental protection, in accordance with guidance from council, as well as the constantly evolving Federal and State regulatory landscape. This element identifies the existing environmental and natural resources in Holly Springs, and existing and proposed strategies that will provide the basis for their protection.

6.2 Natural Resources Objectives

- 1) Balance development with conservation.
- 2) Preserve and enhance the ecology, natural resources, and habitat of Holly Springs.
- 3) Encourage forest and mature tree protection and promote re-forestation in areas designated by the Tree Preservation Ordinance.
- 4) Work with the existing contours of the land by minimizing grade changes of native topography when permitting development, as feasible.
- 5) Provide for and invest in connected greenways, open space areas, land conservation, parks, and access to water resources.
- 6) Support the public acquisition of lands that are environmentally sensitive for passive public recreation and/or conservation purposes.
- 7) Insure that uses that could detract from or damage environmentally sensitive areas are not permitted adjacent to said areas.
- 8) Protect aquatic species and their habitat through protection of water quality by preventing point and non-point source pollution of local waterways.
- 9) Work with landowners and developers to use tools such as grants, conservation easements, purchase of development rights, and transfer of development rights to protect natural, cultural, and historic resources.
- 10) Discourage the use of exotic species of plants and trees in landscapes and beautification efforts; encourage native species and low water usage plant materials.

- 11) Develop programs and regulations that at a minimum comply with Federal and State regulations to offer the most natural resource protection.

6.3 Natural Resource Impacts

The Town administers a multitude of regulations and programs aimed towards mitigating typical environmental impacts associated with development, growing infrastructure and population. These impacts include increased stormwater runoff associated with increased impervious surfaces, the potential for sedimentation into local streams and water bodies, loss of forest land/wildlife habitat and increases in non-point source pollution.

6.4 Natural Resource Planning Efforts

Town staff with the support of Town Council and administration has created environmental programs to address issues associated with growth impacts. The Town of Holly Springs NPDES (National Pollutant Discharge Elimination System) Phase II Stormwater Permit became effective on December 1, 2005 contingent upon a five year renewal cycle. In the first ten years of the permit the Town was required to implement six minimum measures determined by the EPA: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Runoff Control and Pollution Prevention/Good Housekeeping. As a result of this federal requirement, over the past ten years, the Town has created many new stormwater programs and the expansion of existing environmental programs to meet the permit requirements. It is the expectation of EPA and State Authorities that the program continue to evolve and be sustainable. Town environmental programs include a State-Delegated Erosion and Sediment Control Program, a voluntary riparian buffer ordinance adopted in 2003, a flood plain ordinance that exceeds FEMA minimums, a voluntarily established preserved habitat for the Tiger Salamander, an environmental education program for contractors during mandatory preconstruction conferences, and periodic builder and developer information sessions. Other efforts include engagement at various events within the community, a robust Stormwater Control Measure installation, inspection and maintenance program, regular outfall screening to identify potential pollutants, training for Town staff and the public regarding pollution prevention methods, and regularly updated website information, including the publicizing of the Town's Stormwater Hotline.

Of these environmental programs - The Town's Erosion and Sediment Control Program has received the Local Program Award for Excellence in Erosion and



Sedimentation Control from the N.C. Sediment Control Commission on several occasions, most recently in 2017. The Program operates with locally delegated authority from the State for erosion and sedimentation regulations, requiring approval for grading any area greater than 20,000 square feet. During development plan site review, an Environmental Plan Review is conducted prior to development plan approval. The Town then issues an Environmental Development Permit that designates protection and erosion control measures to be installed on site as per the approved Erosion and Sediment Control Plan. The effectiveness of this program lies with the comprehensive review of the construction process from start to finish that considers environmental disturbances during all phases.

