

CHAPTER V-G ENVIRONMENTAL AND NATURAL RESOURCES

The City of Concord is located in the Piedmont region of North Carolina – a region characterized by a temperate climate, rolling topography and an abundance of vegetation and wildlife. While both the mountains and the coast are within easy driving distance, area residents enjoy the forests, lakes and rivers which are close to home. Environmental factors such as climate, temperature, hydrology (including floodplains and watersheds), wetlands, and soil composition can significantly impact the natural environment and shape the future development of Concord and the surrounding area.

1. Climate

From its location in the Piedmont region, between the Blue Ridge Mountains to the west (approximately 80 miles) and the coastal plain (approximately 160 miles to the Atlantic Ocean) to the east, the City of Concord enjoys a moderate climate, characterized by cool winters and warm summers. The general elevation of the area is 730 feet above sea level. Winter is moderately cold but short because the mountains to the west protect the county from many cold fronts. The average low temperature in January is 29.6 degrees, while the average high for the same month is 50.8 degrees. The Concord area is hot and generally humid in summer. The July average high temperature is 89.2 degrees, while the July average low is 69.6. Rainfall is evenly distributed throughout the year, with an average annual precipitation of 44.48 inches. The Concord area averages 5.4 inches of snow per year, with most snowfall occurring in January, February and March.

According to records dating back more than 50 years, there is sunshine an average of 59% of the year in the Concord area. Records dating back nearly 40 years indicate that the average relative humidity is 82% in the mornings and 53% in the afternoons, with slightly lower average humidity in winter mornings than summer mornings and similar average humidity in the afternoons of both seasons.

**Table 48. Daily Mean Temperature (Degrees Fahrenheit)
Charlotte, NC, 1961-1990**

Temperature	January	July	Average Temperature
Daily Mean	43.8	80.8	63.1
Daily Maximum	55.3	91.6	75.1
Daily Minimum	32.1	70.0	50.9

(Source: US Census, Statistical Abstract of the US, 2001.)

Total annual precipitation is 43.09 inches, with March getting the most rain at 4.43 inches (10.3% of average yearly total). However, it should be noted that this information was based on a 30-year period starting in 1961 and ending in 1990. Current precipitation data would reflect

the drought that has affected the southeast from the late 1990's to recent years. Prevailing wind is from the southwest, with average wind speeds peaking at 9 miles per hour in the spring.

2. Hydrology and Flood Plains

Concord is positioned between two major river systems – the Catawba River to the west and the Yadkin/Pee Dee River to the east. It is also within close proximity to major reservoirs including Lake Norman, Badin Lake, Lake Tillery and High Rock Lake. The City is in the Rocky River Sub-basin of the Yadkin River Basin. The primary water supply is drawn from Lake Howell to the northwest of the City, Lake Concord and Lake Fisher to the northeast of the City. Major streams including Coddle Creek, Rocky River, Irish Buffalo Creek, Three Mile Branch and Cold Water Creek flow from northwest to southeast across the City.

A "100-year flood" does not refer to a flood that occurs once every 100 years, but refers to a flood level with a 1% or greater chance of being equaled or exceeded in any given year. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free from encroachment so that the 1% annual chance of flood could be carried without substantial increases in flood heights.

As illustrated in Figure V-G-1, Coddle Creek, Afton Run, Rocky River, Irish Buffalo Creek, Three Mile Branch and much of Cold Water Creek have both floodways and 100-year floodplains designated along their routes through the City. A portion of Cold Water Creek in the far eastern portion of the City has only 100-year floodplain designated, with no floodway.

