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10.1 INTRODUCTION

Lake Lure is a place of natural and scenic beauty which sets this town apart from others as a true gem of the Carolinas. A place with a variety of habitats, elevation differences and natural features, Lake Lure's character is rooted in its pristine natural setting. The Town of Lake Lure has recognized the natural environment as its premium asset, a precious and unique commodity that needs to be strategically protected as future development occurs.

10.2 INVENTORY AND EXISTING CONDITIONS

The recent pace of development within both the town and surrounding areas has caused concern about developmental impacts to the natural environment. Balancing growth with the natural environment is needed to ensure the quality of life for not just residents, but for wildlife and the natural environment as well. The following section highlights natural environment and open space conditions regarding water quality, sedimentation and erosion, flora and fauna habitats, ridgelines, soils and steep slope areas and their impacts on Lake Lure.

Water Quality, Sedimentation and Erosion Control

The following section highlights existing conditions and issues regarding water quality, sedimentation impacts and erosion control efforts.

Water Quality

Maintaining Lake Lure's high level of water quality has been a major source of concern in recent years. Protecting water quality ultimately protects the public's health. High quality water provides clean drinking water, supports healthy natural environments and contributes greatly to recreation and tourism activities. Not only have efforts been identified to maintain the lake's water quality but also the quality of the water in all of Lake Lure's tributaries. (See Figure # 5, Environmental map)

Lake Lure has a large floodplain within its incorporated boundaries that has caused an enormous amount of damage to structures when flooding events occur. This has been a reoccurring problem as Lake Lure has encountered a number of flooding events within the past decade that have cost several million dollars in damages and clean up. This has occurred as recently as July of 2006. The town has taken measures to limit damage due to flooding by establishing a floodplain ordinance to restrict development within the identified floodplain. However, the regulations have not been enforced effectively due to the lack

of accurate data. The State of North Carolina and the Federal Emergency Management Administration (FEMA) are in the process of updating the model that will establish new Base Floodplain Elevations (BFE). Upon receipt of the new data, floodplain regulations will be updated and enforced accordingly and a FIRM Community Panel Map will be created.

Recently, the town applied for and received a grant from the North Carolina Department of Environment and Natural Resources, which is administered by the Land Resource Division. Since Lake Lure is considered to be a “start-up” program, the \$15,822 awarded grant can be spent as the town deems necessary to improve the control of soil erosion and sedimentation. As of December 2006, the town has spent a total of \$17,050, of which \$15,822 will be reimbursed back to the town from the Land Resource Division. The grant is considered to be an agreement between the Land Resource Division and the Town of Lake Lure.

Specifically, the town has utilized the grant to obtain sophisticated software, Geographic Information System (GIS), to improve the mapping of the floodplains. GIS is “a system for management, analysis, and display of geographic knowledge, which is represented using a series of information sets such as maps and globes, geographic data sets, processing and work flow models, data models, etc.” The data will allow recently added personnel, such as the code enforcement officer/environmental manager, to monitor soils and sedimentation and enforce violations. The data will enable the town to create and attach data (e.g. notices of violations, special use permits) to specific parcels for other departmental usage.

According to the 2003 Broad River Basin-wide Water Quality Plan conducted by the North Carolina Division of Water Quality, water quality can be negatively impacted by human disturbance. Pollutants are deposited into water bodies through two types of sources, point and non-point, and contribute to water quality degradation. Point source pollution is generated from piped discharges of wastewater treatment plants, industrial plants and stormwater management facilities. Non-point pollution is often the consequence of various development-related activities and conditions. Examples are chemicals deposited on impervious surfaces (e.g. oil on paved parking surfaces), sediment generated by construction activities and timber harvesting, and fertilizers used on golf courses and in agricultural practices. Most of these



Examples chemicals deposited on impervious surfaces such as oil on paved parking surfaces. Most of these pollutants are carried to lakes, rivers and streams by stormwater runoff.



Streams such as this one can receive chemicals from point and non-point sources of pollution.

pollutants are carried to lakes, rivers and streams by stormwater run-off.