In 2005, the Town was one of four area municipalities to join with the State Department of Environment and Natural Resources (DENR) to author an individual Secondary and Cumulative Impacts Master Mitigation Plan (SCIMMP) for the Town and enter into a Memorandum of Agreement (MOA) with DENR which defines the document's use to meet SEPA (State Environmental Policy Act) requirements for future Town infrastructure projects. This was an innovative and new way to comprehensively address impacts of Town projects holistically. This Plan was most recently updated and accepted by the State in 2017. Figures used in this Plan are referenced in this document.

Other Town documents that provide information regarding environmental resources include current Engineering Design and Construction Standards and publicly distributed brochures and factsheets.

6.5 Natural Resource Features

6.5.1 Topography

Land topography is a determining factor in the designation and development of appropriate land uses. The topography of the Town consists of rolling hills with an elevation range of approximately 200 ft. above sea level to approximately 500 ft. above sea level. The steeper slopes in the Town are generally located along ridgelines extending from the south to the northeast where the rolling hills reach higher elevations.

Grading to produce more suitable land for construction causes changes to topography. The Town has made an effort to alleviate this land transformation through required Erosion and Sediment Control Plan approvals for the grading of areas greater than 20,000 square feet. Other efforts include minimizing the

grading of steep slopes and encouraging the use of natural topography in development project design and construction.

6.5.2 Geology

The 1991 Generalized Geological Map of North Carolina indicates that the geology of Holly Springs includes sedimentary and metamorphic rocks.¹ The Map illustrates two different categories of rock in Holly Springs, the Triassic rock category and the Late Proterozoic to Early Paleozoic rock category.

In the eastern part of Town are Late Proterozoic to Early Paleozoic metamorphic rocks of the Inner Piedmont, Milton belt and Raleigh belt, which include gneiss, schist and amphibolite rock. In the western part of Town are the Triassic rocks, which comprise the majority of the Town's future growth area. Triassic rock includes sedimentary rocks of the Chatham Group consisting of conglomerate, sandstone and mudstone rock. Dividing the two different categories of rock is an inactive fault line – the Jonesboro Fault - which lies just west of Highway 55.

The Triassic rock is more easily erodable than surrounding areas, and has high shrink/swell characteristics if not replaced after excavation in a controlled manner. During construction plan review and in inspections, extreme care is taken to tailor construction techniques to the geology of the project area so as to minimize failures of infrastructure in the future.

8.5.3 Soils

The type of soil located in Holly Springs directly affects the ability to develop land. Vegetative growth, drainage capacity, likelihood of corrosion of underground infrastructure and susceptibility to land erosion all relate to the type of soil in the area. The following information provides an overview of the soil conditions in the Town based on National Resource Conservation Service (NRCS) data. A more detailed study is necessary for any site-specific projects.

8.5.3.1 Soil Type

Based on NRCS data, there are 54 different classifications of soil in Holly Springs, most of which are a type of sandy loam. The top five major soil types include Creedmore sandy loam, Carbonton-Brickhaven complex, White Store sandy loam, Cecil gravelly sandy loam and Appling gravelly sandy loam. The western portion of the Town consists of concentrations of Creedmore and White Store soils, the northern portion of the Town consists

¹ Information Technology Services. North Carolina Department of Environment and Natural Resources.



of concentration of Creedmore and Carbonton-Brickhaven soils and the southern and eastern portions of the Town consists of concentrations of Cecil and Appling soils.

6.5.3.2 Drainage Capacity

The drainage capacity of the soils is an important planning consideration because it affects the transport of pollutants and the ability for plants to grow. If a soil drains rapidly, precipitation or irrigation water transports water-soluble pollutants through the soil, potentially affecting the quality of groundwater. Soils that are not drained well may become saturated making it difficult for plants to survive.

The NRCS rates drainage capabilities based on the type of soil. In the eastern portion of the Town, soils are generally well drained. This soil condition is likely to make the groundwater in Holly Spring more susceptible to pollution. In the western portion of the Town, soils generally range from somewhat poorly drained to moderately well drained. High concentrations of somewhat poorly drained soils exist in the northwestern part of the Town. When soils are poorly drained, plants may become inundated with water, making it difficult for them to survive.