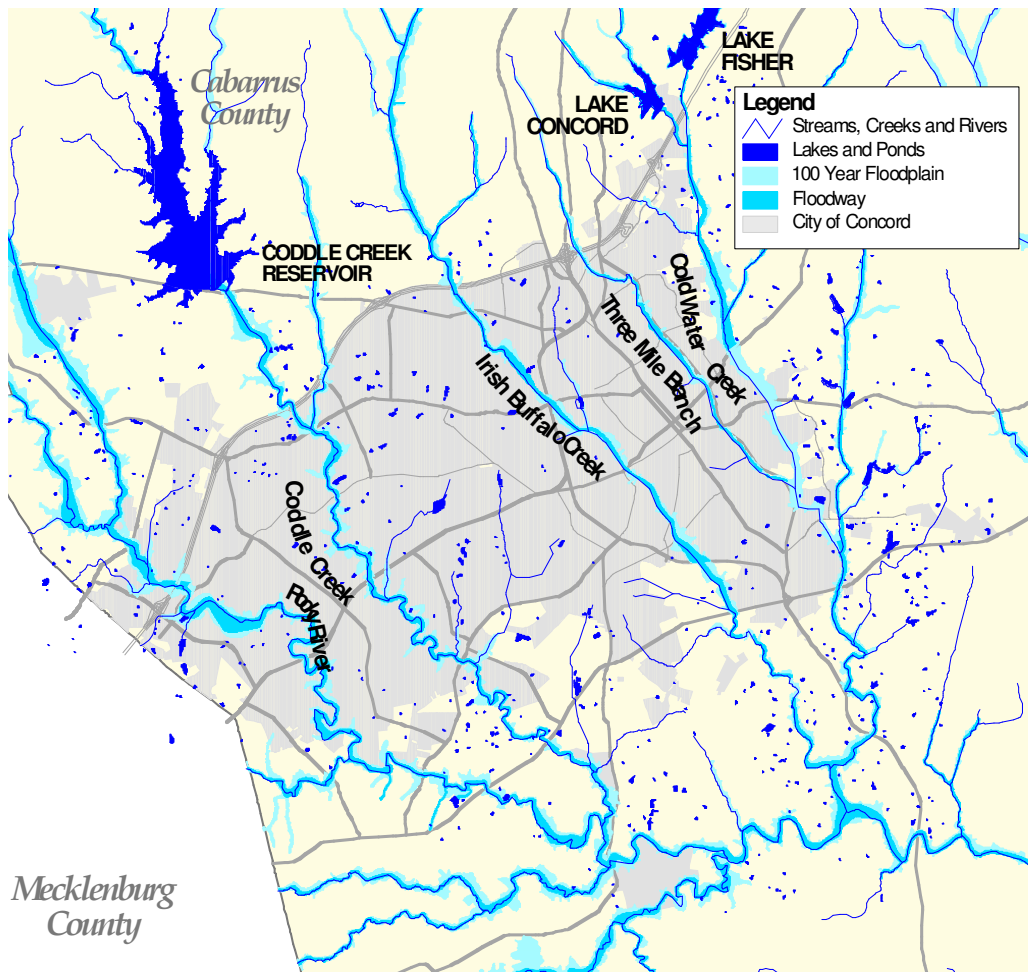
The City of Concord's *Unified Development Ordinance* (UDO) includes a *Floodplain Protection Overlay District* (FPOD) that regulates building and development within designated flood hazard areas. Specifically, the purpose of the FPOD is to promote the health, safety and general welfare and to minimize public and private loss due to flood conditions in specific areas. This is accomplished through provisions designed to:

- ❑ Restrict and prohibit uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- ❑ Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- ❑ Control the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of floodwaters;
- ❑ To maintain the natural storage capacity of the floodway fringe area.
- ❑ Control filling, grading, dredging and other development which may increase erosion or flood damage; and
- ❑ Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

Areas of special flood hazard are defined by the Federal Emergency Service Management Agency in its *Flood Insurance Study*, and include both floodplains and floodways. No substantial structures (with the exception of bridges, dams and other infrastructure-related structures) may be built within the floodway, and all residential and nonresidential buildings in the flood fringe must be elevated with the lowest floor, including the basement, no lower than 2 feet above the base flood elevation.

In addition, the *Concord UDO* includes provisions for a *River/Stream Overlay District (RSOD)*. The District is comprised of a minimum 50-foot stream buffer established on both sides of all perennial streams, measured from the average annual stream bank. The purpose of the District is to minimize soil erosion, reduce the velocity of overland stormwater flow, trap sediment and soil eroded from cropland or other land being developed, and limit other pollutants from entering the waterways. No building or structure may be erected within 20 feet of the buffer. However, greenways, utilities and easements, and certain agricultural uses are allowed within the designated buffer area. Once the Phase II Stormwater Ordinance Regulations are in place, intermittent streams will be required to comply with similar buffering regulations as perennial streams. It is anticipated that those regulations will become effective in the City of Concord by Fall, 2004.

Figure V-G-1
Water Features, Floodways, and Floodplains through
City of Concord



Source: City of Concord, 2002

3. Watersheds

A watershed is defined as an area of land that directs water into a common water body, such as a river or lake. Watersheds direct water to both groundwater and surface water resources. Groundwater is found below the land surface within the zone of saturation or within rock fractures capable of yielding water through wells. Surface water is found in lakes, streams, rivers and wetlands.

As water flows across or under a watershed on its way to a lake, river or stream, it is exposed to potential contaminants in the form of stormwater run-off and other pollutants. Development of natural areas can adversely impact water quality through the removal of vegetation and forests and their replacement with impervious surfaces. Unlike the filtering and absorption qualities of natural vegetation, such surfaces accelerate stormwater run-off and allow the unimpeded entry of pollutants into the water supply. Maintaining the quality of water sources within a watershed is vital to preserving the suitability of water resources for drinking water, recreational use, and habitat.