The 2006 North Carolina Waterbodies Reports, prepared by the North Carolina Division of Water Quality (DWQ), states the lake itself has few water quality protections associated with its state primary freshwater classification of Class B or the supplemental trout water designation. (Class B waters are those used primarily for recreation, which include swimming, skin diving, water skiing, and similar uses involving human body contact with water.) However, the North Carolina Division of Land Resources does require a 25-foot vegetated buffer between trout waters and graded construction sites. The following is an excerpt from the North Carolina Administrative Code Title 15 A Department of Environment and Natural Resources Chapter 4 Sedimentation Control.

15A NCAC 04B .0125 BUFFER ZONE REQUIREMENTS

(a) 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 percent of the strip nearer the land-disturbing activity containing natural or artificial means of confining visible siltation.

(b) The 25 foot minimum width for an undisturbed buffer zone adjacent to designated trout waters shall be measured horizontally from the top of the bank.

(c) Where a temporary and minimal disturbance is permitted as an exception by G.S. 113A-57(1), land-disturbing activities in the buffer zone adjacent to designated trout waters shall be limited to a maximum of ten percent of the total length of the buffer zone within the tract to be distributed such that there is not more than 100 linear feet of disturbance in each 1000 linear feet of buffer zone. Larger areas may be disturbed with the written approval of the Director.

(d) No land-disturbing activity shall be undertaken within a buffer zone adjacent to designated trout waters that will cause adverse temperature fluctuations, as set forth in 15A NCAC 2B .0211 "Fresh Surface Water Classification and Standards", in these waters.

Water quality will continue to be an issue as development occurs within Lake Lure and throughout the entire Upper Broad River Sub-Basin, especially if enforcement of the 25-foot buffer is a challenge. Its geographic position at the bottom of the 94-square mile sub-basin leaves the lake as a prime target for non-point pollution in the form of sedimentation.

Sedimentation

Sedimentation is a major threat to water quality in all water bodies in developing areas. It is even more important in Lake Lure due to its location in the watershed. Sediment is soil particles carried by stormwater into various waterbodies such as

streams, lakes, and rivers. According to Western North Carolina Tomorrow, sedimentation is the largest pollutant by volume and can fill waterways and impoundments quickly compromising their environmental and recreational values.

In Lake Lure, stormwater run-off from construction sites and other land-disturbing activities carries over 40,000 tons of sediment and deposits it on the lake's floor annually. The town conducts ongoing dredging activities to remove the sediment.

Erosion Control

Preserving water quality is becoming more and more difficult as the rate of development increases. Erosion control is the key to managing water quality that is threatened most by sedimentation. Construction activities (e.g., site clearing and grading), increasing amounts of impervious surfaces that increase the velocity of stormwater run-off, and other land-disturbing activities expose soils allowing stormwater to carry particles toward lakes, rivers, and streams. Through four community input opportunities (community meetings, stakeholder interviews, CPSC meetings and the community survey), erosion control was cited as a major issue and a key concern in preserving the quality of Lake Lure's natural environment and resources. Close to 50% of the community survey respondents indicated a need for new or improved erosion control techniques. In addition to local community input, the 2003 Broad River Basin-wide Water Quality Plan reported that Division of Water Quality biologists have found a degradation of aquatic communities at numerous sites throughout the entire Broad River basin in association with narrow or nonexistent zones of vegetative buffers. Minimal buffer areas, where provided, do not create the barrier needed to prevent sediment from reaching the water's edge, allowing it to flow into the lake via streams and rivers in the Upper Broad River Sub-Basin.

Lake shore stabilization is another issue directly related to erosion control efforts. A change in the development pattern is occurring along the lakeshore with older and smaller traditional cottage cabins redeveloping and transitioning into larger home sites. With this type of development occurring, concerns about the integrity of the lake edge have surfaced through the public process. Though a 25-foot vegetative buffer along the lake and stream edges are required, little has been done to enforce these regulations. In addition, existing older seawalls continue to erode due to continuous wave action at the base of the walls, causing the walls to lose structural integrity and erode natural



Ridgelines and vegetation, steep slopes are key attributes to Lake Lure's natural environment. Lake Lure has a large amount of vantage points that capture breath taking views to distant ridgelines, tree-covered mountains, and hillsides.

shoreline areas. In response, the town has addressed this issue by amending its standards for lake structures.