6.5.3.3 Erosion

Erosion is the transport of soil by wind or water. Susceptibility of a type of soil to erosion is based on the composition of the soil as well as the slope and the vegetative cover of the land. Soil erosion can cause a loss of topsoil and create ruts and gullies in the land. Erosion also can transport materials that pollute downstream waters, clogging creeks, streams and drainage ditches.

The NRCS rates erodibility based on soil properties. NRCS data was used to determine the erosion hazard of soils in the Town. Over half the Town's soil has a moderate erosion hazard. The soils with severe erosion hazards are generally distributed throughout the northern, southern and central portion of the Town.

6.5.3.4 Relocation of Soils

With development requiring the excavation of soils and resultant relocation of them, the location of soils is likely to change. The Town mitigates the impacts of soil relocation through contractor education, the

Erosion and Sediment Control Program and permitting development only in accordance with approved site plans.

6.5.4 Watersheds

Two major river basins run through Holly Springs, the Neuse River Basin and the Cape Fear River Basin. The Basin Divide runs in similar location to the Jonesboro fault line (referenced above) and is located along the Highway 55 corridor.

6.5.4.1 Cape Fear River Basin

The western portion of the Town is part of the Cape Fear River Basin. This is the largest river basin located entirely in North Carolina and drains 9,010 square miles. Holly Springs is part of the Harris Lake watershed, a subbasin of the Cape Fear River Basin that includes nine tributaries in the Town. Harris Lake, which is at the terminus of drainage from all streams in Holly Springs in this watershed, is a constructed body of water owned by Progress Energy that provides cooling water for Shearon Harris Nuclear Power Plant. Progress Energy is in the process of pursuing an expansion to its Nuclear Power Plan which would include the raising of the water level of Harris Lake to 240 ft. above sea level. Habitat, streams and wetlands will be lost with the expansion of the plant. To mitigate this loss Progress Energy will be required to find opportunities for stream and wetland enhancement, creation, restoration or preservation in the Harris Lake Watershed. According to the North Carolina Department of Environment and Natural Resources Basinwide Assessment Report of 2005, Harris Lake is eutrophic, meaning that it is over-enriched with nutrients.

6.5.4.2 Neuse River Basin

The eastern portion of the Town is part of the Neuse River Basin. This river basin covers 6,225 square miles and is located entirely in North Carolina. Holly Springs is in the Middle Creek watershed, a subbasin of the Neuse River Basin that includes two tributaries located in the Town. Also located in this watershed below downstream of Holly Springs are two man-made or re-made lakes: Sunset Lake and Bass Lake. Sunset Lake is a 105-acre man-made impoundment that empties into Middle Creek. Bass Lake is an 85-acre lake, which drains into Sunset Lake. Bass Lake was reconstructed in 2004 after Hurricane Fran destroyed it in 1996.



Table 6-1 River Basins and Sub-Basins Located in Holly Springs

River Basin	Watershed	Tributary/Stream
Cape Fear	Shearon Harris Reservoir	Buckhorn Creek
		Jim Branch
		Cary Branch
		Utley Creek
		Little Branch
		Big Branch
		White Oak Creek
		Little White Oak Creek
		Thomas Creek
		Norris Branch
Neuse	Middle Creek	Basal Creek
		Rocky Branch

Source: 1:24,000 (7.5 minutes) topographic quadrangle maps provided by the US Geological Survey

6.5.4.3 Stream Classifications for Best Use

The North Carolina Department of Environmental and Nature Resources (DENR), Division of Water Quality assigns primary water quality classifications for all surface waters in the State. The classifications are based on the best use to be protected within the specific body of water. A description of all freshwater primary classifications is provided in the following table. Some surface waters are assigned secondary classifications to provide special protection to waters with special uses or values.