Protection of watersheds depends in large part on the adoption and implementation of policies and regulations by local governments. The *Water Supply Watershed Protection Rules* adopted by the North Carolina Environmental Management Commission require that all local governments having land use jurisdiction within water supply watersheds adopt and implement water supply watershed protection ordinances and maps. The Cities of Concord and Kannapolis, the Town of Mt. Pleasant and Cabarrus County have all adopted watershed protection overlay restrictions as part of their zoning ordinances.

The City of Concord's UDO includes provisions for watershed protection through *Watershed Protection Overlay Districts*. The watershed overlay zones included in the UDO have been established by Concord, the City of Kannapolis, Town of Mount Pleasant and Cabarrus County. Included in the provisions are a 50-foot vegetative buffer along all perennial waters, including streams, rivers and impoundments for all new development; and requirements that all new roads, bridges, and development minimize built-upon area, divert stormwater away from surface water supply waters as much as possible, and employ best management practices to minimize water quality impacts. As previously mentioned, intermittent streams will have to comply with new buffering regulations once the Phase II Stormwater Regulations go into effect within the City.

The major watershed of the Concord area is the Yadkin River watershed. There are numerous smaller watersheds within the Yadkin that direct water to smaller streams, creeks and lakes. Although all lands fall within a watershed, only a small portion of the City of Concord located at the northeastern most tip of the City lies within a critical watershed. That small area of the City is within the critical area of the Lake Concord Watershed. The critical area of a watershed is the land adjacent to a water supply intake where risk associated with pollution is greater than from remaining portions of the watershed.

Just north of the City, the Coddle Creek Watershed flows into Lake Don T. Howell. To the northeast, the remainder of the Lake Concord Watershed flows into Lake Concord and the Lake

Fisher Watershed flows into Lake Fisher. Further to the east is the large Dutch Buffalo Creek Watershed, which flows into the Dutch Buffalo Creek.

Table V-G-1 lists the primary water bodies that traverse the City of Concord and surrounding areas, along with their current classification and description. With the exception of those leading to and from Lake Concord, this listing excludes several smaller tributaries that feed into area lakes, creeks and rivers.

**Table V-G-1
Classification of Concord Area Water Bodies**

Water Body	Segment Description	Classification
Rocky River	From source to Pee Dee River	C
Coddle Creek	From source to point .5 mile downstream of East Coddle Creek	WS-II; HQW
Coddle Creek, including Supply Reservoir for City of Concord	From point .5 mile downstream of East Coddle Creek to point .2 mile upstream of NC Hwy 73 (concord water supply intake)	WS-II; HQW; CA
Coddle Creek	From point .2 mile upstream of NC Hwy 73 to Rocky River	C
Afton Run	From source to Coddle Creek	C
Irish Buffalo Creek	From Kannapolis water supply dam to Rocky River	C
Cold Water Creek (Lake Fisher)	From point .5 mile downstream of Rowan County SR 1221 to dam at Lake Fisher	WS-IV; CA
Cold Water Creek	From dam at Lake Fisher to Irish Buffalo Creek	C
Unnamed Tributary to Cold Water Creek (Lake Concord)	From point .7 mile downstream of Rowan/Cabarrus County line to dam at Lake Concord	WS-IV; CA
Unnamed Tributary to Cold Water Creek	From dam at Lake Concord to Cold Water Creek	C
Three Mile Branch	From source to Cold Water Creek	C
Dutch Buffalo Creek	From source to point .6 mile downstream Cabarrus County SR 2416	WS-II; HQW
Dutch Buffalo Creek	From point .6 mile downstream of Cabarrus County SR 2416 to point .5 mile upstream of NC Hwy 49	WS-II; HQW; CA
Dutch Buffalo Creek	From point .5 mile upstream of NC Hwy 49 to Rocky River	C

Classification Code: C – Aquatic Life, Secondary Recreation, Free; CA – Critical Area; HQW – High Quality Waters; WS-II – Water Supply II/Undeveloped; WS-IV- Water Supply IV/Highly Developed (Source: Basinwide Information Management System, NCDENR, 2002.)

4. Wetlands

Wetlands are a vital natural resource – providing a natural filtration system for sediment and pollution and serving as habitat for numerous species. Numerous wetland areas have been identified within the City's boundaries that may fall under the permitting authority of the US Army Corp of Engineers and the State of North Carolina. These wetlands are primarily associated with the ponds, rivers and streams within the City and range from permanently flooded wetlands to intermittently or seasonally flooded wetlands.

Although the City of Concord does not have regulations that are specific to wetlands, regulatory authority over waters and wetlands in North Carolina is exercised by two federal agencies – the US Army Corp of Engineers and the US Environmental Protection Agency – and two state agencies – the Division of Water Quality and the Division of Coastal Management. The Division of Coastal Management concentrates its regulatory authority on tidal wetlands.