Lake Lure has a representative on the Upper Broad River Watershed Protection Committee (UBRWPC), which formed to address sedimentation issues at the regional level. The UBRWPC helps to identify regional sources of erosion and provides solutions to specific sedimentation problems.

The Town of Lake Lure has taken positive steps to reduce erosion impacts locally. With a grant the town recently received, the town has been able to enhance the soil and erosion control program by purchasing computer equipment and software to utilize and benefit from Geographic Information System (i.e. GIS). The town has also added staff, an erosion control officer/environmental manager, to monitor land disturbance activities and to enforce adopted regulations. This position, which was part-time until July 2006, is now a full-time position. Chapter 96 of the Town of Lake Lure Soil Erosion and Sedimentation Control Regulations requires any land disturbance activity over 100 square feet to have a sedimentation and erosion control plan being considered for amendment. Plans that involve such disturbances must be submitted for review and approval by the town prior to the issuance of construction permits or any activity beginning on the site.

Lake Lure lacks a post-construction stormwater quality policy. The impact of stormwater from new development may be mitigated by practices which treat, store and infiltrate run-off before it can affect bodies of water downstream. It is possible to reduce the flow of run-off and improve water quality through the use of innovative site designs that reduce impervious area. Smaller-scale, low impact development practices also help lower the amount of run-off into streams, rivers and lakes.

Flora and Fauna

Rutherford County is home to a variety of endangered plant and animal species. Many species have been found specifically within the Hickory Nut Gorge area. According to the Nature Conservancy, the Gorge is home to “37 rare plant species, 6 rare natural community types and 14 rare animal species, including cave-obligate invertebrates, spiders, salamanders, bats and woodrats. Its ecological features include Bat Cave (just outside of Lake Lure) known to be the longest granite fissure cave in the world with additional cave systems found throughout the gorge.”



Wildlife is able to move freely within open space and undeveloped areas. This snapshot was taken near the town center where deer grazed near the stream.

The area caves, waterfalls and elevation differences are features of the unique habitats for a variety of flora and fauna. Predominant natural community types include the following: Oak Hickory Forests, Moist Hardwood Forests and Flood Plain Forest.

The following charts divide the Rutherford County plant species into three categories: endangered, threatened and species of concern (U.S. Fish and Wildlife Threatened and Endangered Species List, 2002).

- *Federal Species of Concern* denotes a species under consideration for listing at this time.
- *Threatened* denotes a taxon, or organism, likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- *Endangered* denotes a taxon in danger of extinction throughout all or a significant portion of its range.

Table 10.1: Plant Species:

<i>Plant</i>	<i>Federal Species of Concern</i>	<i>Threatened</i>	<i>Endangered</i>
Blue Ridge ragwort	X		
Butternut	X		
Rock gnome lichen			X
Granite dome goldenrod	X		
Gray's saxifrage	X		
Mountain catchfly	X		
Small whorled pogonia		X	
Sweet Pinesap	X		
White irisette			X

Table 10.2: Vertebrate Species:

<i>Vertebrate</i>	<i>Federal Species of Concern</i>	<i>Endangered Species</i>
Cerulean warbler	X	
Eastern small-footed bat	X	
Green salamander	X	
Indiana bat		X

American bald eagle		X
Northern pine snake	X	
Southern Appalachian eastern wood rat	X	

Source: U.S. Fish & Wildlife Threatened and Endangered Species List, 2002

According to town staff, bald eagles have been observed on the western edge of the lake. However, ecological occurrence documentation has not been submitted to the North Carolina Natural Heritage Program. In 2006, a nest was discovered in the Blue Heron Point subdivision which prompted the North Carolina Division of Water Quality to ask the town and volunteers to submit information on bald eagle observations at that site. A volunteer observer and monitoring program has been started and information gathered will be recorded in a database and GIS shape file for future use.

In response to the community’s desire to protect local flora and fauna and their habitats, the town has adopted an amendment to the subdivision regulations (Ordinance 06-10-10) to protect tree cover during residential development. This ordinance, developed with assistance from a volunteer Tree Management Committee, is designed to prevent excessive removal of trees and native shrubs and to minimize land disturbances by mandating tree densities, tree species and tree protections during subdivision development. This ordinance is a positive step in securing protections for Lake Lure’s pristine natural environment. New developments have now been limited in their clearing potential, which will positively enhance the natural plant animal habitats of Lake Lure. Progress is also being made on the creation of an ordinance to protect trees on individual lots.