In the Cape Fear River Basin all of the streams are 'Class C' waters except for the lower segment of Buckhorn Creek, which is designated 'Class B' waters. Harris Lake watershed is designated as WS V. The NC Division of Water Quality's Guide to Surface Freshwater Classifications in North Carolina lists that there are no restrictions on the allowable density of development in WS V watersheds. However, the Town's NPDES Phase II Post-Construction Stormwater Regulations have performance standards that require development to design for Peak Discharge, Total Nitrogen, 85% Average TSS, and a minimum 30 foot stream setback in both the Cape Fear and Neuse River Basins.

In the Neuse River Basin, Middle Creek is designated 'Class C' waters. Also, all Neuse River Basin waters are designated as Nutrient Sensitive Waters (NSW). This classification is for waters that experience or are subject to excessive growths of microscopic or macroscopic vegetation. This designation is a response to problems with nutrient pollution and algal

blooms, which resulted in extensive fish kills in the Neuse River during 1995.

Table 6-2 North Carolina Surface Water Classifications

Classification	Best Usage of Waters
C	Waters protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.
B	Waters protected for all Class C uses in addition to primary recreation. Primary recreational activities include swimming, skin diving, water skiing, and similar uses involving human body contact with water where such activities take place in an organized manner or on a frequent basis.
WS V	Waters protected as water supplies which are generally upstream and draining to Class WS-IV waters or waters used by industry to supply their employees with drinking water or as waters formerly used as water supply. These waters are also protected for Class C uses.

Source: North Carolina Division of Water Quality Planning CSU Surface Water Classification
<http://h2o.enr.state.nc.us/csu/swc.html>

6.5.4.4 Water Quality Standards

The N.C. DEQ (303(d)) lists those streams that are not meeting water quality standards or those that have impaired uses, in accordance with the federal Clean Water Act. Middle Creek appears on the 2016 303d list with a rating as fair, the Parameter of Interest being Benthos (Nar, AL, FW), based on narrative criteria to protect aquatic life in fresh water. This rating is given in this stretch of stream primarily based upon turbidity associated with sediment form in stream erosion/urbanization and runoff associated with development.

The Wake County Watersheds Assessment, completed in 2003, provides a more detailed assessment of the watersheds in Holly Springs. The Assessment was a joint initiative, conducted by consultants CH2MHILL and CDM, in which Holly Springs participated. The study purpose was to evaluate water quality of streams and watersheds throughout Wake County.



Streams with lower impervious surface coverage surrounding the stream corridor were determined to be healthier than streams with greater impervious surface area. The harmful impacts of impervious surfaces include limiting the absorption of water and causing runoff to travel across the land collecting sediments, nutrients and toxins that are carried to streams and creeks of the watershed. Impervious surfaces are impermeable surfaces that include rooftops, parking lots, driveways, sidewalks, roads and other surfaces that prevent water infiltration and limit groundwater recharge.

The stream classifications in the County's study were defined as follows:

- A healthy stream corridor: Less than 10% impervious contributory drainage area
- An impacted stream corridor: Between 10 and 25% impervious contributory drainage area
- A degraded stream corridor: Greater than 25% impervious contributory drainage area

Within Holly Springs, two streams were determined by the County's study to be impacted: Middle Creek and Basal Creek.

Current regulations to protect the watersheds in Holly Springs include the stream buffer regulations, the Town's NPDES Phase II stormwater program, the Erosion and Sediment Control Program, the floodplain ordinance, and open space preservation.

6.5.5 Floodplains

A floodplain is an area that is subject to full and partial flooding. In addition to providing natural flood control, floodplains offer erosion control, protect the water quality, serve as an area for groundwater recharge and act as a fish and wildlife habitat.

The Federal Emergency Management Agency (FEMA) federally designates and regulates floodplains with drainage areas that are typically equal to or larger than one square mile. According to FEMA, the 100-year flood, or base flood elevation, is the flood elevation that has a 1% chance of a floodwaters equaling or exceeded this elevation each year. The North Carolina Floodplain Mapping Program in coordination with FEMA remapped the floodplain for

Wake County, which became effective of May 2, 2006. The new Flood Insurance Rate Maps (FIRM) shows the FEMA and State Regulated 100-year, 500-year and 100-year future floodplains.