Section 404 of the Clean Water Act (33 USC 1344) requires authorization by the Corps of Engineers for the discharge of dredged or fill materials into all navigable waters of the United States, including wetlands. Discharge of fill material generally include: placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; dams and dikes; artificial islands; property protection or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments; beach nourishment; levees; fill for intake and outfall pipes and sub-aqueous utility lines; fill associated with the creation of ponds; and any other work involving the discharge of fill or dredged material. A Corps permit is required whether the work is permanent or temporary. The Corps of Engineers does not regulate isolated wetlands, but the State of North Carolina, through the Division of Water Quality does regulate them.

All projects are subject to wetlands regulation, however few actually are determined to have a direct impact on one or more wetlands. The first step in the process is a determination by the Corps of Engineers of the existence of a wetland, followed by an examination of the size and type of project proposed. Generally, if a project results in a discharge into 1/10th of an acre of wetlands, is within 150 linear feet of a stream, or includes 1/3 of an acre of waters it is subject to water quality certification.

In the case of impact upon isolated inland wetlands such as ones that exist in the City of Concord, a 401 Water Quality Certification (Section 401 of the Clean Water Act) would be required. A 401 Certification is essentially a verification by the State that a given project will not degrade waters of the State or otherwise violate water quality standards.

5. Soils and Topography

Soil characteristics and topography play a significant role in the development potential within the City and surrounding areas. Soil characteristics of major concern that can pose limitations for development include erodability, percolation rates, load bearing capacity, slopes, depth, and water tables. Soils that exhibit similar characteristics or profiles are grouped into a soil series. Soil associations consist of groups of series that are related and influenced by time, climate, and slope patterns.

Four soil associations occur within the City of Concord and surrounding areas, Mecklenburg-Iredell, Enon-Mecklenburg-Poindexter, Poindexter-Enon, and Cullen-Cecil-Hiwassee (Table V-G-2). Of these four, Mecklenburg-Iredell and Cullen-Cecil-Hiwassee are the predominant soils

within the City. Mecklenburg-Iredell is primarily in the mid-to-western area of the City, while Cullen-Cecil-Hiwassee extends outward from the Mecklenburg-Iredell soils to the north, east and west. The far eastern area of the City has Enon-Mecklenburg-Poindexter soils, while a narrow area on the western border of the City has Poindexter-Enon soils. The following are descriptions of the four major soil associations, along with their characteristics and development limitations. A more detailed description of soils within the region is provided in the “Soil Survey of Cabarrus County, North Carolina,” published by the US Department of Agriculture’s Soil Conservation Service.

In general, much of the land within Concord is in the Mecklenburg-Iredell association, with large areas to the west and east in the Cullen-Cecil-Hiwassee association. Soils in both associations are excellent for cropland or woodland and are suited for urban development. The soils within the City generally drain well and have a “clayey” (includes sandy clay, silty clay and clay) subsoil. None of the soil types within the City are optimal for septic tank use, though they can be used. Slopes range widely from level to very steep, with much of the land characterized as nearly level to strongly sloping. Excessive slope can be a limitation to development with both of the major soil associations found in the City.

**Table V-G-2
Primary Soil Associations of Concord and Surrounding Area**

<i>Soil Association</i>	<i>Characteristics/Development Constraints</i>
Mecklenburg-Iredell	Characterized by nearly level to strongly sloping, well drained and moderately well drained soils that have a clayey (textural term that includes sandy clay, silty clay and clay) subsoil. Both Mecklenburg and Iredell soils percolate slowly and are rated “severe”, making septic tank use difficult.
Enon-Mecklenburg-Poindexter	Characterized by gently sloping to very steep, well drained soils that have a clayey or loamy subsoil. Both Enon and Mecklenburg soils percolate slowly and are rated “severe”, making septic tank use difficult. Poindexter soils are rated as moderately suited to septic tank drainage fields.
Poindexter-Enon	Characterized by gently sloping to very steep, well drained soils that have a loamy or clayey subsoil. Enon soils percolate slowly and are rated “severe”, making septic tank use difficult. Poindexter soils are rated as moderately suited to septic tank drainage fields.
Cullen-Cecil-Hiwassee	Characterized by gently sloping to strongly sloping, well drained soils that have a clayey subsoil. Cullen, Cecil and Hiwassee soils all percolate slowly and are rated “moderate” for use of septic systems.

(Source: United States Department of Agriculture, Soil Conservation Service. “Soil Survey of Cabarrus County, North Carolina.”)

6. Habitat and Wildlife

Development pressure in Concord and the surrounding region pose significant challenges for protecting sensitive habitats and wildlife. The Plant Conservation Program (PCP) of the NC Department of Agriculture inventories rare plant species and maintains the list of endangered, threatened, special concern, and candidate plant species. The PCP enforces regulations concerning state-listed plant species and monitors and manages their populations. The PCP works closely with the Natural Heritage Program (NHP) of the NC Department of Environment and Natural Resources to identify and list rare plants. The State's Natural Heritage Program is charged with locating important natural areas and species, and rare and endangered species. Information on their locations and status is recorded in the Natural Heritage Inventory that houses a base of nearly 500 species. The PCP listing contains approximately 125 species, with 24 currently listed as endangered on the federal lists.