Ridgelines

Ridgeline protection is an issue throughout western North Carolina. Development in such visually prominent locations within the landscape can interrupt views and have a significant economic impact; the views are one of the features that have attracted the many people visiting and investing in the region.

The North Carolina Ridge Protection Act of 1983 was developed and adopted in response to the significant viewshed impacts of the condominium development on top of Sugar Mountain, Little Sugar Top Mountain, which is highly visible from a popular tourist attraction, Grandfather Mountain, which boasts some of the best views in western North Carolinas. This act protects mountain ridges whose elevation is at or above 3,000 feet and is



Development, road construction, and removal of vegetation adversely affect erosion. Exposed soils allow stormwater to gain velocity during precipitation events; the stormwater gathers sediment and pollutants and carries them into streams, creeks, and lakes.

also 500 or more feet above the elevation of an adjacent valley floor. The Act defines a "ridge" as the elongated crest or series of crests at the apex or uppermost point of intersection between two opposite slopes or sides of a mountain, and includes all land within 100 feet below the elevation of any portion of such line or surface along the crest. (See Figure # 4, Elevation map).

Elevations over 3,000 feet do not exist within Lake Lure's current jurisdictional boundary. In fact, the majority of land within the town is under the 1500' elevation. However, some ridgelines that meet the definition set forth in the Act can be found just outside of the town's jurisdiction. These and ridgelines at lower elevations are very much a component of the views enjoyed from a number of vantage points throughout the town. The protection of each is important to the residents and property owners in Lake Lure. The community survey results underscored the importance of this issue; 87% of the participants support ridgeline protection.

Steep Slopes

Steep slopes are areas where land (grade) ascends rapidly over a short distance from a relatively horizontal plane. Lake Lure has many areas of 20% slope or more and some places where slopes exceed the 40%. Most of the 40% and steeper slopes are located above the 1500' elevation line.

Building on steep slopes is a major issue in Lake Lure, as development increases in these areas. The survey respondents and participants in the public meetings indicated a desire for regulations to protect existing trees, environmentally sensitive areas and steep slopes during development. Developing on steep slopes increases the potential for adverse watershed and environmental impacts and decreased structural integrity of buildings. Development on steep slopes challenges the integrity of the slopes as trees and other vegetation that hold/stabilize the soil are removed. Steep slopes are also home to soil formations that are prone to erosion and lack of percolation. Soils are often shallow and unstable in these areas, resulting in erosion, vegetative loss, and reduced water quality. Like ridgeline development, it is also more visible than development in other locations.

Development on steep slopes is of greater concern to the community and all of western NC now than in the recent past. These areas were previously thought to be un-buildable. With recent engineering advances in roadway and building



Although provisions are in development, the Town has not adopted conservation regulations to protect vegetation, hillsides, and steep slopes. This creates potential erosion issues and adversely alters existing viewsheds.

construction, and land values that justify the costs of employing the more costly techniques, development on steep slopes is more feasible.

Soils

Four major soil associations are found within Lake Lure: Pacelot-Rion, Evard-Cowee-Fannin, Ashe-Edneyville-Rock Outcrop-Cleveland and Greenlee-Tate according to the General Soils Map of Rutherford County 1997, Soil Survey of Rutherford County, NC.

The following descriptions of the four classifications are cited from the Soil Survey of Rutherford County, USDA-NRCS Soil Survey Division, 1997:

Pacelot-Rion

Pacelot-Rion soils are strongly sloping to very steep, very deep, well drained soils that have clayey or loamy subsoil. This soil association exhibits erodibility, slope and restricted permeability characteristics when developed.

Evard-Cowee-Fannin

Evard-Cowee-Fannin soils are well drained soils that are very deep and moderately deep and have a predominantly stony surface layer and loamy subsoil. This soil association exhibits erodibility, slope, limited depth to bedrock and restricted permeability characteristics when developed.

