

## Chapter VII . NATURAL RESOURCES

Clemson is located along the banks of Lake Hartwell near the juncture of Oconee, Pickens and Anderson Counties in the upper part of the Piedmont Plateau. These counties cover the northwestern tip of South Carolina where the terrain ranges from the Blue Ridge Mountains in the northern parts of Oconee and Pickens Counties to a hilly Piedmont Plateau in the southern and eastern sections of Oconee and Anderson Counties.

In the immediate Clemson area, elevation averages 800 feet above sea level. Lake Hartwell now fills the Seneca River Valley with a full pool level of 660 feet above sea level. Elevation quickly rises to near 1000 feet a few miles to the north of Clemson. Mountaintop elevations further to the north along the North Carolina state line reach more than 3000 feet above sea level.

The geologically old soils in the Piedmont region are clay and sandy loams with the Cecil-Hiwassee series soil types predominating in the Clemson area. Severe erosion occurred as water ran off the rolling landscape during the years when cotton was king removed a lot of the region's topsoil. Reforestation and land conservation practices that began in the 1930s have minimized severe erosion events and formed new topsoil. Land use in the Lake Hartwell watershed includes about 56% forested land, 18% agricultural land, 13% water, 10% urban, 1% forested wetland and less than 1% barren land.

Clemson has a temperate climate with four distinct seasons largely due to the Blue Ridge Mountains to the west and north of Clemson. Moist upslope winds from the south and east increase precipitation as elevation increases. Winds from the west flow down slope and create a rain shadow across the area as descending air warms and dries. The damming effect of the mountain chain funnels cold air into the area on Northeasterly winds.

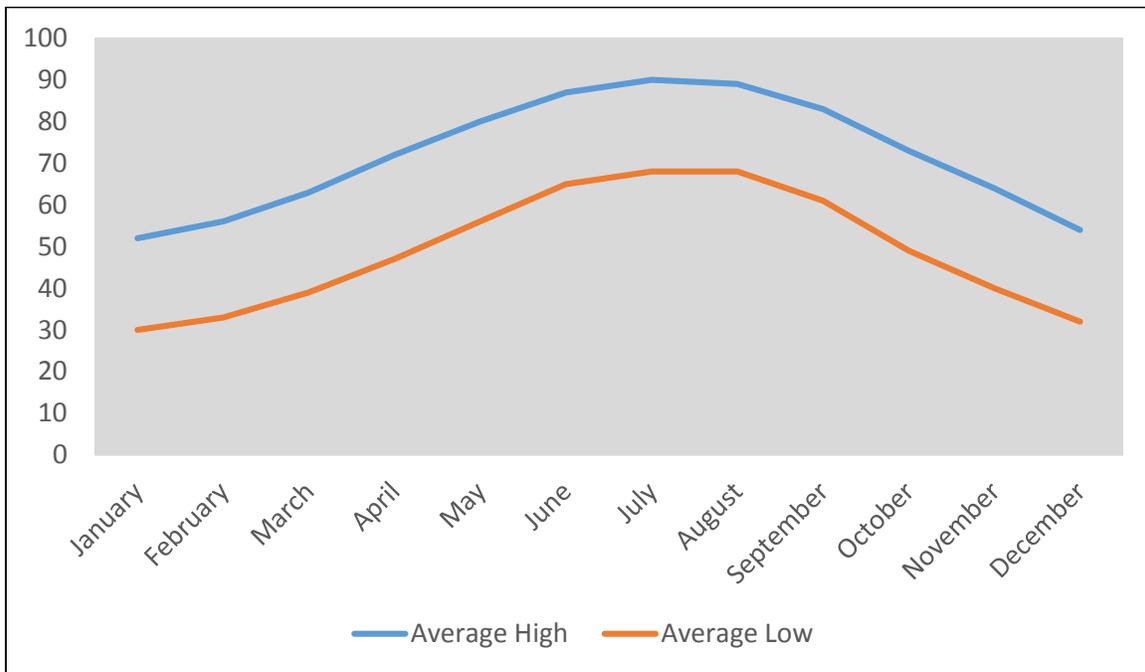
The quality of City of Clemson's natural resources is a large part of the quality of life experienced in the City. A healthy natural environment supports a healthier social and economic development of the City. In addition, natural resources impact economic factors that range from tourist activity to homeowners insurance rates. The Natural Resources element provides a framework for environmental planning in the City and addresses the need for the identification, conservation, and management of sensitive resources.