In Cabarrus County, the Natural Heritage Program has identified four animals, sixteen species of vascular plants and seven communities as being endangered, threatened or of special concern (Table V-G-3).

**Table V-G-3
Rare Communities and Species of Cabarrus County**

<i>Species/Common Name</i>	<i>NC Status</i>	<i>Federal Status</i>
<i>Etheostoma collis</i> Carolina Darter	Special Concern – Rare or uncommon in NC	N/A
<i>Lasmigona decorata</i> Carolina Heelsplitter	Endangered – Critically imperiled in NC	Endangered – Critically imperiled globally
<i>Villosa delumbis</i> Eastern Creekshell	Significantly Rare – Rare or uncommon in NC	N/A
<i>Villosa vaughaniana</i> Carolina Creekshell	Special Concern – Imperiled in NC	Fed. Species of Concern Imperiled Globally
<i>Baptisia alba</i> Thick-pod White Wild Indigo	Significantly Rare– Imperiled in NC	N/A
<i>Baptisia minor</i> Prarie Blue Wild Indigo	Threatened – Imperiled in NC	N/A
<i>Cirsium carolinianum</i> Carolina Thistle	Candidate – Critically imperiled in NC	N/A
<i>Desmodium sessilifolium</i> Sessile Tick-trefoil	Candidate – Of historical occurrence in NC	N/A
<i>Gnaphalium helleri</i> Hellers Rabbit Tobacco	Significantly Rare – Imperiled in NC	N/A
<i>Helianthus schweinitzii</i> Schweinitz's Sunflower	Endangered – Imperiled in NC	Endangered – Imperiled globally
<i>Hexalectris spicata</i> Crested Coralroot	Significantly Rare – Imperiled in NC	N/A – Imperiled globally
<i>Lilium canadense ssp. Canadense</i> Yellow Canada Lily	Candidate – Critically imperiled in NC	N/A
<i>Lilium canadense ssp. Editorium</i> Red Canada Lily	Candidate – Critically imperiled in NC	N/A
<i>Lotus helleri</i>	Candidate – Rare or uncommon in NC	Federal Species of Concern

Carolina Birdfoot-Trefoil		
<i>Porteranthus stipulatus</i> Indian Physic	Significantly Rare – Imperiled in NC	N/A
<i>Portulaca smallii</i> Small’s Portulaca	Threatened – Imperiled in NC	N/A
<i>Silphium perfoliatum</i> Northern Cup-plant	Significantly Rare – Critically imperiled in NC	N/A
<i>Silphium terebinthinaceum</i> Prarie Dock	Candidate – Imperiled in NC	N/A
<i>Smilax biltmoreana</i> Biltmore Carrion-flower	Candidate – Rare or uncommon in NC	N/A
<i>Solidago rigida ssp. glabrata</i> Southeastern Bold Goldenrod	Significantly Rare – Imperiled in NC	N/A
Basic Mesic Forest (Piedmont Subtype)	Imperiled in NC	N/A
Basic Oak-Hickory Forest	Rare or uncommon in NC	N/A
Dry Oak-Hickory Forest	Apparently secure in NC	N/A
Granitic Flatrock	Imperiled in NC	N/A
Upland Depression Swamp Forest	Imperiled in NC	N/A
Xeric Hardpan Forest	Rare or uncommon in NC	N/A
Wading Bird Rookery	--	N/A

(Source: *Natural Heritage Program, NCDENR, 1999.*)

Another local effort to identify, increase awareness, and protect the natural resources of Cabarrus County has yielded a comprehensive inventory of natural communities that are somewhat unique to the area (Table V-G-4). The *Natural Heritage Survey* of Cabarrus County was conducted to identify and preserve rare species of animals, plants, and natural communities in the County. Seven of these habitats are also included in the State’s Natural Heritage Program listing of areas of special concern.