Ashe-Edneyville-Rock Outcrop-Cleveland

This soil association contains rock outcrops and moderately steep to very steep, shallow to very deep soils that have a predominantly loamy subsoil and formed in residuum affected by soil creep and weathered mainly from high-grade metamorphic rock. This soil association exhibits erodibility, slope, rooting hazards, and limited depth to bedrock characteristics when developed.

Greenlee-Tate

Greenlee-Tate soils are strongly sloping to steep, very deep soils that have a predominantly extremely bouldery surface and loamy subsoil. This soil association exhibits erodibility, slope, restricted permeability and large stone occurrence characteristics when developed.

Soils associated with wetlands, lakes or river bottoms that are frequently flooded or waterlogged are known as “hydric” soils.



Distant ridgelines and tree-covered mountains are essential to Lake Lure's natural environment.

Hydric soils do not support freestanding vegetation but often have a layer of decomposing plant material on the surface. Lake Lure has six hydric soil types: Chewacla, Dogue, Fluvaquents-Udifluvents, Helena-Worsham, Lotla and Wehadkee.

The soil types within Lake Lure play a vital role in determining construction practices and development potential of tracts of undeveloped land within Lake Lure. As noted in previous subsections, these restrictive soil characteristics present numerous challenges for development. The challenges related to erodibility and permeability present the biggest challenge for development, however, commonly used mitigation techniques allow further development as suggested in previous sub-sections. These restrictive soil characteristics present numerous challenges for development, however, they are related to erosion and permeability. Commonly used mitigation techniques allow further development.

Open Space

Open space is any privately- or publicly-owned land in an undeveloped state. In that state, such undeveloped land contributes to vital ecological functions and often contain important natural resources or cultural resources worthy of potential conservation and protection. Such areas may contain, but are not limited to woodlands, farmland, old fields, floodplains, and wetlands. The majority of the land, 82%, within Lake Lure's jurisdictional boundary is undeveloped.

Given the mutually exclusive nature of development and preservation of open space, the increase in residential and commercial development will reduce existing open space quantities. However, development can integrate open space in a manner that preserves the valuable features of open space (and maintains the benefits of it) while complementing new development and serving as an amenity to it.

Currently, Lake Lure does not require open space be set aside as development occurs. Requirements to protect and preserve open space during the development process are an option worthy of further detailed exploration. In addition to developing requirements, it was identified that public education efforts should be explored to help educate developers and residents alike about the benefits of conservation design from large subdivisions to individual building lots.



Roadways and construction increase run-off as sediment is carried into streams, lakes, and rivers.

10.3 SUMMARY OF ISSUES AND OPPORTUNITIES

- Potential for further development on steep slopes and ridges could adversely affect the natural environment and scenic views.
- Potential for further development on sensitive soils could cause additional erosion and sedimentation problems.
- Standards have been added to the subdivision regulations to preserve trees and existing vegetation; however, the regulation is limited to subdivisions. There is an opportunity for these regulations to be expanded to all developments. Work has started to address tree preservation on individual lots.
- The water quality issue is directly related to sedimentation. Lake Lure annually receives high amounts of sediment at the bottom of its lake. Sedimentation is due to erosion caused by development and other land-disturbing activities upstream and outside of the town's jurisdiction. Sediment is carried to water bodies via stormwater runoff. Additional impervious surface increases runoff velocity and, therefore, increases erosion. One of the more serious impacts is the amount of sedimentation in the lake that requires regular dredging, a costly maintenance activity for the town.
- Lake Lure has experienced major flood events throughout the past decade. This presents a dangerous and costly environment for those who live within the town's floodplain.
- Required vegetative buffers, including the 25-foot buffer required along trout waters, are too narrow to reduce the velocity of stormwater carrying pollutants or to filter such pollutants before either enter the lake and streams.
- New developments, especially residential subdivisions, are not required to preserve or integrate open space within it.

10.4 GOALS, OBJECTIVES AND POLICIES

NE Goal 1: Preservation and enhancement of open space, particularly Lake Lure's environmentally sensitive areas

Objective: NE-1-1: Maintain open space in a manner that allows development to harmoniously blend with the natural environmental.

Policy NE-1-1.1:

Raise awareness of open space conservation initiatives and benefits.