In addition to the floodplain areas identified on the FIRM, the Town regulates locally designated floodplains that have drainage areas less than one square mile. These floodplain regulations prohibit residential development in the floodplain, which includes both residential structures and fill in the floodplain and requires a minimum buildable area outside of the floodplain on each residential lot. The Town also requires a 2-foot freeboard, which ensures that all of the lowest finished floor elevations are at least 2 feet above the 100-year floodplain elevation. These floodplain development requirements are more restrictive than the State and Federal regulations and provide additional protection of the safety and welfare of the Town's citizens as well as protection of the environmental functions that floodplain provides.

6.5.6 Riparian "Stream" Buffers

Riparian buffers provide water quality protection and environmental benefit by filtering pollutants suspended in runoff, providing bank stabilization and by providing wildlife habitat. These buffers are also known as stream buffers and are vegetated areas next to water resources, such as streams, rivers and lakes. They may be forested or vegetated with native vegetation that is allowed to thrive. Riparian buffers provide water quality protection and environmental benefit by filtering pollutants suspended in runoff, providing bank stabilization and by providing wildlife habitat.

The Town has adopted its own voluntary riparian buffer ordinance in addition to the North Carolina Neuse Buffer Rules. In the Cape Fear River Basin the Town's voluntary rules protect a 30-foot area from the top of bank on each side of intermittent and perennial features. The Neuse River Basin has 50-foot State regulated Neuse Buffers measured from the top of bank on each side of intermittent and perennial features. The Town has adopted more restrictive 100-foot buffers for perennial features in the Neuse River Basin. These include a 100-foot undisturbed buffer for perennial features that drain into Bass Lake.

The Town has acquired a 110 acre tract of land upstream of Bass Lake and Basal creek and is active in preserving and managing the area in accordance with the conservation easement.



6.5.7 Wetlands

According to the U.S. Army Corps of Engineers wetlands are “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, wet meadows and similar areas.” Wetlands provide important water quality controls by filtering pollutants, providing flood control and providing flood and sediment control. Wetlands also provide wildlife habitats.

The wetlands in Holly Springs generally are located along the stream corridors, lakes or ponds of the Town. The Town’s wetlands are regulated by the Army Corps of Engineers, which requires the replacement of wetlands when they are disturbed and controls the amount of development that can occur in a wetland. The Town assists the Corps by identifying and requiring development projects that contain a wetland to receive the approval of the Corps prior to issuing construction approvals.

Furthermore, because the Town’s wetlands are generally located along the stream corridors, they often coincide with the floodplains that are regulated by the stream buffers and floodplain protection regulations in the Town.

6.5.8 Groundwater

Groundwater is an important source of drinking water that is recharged through the percolation of water through soil or through aquifer recharge areas. Groundwater is generally susceptible to either over-pumping in areas where recharge endures a slow process or pollution in areas where substantial recharge occurs.

A groundwater recharge area exists in Holly Springs, east of Progress Energy lands and extending south into Fuquay-Varina. In this area the groundwater is replenished through percolation of water into the aquifer. What makes this an important place for groundwater recharge also makes it very susceptible to pollution. The pollution of groundwater is especially harmful because, while surface water can somewhat be treated, once groundwater is polluted it cannot be treated.

One of the ways that the Town intends to alleviate groundwater impacts as growth continues is by the use of the stormwater program with its ability to

allow developers to develop comprehensive watershed plans and use of Low Impact Development (LID) in its Post-construction Stormwater Ordinance. The Town feels that the National Pollutant Discharge Elimination System (NPDES) stormwater requirements may cause LID to be a more appealing option for developers and promote techniques to increase infiltration.