Table V-G-4
Natural Communities of Cabarrus County

<i>Natural Community</i>	<i>Characteristics</i>
Basic Oak-Hickory Forest	Covers moisture range equivalent to both Dry and Dry-Mesic Oak-Hickory Forest types. Local examples include: Back Creek Gabbro Hill; Blackwelder Property; Butcher Branch Hill; Jesse Slagle Knoll; Reedy Creek Knoll; and Beaver Pond (in part).
Dry Oak-Hickory Forest	Once a predominant Piedmont forest community type. Now in agriculture, urban development or occupied by successional pine stands. Local examples include: Barnhart/Richie Property (in part); Barringer/ Honeycutt Property (in part); Lentz Harness Shop Road Upland Depression (in part); Reed Gold Mine (in part); Reedy Creek Knoll; and Beaver Pond (in part).
Dry-Mesic Oak-Hickory Forest	Once a predominant Piedmont forest community types. Now in agriculture, urban development or occupied by successional pine stands. Relatively common but examples of significant size and good quality are rare. Most protected areas are in dissected lands near rivers or creeks occurring on mid slopes, low ridges and upland flats on acidic soils. Local examples include: Barnhart/Richie Property (in part); Barringer/ Honeycutt Property (in part); Bellefont Church Oak-Hickory Forest (in part); Butcher Branch Hill; Frank Liske Park (in part); Hartsville Road (in part); Miami Church Hill; New Testament Baptist Church Knoll and Seep(in part); and Stephens Church (in part).
Granitic Flatrock	Outcrops occur when surfaces exposed at about same elevation as surrounding land. May be composed of granite, syenite or related rock. Most of area is dry, but depressions in rock may hold water in winter. Seepage zones often occur at the forest edge or in cracks in

	the rock, providing water over the surface of the rock.
Low Elevation Seep	Seepages and springs at the bases of slopes or edges of floodplains form between the adjacent floodplain and the upland communities. Typically slope into Bottomland forests or into slope forests such as Mesic Mixed Hardwood. Communities tend to be small, often shaded by the canopy of adjacent communities. Soil is usually muddy, and permanently saturated. Local examples include: Bellefont Church Oak Hickory Forest (in part) and New Testament Baptist Church Knoll and Seep (in part).
Mesic Mixed Hardwood Forest	Common with occurrence on steep sites that has allowed many to escape with less disturbance. Increased development pressures now pose threat. Some examples with old forest can still be found on lower slopes, steep north-facing slopes, ravines, and well drained small stream bottoms, on acidic soils. Local examples include: Barringer/Honeycutt Property (in part); Clarke Creek Heron Rookery (in part); Dutch Buffalo Creek Dam (in part); Everett Voncannon Property (in part); Hartsville Road (in part); Old Bell Mission Church (in part); Rocky River, Hwys 601 and 200 (in part).

Table V-G-5
Natural Communities of Cabarrus County, *Continued*

Piedmont Alluvial Forest	Distinguished from larger floodplain communities because of differences in ecosystems. Relief and size of the landforms become smaller. Can be regarded as fine-scale mosaics of Levee, Swamp and Bottomland communities. Levees, sloughs, and ridges are absent or poorly developed, due to frequency and recentness of destructive flooding. Sites vary due to different alluvial material and its effect on soil fertility, but almost all alluvial sites are more fertile than surrounding uplands. Soils may be especially rich if surrounding uplands are on mineral rock substrate. Soils are seasonally or intermittently flooded.
Piedmont Bottomland Forest	Occur on floodplain ridges and terraces other than active levees near the river channel. Communities are flooded occasionally but seldom disturbed by flowing water. Fertility and infrequent flooding of these sites makes them excellent farmlands. Local examples include: Barringer/Honeycutt Property (in part); Frank Liske Park (in part); Gold Hill Road Bottomland Hardwood Forest (in part); and Rocky River Corridor (in part).
Piedmont Levee Forest	Occur on natural levees next to rivers and dominated by the forces of the river. Vegetation may be directly disturbed by flooding and may consist of mature climax forest or may be in various stages of primary or secondary succession. Periodic input of nutrients in flood-deposited sediment makes sites very fertile and growth rapid. Soil is medium or coarse grained alluvial type. Local examples include: Everett Voncannon Property; Gold Hill Bottomland Hardwood Forest (in part); and Rocky River Corridor (in part).
Piedmont Monadnock Forest	Monadnocks (hills projecting above the surrounding topography) and high ridges occur because of highly resistant rock bases. Generally very low in plant diversity, due to a combination of exposure, dryness, and rocky, acidic soil that is nutrient poor. Hydrology is dry to extremely dry. Local example is the New Testament Baptist Church Knoll and Seep (in part).
Piedmont Semi-permanent Impoundment	Results from beaver ponding and similar small, old, undisturbed, man-made impoundments in floodplains and low valleys. Separated from surrounding floodplain communities by the occurrence of permanent or semi-permanent standing water. Man-made ponds considered part of this category if in small to large floodplains, of the same size scale as natural beaver ponds, established a long time, and not significantly modified other than by flooding. Local examples include: Clarke Creek Heron Rookery (in part); Coddle Creek Reservoir (in part); and Reedy Creek Knoll and Beaver Pond (in part).