- (1) Conduct public meetings and open forums to inform the public of current environmental initiatives. *This would complement or be an extension of the Carolina Mountain Land Conservancy's current program that aims to raise awareness of the benefits of conservation easements.*
- (2) Educate developers and real estate agencies about the value of the environment, open space and recreational opportunities available in homebuyers' decisions.

Policy NE-2-1.1:

Identify open space worthy of protection, such as environmentally sensitive areas, and pursue protection through a range of methods.

- (1) Formally define "environmentally sensitive" areas and locate accordingly. *At a minimum, map environmentally sensitive areas in accordance with the definition to document the inventory of lands meeting the definition. A more thorough approach would involve the creation of a comprehensive land and water environmental survey by qualified naturalists to inventory and establish the areas that harbor the endangered species of flora and fauna, unique geological formations, delicate ecosystems and waterways that should be retained in their current, natural state.*
- (2) Pursue conservation easements for natural areas identified in the composite map.
- (3) Create a trust that allows donators to transfer their property to the town for preservation purposes.
- (4) Consider partnering with state-funded agencies, universities and private

conservation groups to undertake this inventory.

- (5) Explore the potential to collect land transfer fees that could fund a specific activity, such as land acquisition for open space purposes to preserve environmentally sensitive areas. *This would require special legislation from the state.*

Policy NE-1-1.3:

Improve all developments by promoting environmental conservation in the development process.

- (1) Require a fixed percentage of land to be set aside as open space in all future developments.
- (2) Establish methods to limit or restrict ‘clear-cutting’ techniques in all developments. *This could include establishing maximums for disturbed area and/or impervious area within lots.*
- (3) Incorporate tree protection regulations into the zoning regulations so they apply to all development types, not just subdivisions.
- (4) Establish a “Purchase Development Rights Program” that allows the town to purchase development rights from land owners for conservation purposes. *This will limit the future use of the land and reduce the landowner’s property taxes. This could give the owners a right to develop their land in a limited manner. The balance of development rights are sold to the local municipality in exchange for a reduction in property taxes for the owner.*
- (5) Allow conservation subdivision development as a by-right option in all residential districts. *Develop subdivision standards that allow a cluster development option as a means to preserve open space. This should be provided as an option within the subdivision regulations and should not require a special permit. Consider a*

density bonus as an incentive; allowable density can be exceeded if open space requirements are exceeded. See Image 15 for a comparison of conventional and conservation subdivision.

(6) Explore the possibility of creating a financial incentive program for conservation development. *This incentive program could be a reduction in permit fees or a reduction in impact fees.* Clearly define the requirements for financial incentives and publish information for public records.

Policy NE-1-1.4:

Consider environmental value of land owned by the town.

(1) In conducting inventory, document clearly the characteristics of parcels owned by the town that meet environmental objectives. *This is critical for determining whether such parcels should remain in town ownership when land sales are contemplated by the town.*

(2) Utilize data contained in the detailed inventory, if conducted, to identify parcels to be acquired by the town. *This may also be helpful in considering land swaps, allowing for development in appropriate locations while preserving environmentally sensitive lands.*

NE Goal 2: A linked system of green open spaces

Objectives:

NE-2-1: Provide for connections that benefit the natural environment, such as wildlife corridors.

Policy NE-2-1.1:

Ensure open space is linked via trails, greenways, and open space corridors throughout the town.

(1) Create an open space plan. *This plan should build on a mapped inventory of environmentally sensitive areas (see above), identify open space*

land that is already protected, and generally locate proposed open space to be protected.

Policy NE-2-1.1:

Seek opportunities to link open space (existing and proposed) in Lake Lure to adjacent open space to create a regional system of open space.

(1) Establish a regional effort that targets environmental conservation within and outside of Lake Lure's jurisdictional limits.

(2) Host regular meetings with neighboring jurisdictions to coordinate open space preservation efforts.

NE Goal 3: Implementation of subdivision regulations addressing design practices

Objective:

NE-3-1: Minimize negative impacts from grading on steep slopes and post-construction stormwater run-off.

Policy NE-3-1.1:

(1) Define steep slopes relative to topography in Lake Lure specifically.