A. CLIMATE

1. AIR TEMPERATURE

The City of Clemson has a temperate climate with air temperatures ranging from an average of 41°F in January to 79°F during the month of July (Figure VII-1). The annual mean temperature is 59.5°F.

**FIGURE VII-1. AVERAGE AIR TEMPERATURES IN CLEMSON, 2013**



Source: The Weather Channel, 2013

2. PRECIPITATION

Rainfall in the City of Clemson is moderate, with most precipitation occurring in the winter months (average 16.24 inches) and the least occurring in spring months (11.97 inches). The average annual precipitation is 53.6 inches and consists mostly of rainfall with occasional snow and sleet.

Over the past decade, the Upstate of South Carolina has experienced several periods of drought, most notably in 2007-2008 and again in 2011-2012. These episodes have had significant impacts on Lake Hartwell and other local water bodies. In December 2012, Lake Hartwell was approximately 22 feet below full pool. Since that time, lake levels have fluctuated significantly due to periods of heavy rain and periodic US Corps of Engineers lake water releases

via the Lake's dams. The Hartwell Basin average rainfall has varied from 75.41 inches in 2013 to 31.65 in 2007. Both years represent near record high and low annual totals.

**FIGURE VII-2. FLASH FLOODING FROM INTENSE RAIN EVENT**

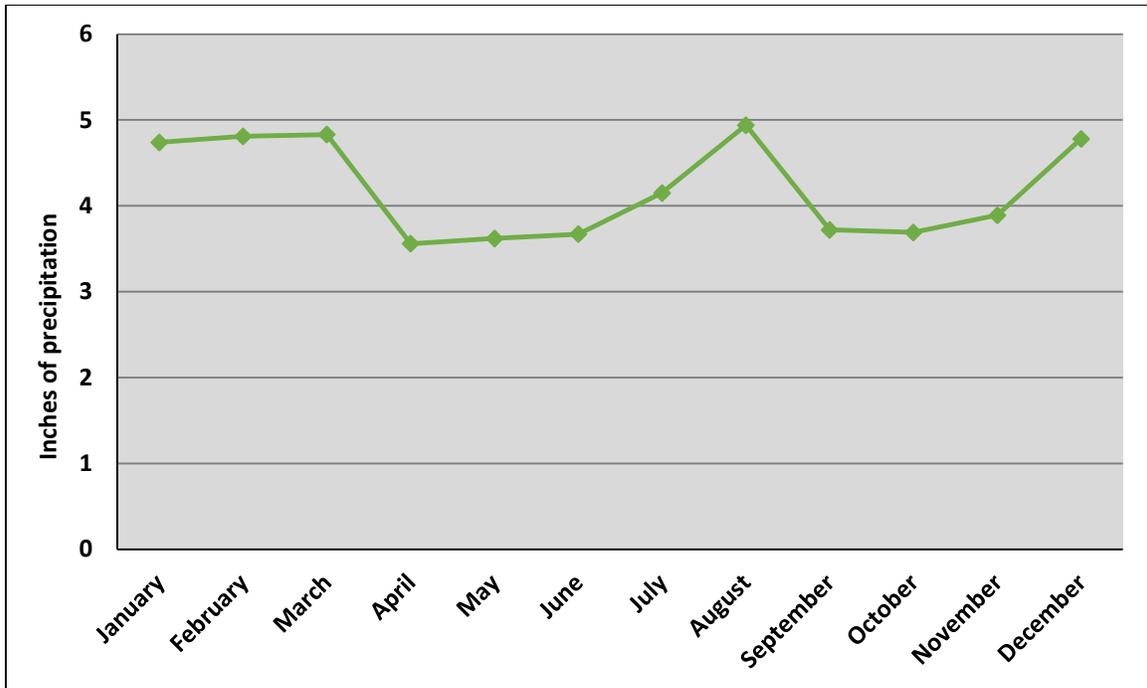


*Source:* Planning & Codes Administration Department, 2014

Since 2013, the City has experienced several major rainfall events, most notably in July 2013 and August 2014. The July 13, 2013 event produced up to 8.96 inches of rain in the Clemson area. On August 10, 2014, the City experienced a 4.8 inch rainfall. These events were categorized as 'rain bombs' due to their flooding and property damage.

The combination of drought and flooding poses unique challenges. Long periods of dry weather cause soils to lose a significant amount of moisture. Then, when heavy rains occur, the soils are unable to quickly absorb runoff and flash flooding results. Drought followed by heavy rain followed by drought also causes soil to contract and expand creating potential for structural damage to foundations. Figure VII-3 illustrates the significant changes in precipitation from month to month in 2013.