Upland Depression Swamp Forest	Poorly drained upland flats or depressions. Occur usually on broad upland flats but occasionally on high ridge tops. Have a closed canopy and a short hydroperiod (standing water from October to May), tending to pond rain and runoff water rather than fill by seepage. Relatively stable, maintained by their hydrology. Susceptible to disturbances caused by unusually prolonged flooding, by drought or by development that affects ponding potential. Local examples include: Barnhart/Richie Property (in part); Bellefont Church Oak Hickory Forest (in part); and Lentz Harness Shop Road Upland Depression (in part).
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(Source: Classification of the Natural Communities of North Carolina, Third Approximation (Schafale and Weakley, 1990 and Natural Heritage Survey of Cabarrus County, 1999).

As Concord and Cabarrus County absorb an increasing influx of residents and workers, unprecedented pressure is placed on landowners to develop properties that provide special habitats for wildlife and plant species. In addition, advances in construction technology and the extension of water and sewer infrastructure have significantly lessened development constraints on most lands. As development pressure intensifies, alternate approaches are needed to preserve sensitive habitats, while providing economic incentives to landowners.

Of particular note are the private, non-profit organizations known as land trusts that have emerged throughout North Carolina and the nation over the last decade in response to growing development pressures. These organizations have become very active in the protection of natural and cultural resources through the permanent protection of properties from development. This protection is commonly achieved by obtaining identified lands through donation or purchase, or by receiving conservation easements which restrict future development of the property. Conservation easements are a widely-recognized protection tool that allow the land to remain in the hands of the original landowner, who in turn becomes eligible for special tax incentives. The land trust typically assumes responsibility for management of the resource. Conservation easements are individual agreements between the land trust and the private landowner and have emerged as an effective tool in preserving unique and sensitive areas. Land trusts are also active in identifying key conservation lands for future purchase, as well as holding the land under option while public agencies can identify and secure funding sources to support the acquisition.

The Land Trust of Central Carolina operates in a 10-county region that covers Anson, Cabarrus, Davidson, Davie, Iredell, Montgomery, Randolph, Richmond, Rowan and Stanly Counties. The Trust works with area property owners to preserve key lands and habitats from development, maintain scenic vistas, and protect the unique natural and cultural resources of the region. The Trust has completed two projects in Cabarrus County to date: 1) a 2000 conservation easement on the John Bunyan Green Farm historic home and grounds totaling more than 317 acres and including Rocky River frontage; and 2) a 1999 fee title ownership of the Clarke Creek Rookery waterfowl habitat, with more than 34 acres of urban open space acquired.

7. Noise Pollution

Noise pollution is produced by a variety of land uses and generates sound that occurs at high enough levels to carry onto adjacent properties. Excessive noise levels can contribute to decreased property values, degradation of wildlife habitat, and reduced quality of life for residents in affected areas. Among the more common causes of environmental noise are airports, construction activity, highways, industry, and recreational activities such as auto racing. Land uses that are particularly impacted by noise levels include schools, residential developments, hospitals, churches, libraries, nursing homes and other health care facilities.

Concord Regional Airport located just minutes from Downtown Concord, serves a growing general aviation market for Cabarrus County and surround area. As the fourth busiest airport in North Carolina, the airport not only serves the County, but provides a regional alternative to Charlotte/Douglas International Airport. Although the City's UDO includes an *Airport Overlay District*, there are currently no land use regulations based on the noise contours generated by air traffic. The Airport maintains a computer-generated noise contour map that indicates areas susceptible to heightened noise levels based on the frequency and time of flights, flight patterns, types of aircraft, runway usage, and local climatic and geographic conditions. The noise contour map depicts community impact areas, or noise contours, that are subject to aircraft-generated noise of 65 Ldn or greater. The Ldn, or Day-Night Average Sound Level, is measured over a 24-hour minimum time span. Noise levels are used to delineate a general boundary line surrounding the airport that encompasses a geographic area that is exposed to a particular Ldn level. This generates a set of contour lines at 65 Ldn, 70 Ldn, and 75 Ldn, in which the contours closer to the airport (75 Ldn) indicate areas that experience higher noise levels than contours farther out (65 Ldn). Lands located within the 65 Ldn noise contour are subjected to higher levels of aircraft flight noise due to take-offs, landings or other operations. This noise level renders most areas incompatible for residential, service commercial, or cultural and entertainment uses. Land within the 75 Ldn – closest to airport operations – becomes incompatible for even some manufacturing uses.

The protection of the airport from encroachment of incompatible land uses that are noise sensitive – such as residential development – should be a priority consideration in the land use planning process. Noise attenuation measures should also be considered in local regulations and building codes for new construction within the airport noise contours. While airports can pursue noise abatement procedures such as changes in flight patterns, runway usage, and nighttime operations, approaches to alleviate noise impacts on the community, local governments can consider impact on airport environs in siting capital facilities and expanding infrastructure. These measures can contribute to the long-term viability and operation of the airport as a community asset, while protecting residents from the long-term health concerns related to prolonged exposure to elevated noise levels.