Other groundwater protection efforts include identifying existing wells during the development process and requiring them to be capped, in accordance with State regulations. The Town has also undertaken significant infrastructure projects to eliminate wells in areas where groundwater contamination was in existence. Finally, the Town's Public Utilities Department has a wellhead protection program.

6.5.9 Forestlands

Forestlands in the Town of Holly Springs provide numerous benefits to the quality of life. They provide a habitat, nesting ground and food source for the area's wildlife and also provide an area for water recharge, prevent runoff and soil erosion, and filter pollution. Furthermore, with the proper measures, forestlands provide a natural, renewable resource that serves as an economic resource in the Town.

Most of the Town's forestlands are located in the west, around the Harris Lake area. To the east, forests are more scattered. Typical forests in Holly Springs include pines and oaks as well as sweet gum, red maple, sycamore, black gum and eastern red cedar. The most dominant forest type is coniferous cultivated pine. Also located in the Town, within the Harris Lake game land and forest resource area, is the Piedmont Longleaf Pine Forest. According to the NCSU Department of Forestry there are only ten forest communities of this type remaining in the world. Although the forest is ranked by Wake County GIS as a "C" meaning that it has a poor ecosystem integrity and quality, Progress Energy has helped with restoration work such as removing all the vegetation but the long leaf pine and opening up the stand of trees within the forest area.

The major threat to the forestlands of Holly Springs is the conversion to low-density residential land. As more development occurs the Town will continue to lose forestlands, deterring from the quality of the environment and natural habitats. Forestlands that are somewhat protected include those along the stream corridors and around the Shearon Harris Nuclear Power Plant land. The Town has open space requirements for residential developments in an effort to protect forest resources and a riparian buffer ordinance. In addition, the Town's Unified Development Ordinance (UDO) provides credits for preserving existing vegetation in order to decrease the need for new



vegetation. Going beyond this incentive program, the Town has adopted a Required Tree Preservation ordinance that works to preserve native forest stands as well as large individual trees.

6.5.10 Wildlife Habitat

The wildlife in Holly Springs includes many different species of mammals, amphibians, reptiles, birds and fish. Typical wildlife species found in Holly Springs include the following:

- Virginia opossum
- Raccoon
- Eastern cottontail
- Gray squirrel
- Red and gray foxes
- White-tailed deer
- Eastern mole
- Cardinals
- American robins
- Carolina chickadees
- Blue birds
- Sparrows
- Warblers
- Rufous-sided towhees
- Red-tailed Hawks
- Owls
- Vultures
- Mallards
- Wood ducks
- Teal
- Geese
- Great blue herons
- Green-backed herons
- Catfish
- Suckers
- Bass
- Crappie
- Sunfish

Within all of Wake County there are 72 species that are federally listed, 11 that are Federal Species of Concern, three that are listed as Endangered and none that are listed as Threatened. The five federally listed Endangered Species within Wake County include the Red-cockaded Woodpecker, Dwarf Wedge Mussell, Michaux's Sumac, and Rusty-Patched Bumblebee. The Bald Eagle is also a federally listed status under the Bald & Golden Eagle Protection Act.

Within Town limits and beyond, State designated species listed as threatened include the Eastern Tiger Salamander and the Dwarf Wedgemussel. Species listed as of special concern include Red-Cockaded Woodpecker and Bachmans Sparrow.

The Town has voluntarily established a preserved habitat for the Tiger Salamander. The habitat is a 40-acre area along Middle Creek, north of Holly Springs Road. Most of the habitat is protected because it is part of the floodplain area. In the area that is not part of the floodplain, there is an existing

sewer line making the area susceptible to development. If development does occur in this location, regulations are in place to preserves the area's trees.

Water quality deterioration and loss of habitat threaten wildlife in Holly Springs. Both of these threats are typical impacts of increased development. The existing Town regulations for protection of wildlife habitat and quality include a voluntary riparian buffer ordinance, a floodplain management ordinance, open space requirements, the Erosion and Sediment Control Program, stormwater runoff control requirements and a voluntarily dedicated Tiger Salamander Preserve location.