(2) Modify subdivision regulations to minimize density and grading impacts on steep slopes. *This could include requirements for increasing lot size with steeper slopes.*

(3) Adopt regulations to minimize grading impacts on steep slopes within non-residential development or any type of development not subject to subdivision regulations.

NE Goal 4: High water quality in local lakes, rivers and streams.

Objective:

NE-4-1: Improve and maintain water quality for the enjoyment of the community and to support natural habitats.

Policy NE-4-1.1:

Monitor water quality regularly.

(1) Establish better, more regular means of communication with the State of North Carolina, specifically the DWQ, to strengthen efforts to test stream pollutant levels, water temperatures, etc.

Policy NE-4-1.2:

Establish effective buffers as a way of strengthening water quality protection measures.

(1) Increase the width of the required lake edge buffer and require stream buffers. *The width of these buffers shall be a minimum of 50 feet measured horizontally from lake's edge (standard elevation) or the top of the stream bank.*

(2) Specify in regulations accepted methods for delineating buffer zones.

(3) Establish minimum planting requirements to ensure adequate buffer vegetation. *Buffers shall maintain existing vegetation. Where such vegetation does not exist, buffers shall be planted with native vegetation, particularly pollutant-absorbing plants to filter chemicals in runoff entering streams and lakes. Review the standards for buffer planting currently required by the NC Division of Land Quality (NCDLQ) to ensure future standards established by the town enhance rather than conflict with the NCDLQ's standards.*

(4) Establish limitations for clearing within the required buffer to ensure the effectiveness of the buffer is maintained.

(5) Avoid embankment fill for bridge approaches, using causeways over floodplain to preserve existing vegetation wherever possible.

(6) Review staff resources and add personnel as needed to adequately monitor adherence to buffer regulations. *Staff will be required to inspect buffers established during construction phase of development and conduct buffer walks to check for encroachments or other violations.*

Policy NE-4-1.3:

Manage upstream development activities that result in sedimentation and other impacts that threaten water quality.

(1) Conduct a Watershed Study to specifically identify regional erosion and sedimentation issues and problem areas that directly impact Lake Lure.

(2) Evaluate impervious cover impacts on surface water hydrology, quality, and ecology. *This will be helpful in determining what types of regulations (i.e. impervious surface limitations) are appropriate.*

(3) Classify “Watershed Study” into three broad impact classifications: low, medium, and high. *These categories will be useful to assess the potential for watershed restoration and provide a baseline for watershed protection. The lower the overall characteristic, the lower the adverse impacts of phosphorous loads, sediment inputs, bacterial loads, and shoreline erosion.*

(4) Adopt regulations to mitigate impacts in accordance with the findings of the Watershed Study. *Regulations could address a number of factors that contribute to the degradation of water quality, including impervious surface areas limits.*

(5) Explore additional solutions to management of sedimentation and dredging to reduce the cost of sedimentation removal activities.

(6) Continue participation on and support of Upper Broad River Watershed Protection Committee.

Policy NE-3-1.4:

Utilize the recently established Geographic Information System (GIS) to better inform development approval decisions.

(1) Use Spatial Analyst software to better understand steep slope conditions

(2) Map soil types to locate highly-erodible soils and aid decisions for erosion control measures.

(3) Utilize updated floodplain maps to improve accuracy of floodplain area and to enforce floodplain regulations

Policy NE-3-1.5:

Educate the public about importance of water quality.

(1) Educate public about buffers and benefits of maintaining existing native vegetation. *On public property, conduct stream walks, post interpretive signs and involve the public in replanting efforts.*

(2) Create an informational pamphlet and distribute to businesses, private landowners, and developers to inform them of environmental impacts associated with increases in impervious surface area. *The information should include: 1) examples of impervious surface areas (e.g. rooftops, parking lots, etc) 2) effects of impervious surfaces (e.g. preclusion of precipitation infiltration into soils, which causes reduction in groundwater recharge, subsequently lowering the water table, depleting groundwater supplies, and reducing ecologically*

significant base flow into streams, wetlands, and Lake Lure) 3) presentation of mitigation strategies (e.g. green roofs, paving materials, etc.) 4) landscaping best practices.

(3) Coordinate with neighboring jurisdictions to expand educational efforts beyond Lake Lure's jurisdiction.