The FAA Southern Region has prepared a guide on *Land Use Compatibility and Airports* to assist airport managers and local governments in promoting land use compatibility in airport environs. The guide identifies planning and regulatory tools that protect both the community's economic investment in air operations and the health and safety of area residents. The FAA has

also issued a detailed list of compatible land uses within noise contours contained in Federal Air Regulation 150.

Another key community facility that generates a significant noise impact is the Lowe's Motor Speedway. The facility has been in operation since the late 1950's. In the more than four decades since it was established, extensive new residential development has occurred in surrounding areas near the track, which are significantly impacted by noise levels during speedway events. Many planning measures that apply to airport environs are also appropriate to land use planning in areas surrounding the racing facility. The noise levels generated by the track and the need to accommodate compatible land uses should be a consideration in land use planning.

8. Air Quality

Air quality affects public health, the weather, the quality of life, and the economic potential of a community. Air quality can be influenced by short-term, temporary events such as wildfires, or by more serious, long-term conditions such as ozone and haze. The *Clean Air Act* establishes federal standards for six primary air pollutants – ozone, lead, dust, carbon monoxide, nitrogen dioxide and sulfur dioxide. Although overall air quality in North Carolina has improved over the last two decades, the level of ozone continues to be a concern. Although ozone plays a key role in protecting the earth from solar radiation, problems can arise when it occurs in concentrated areas closer to ground level creating health risks for residents, damaging vegetation, and escalating deterioration of outdoor structures.

The State of North Carolina developed a comprehensive *Clean Air Plan* in 1998 to further protect public health, the environment, and jobs. The plan is primarily aimed at reducing ozone air pollution with a focus on achieving significant reductions in utility emissions and implementing measures to reduce exhaust emissions from motor vehicles.

The Air Quality Section of the NC Department of Environment and Natural Resources is tasked with establishing air quality standards and monitoring air quality. The Division performs planning and modeling to determine appropriate controls, prepares rules and regulations, issues industrial permits, and maintains a database of information on point source facilities which emit particulates, sulfur dioxide, nitrous oxides, volatile organic compounds, or carbon monoxide. The Division of Air Quality, in partnership with local air quality offices, also conducts the *Air Awareness/Ozone Action* program in six NC metropolitan areas including Charlotte. The program aims to increase public awareness about air quality problems through ozone forecasts and other activities, while motivating individuals and businesses to take actions that help reduce levels of ozone and other air pollutants. In addition, the Pollution Prevention Program administered by the NC Office of Waste Reduction provides industry with technical assistance on reducing air emissions and assists them in complying with the State waste reduction planning requirements.

The Charlotte region posted an *Air Quality Index* ranking of 3.7 for 2001. Among the five major air pollutants monitored by the EPA, the Charlotte Metropolitan Area surpassed minimum allowed levels of ozone. Like most major urban areas in the nation, ozone poses the most serious health risk to Charlotte area residents and ranks as the major air pollutant. The region's levels of carbon monoxide, lead, nitrogen dioxide, particulate matter, and sulfur dioxide registered below the EPA serious health risk threshold.

As part of the rapidly-growing Charlotte metro region, Concord is affected by air quality conditions generated by the heavy traffic and development throughout the region. Air quality monitoring data from the NCDENR Division of Air Quality reveal the expanding impact of development in the Charlotte region. As shown in Table V-G-6, three of the five counties that border Cabarrus consistently post 8-hour ozone violations. Mecklenburg County to the southwest and Rowan County to the north have consistently posted elevated ozone levels over the past six years, while Union County to the south has also exceeded ozone standards. There have been no monitors actually in Cabarrus County over the past several years so variations do not show up in Table V-G-6. However, a monitor at the Cabarrus-Mecklenburg county line records the highest ozone concentration in the entire region at 1.02 ppm suggesting that, indeed, air quality is severely impacted in Cabarrus County.

**Table V-G-6
Incidence of 8-Hour Ozone Violations in Cabarrus and
Adjacent Counties, 1995-2001**

<i>County</i>	<i>1995-97</i>	<i>1996-98</i>	<i>1997-99</i>	<i>1998-2000</i>	<i>1999-2001</i>
Cabarrus	X				
Iredell					
Mecklenburg	X	X	X	X	X
Rowan	X	X	X	X	X
Stanly					
Union	X		X	X	X

(Source: Division of Air Quality, NCDENR)
X- 8-Hr Ozone Violation

Concord is located within a major metropolitan area and includes one of the busiest interstates in the southeast, I-85, within its borders. Population and traffic are the two key contributors to air quality problems. Therefore, land use decisions weigh heavily on long-term air quality conditions. Compact development should be encouraged and the impact on transportation and the number and length of vehicle trips generated should be considered with new development. Accommodations for alternative forms of transit should also be made to provide accessible and safe pedestrian and biking routes.