FIGURE VII-3. AVERAGE MONTHLY PRECIPITATION IN CLEMSON, 2013



Source: The Weather Channel, 2013

**3. AIR QUALITY**

SCDHEC’s Division of Air Quality Analysis (DAWA) measures the quality of air in South Carolina. This work provides the base data to assure statewide compliance with the standards set in the Clean Air Act (CAA) and the SC Pollution Control Act (SCPCA). DAWA gathers ambient data from areas throughout South Carolina.

FIGURE VII-4. AIR QUALITY IMPACTS FROM TRAFFIC CONGESTION

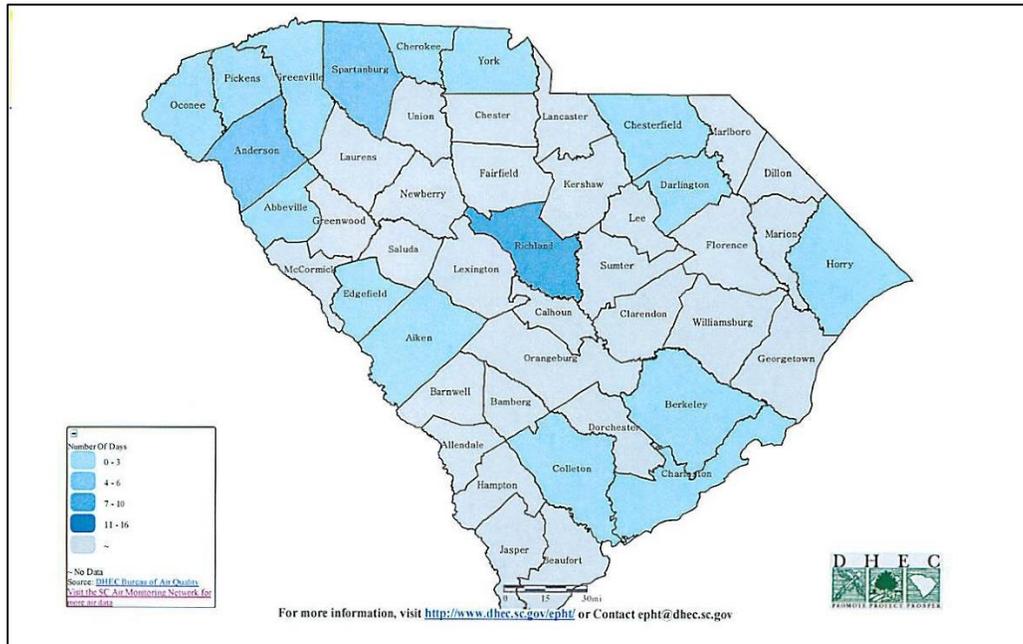


Source: Planning and Codes Administration, 2014

Three air quality monitoring sites are within close proximity of the City of Clemson.

- The Clemson Continuous Monitoring Site (CMS) is located on the grounds of Clemson University. This monitor measures ozone concentrations upwind of the Greenville-Spartanburg urbanized area. The sample inlets are 27.4 meters from the nearest road. This site was part of the Greenville MSA Ozone study, initiated in 2008 and designed to investigate ozone concentration variability across the Upstate and provide information to help refine the monitoring network to better meet monitoring objectives.
- The Wolf Creek site is located in central Pickens County and was established to gain an understanding of ambient ozone concentrations in central Pickens County. Data from the Wolf Creek site has been collected and compared to Clemson CMS site to determine the most appropriate location to represent ozone concentrations in this area of the CSA.
- The Long Creek monitoring site is located on Round Mountain in northwest Oconee County. The Long Creek site was also established as part of the Southern Oxidant Study. Due to the elevation, it provides a unique vantage point for monitoring the impacts of transported pollutants. Long Creek has continuous monitors for ozone, PM<sub>2.5</sub>, sulfur dioxide and precipitation. The sample inlets are 11.0 meters from the nearest road. Due to the importance of measuring region-wide sulfur dioxide, PM<sub>2.5</sub> and ozone concentrations, the unique location and collocated monitoring activity, DHEC has determined that monitoring at this site should be continued.

**MAP VII-1. ANNUAL NUMBER OF DAYS WITH MAXIMUM 8-HOUR AVERAGE OZONE CONCENTRATION WITH ARE OVER THE NATIONAL AIR QUALITY STANDARDS, 2011**



Source: SC Department of Health & Environmental Control, 2011

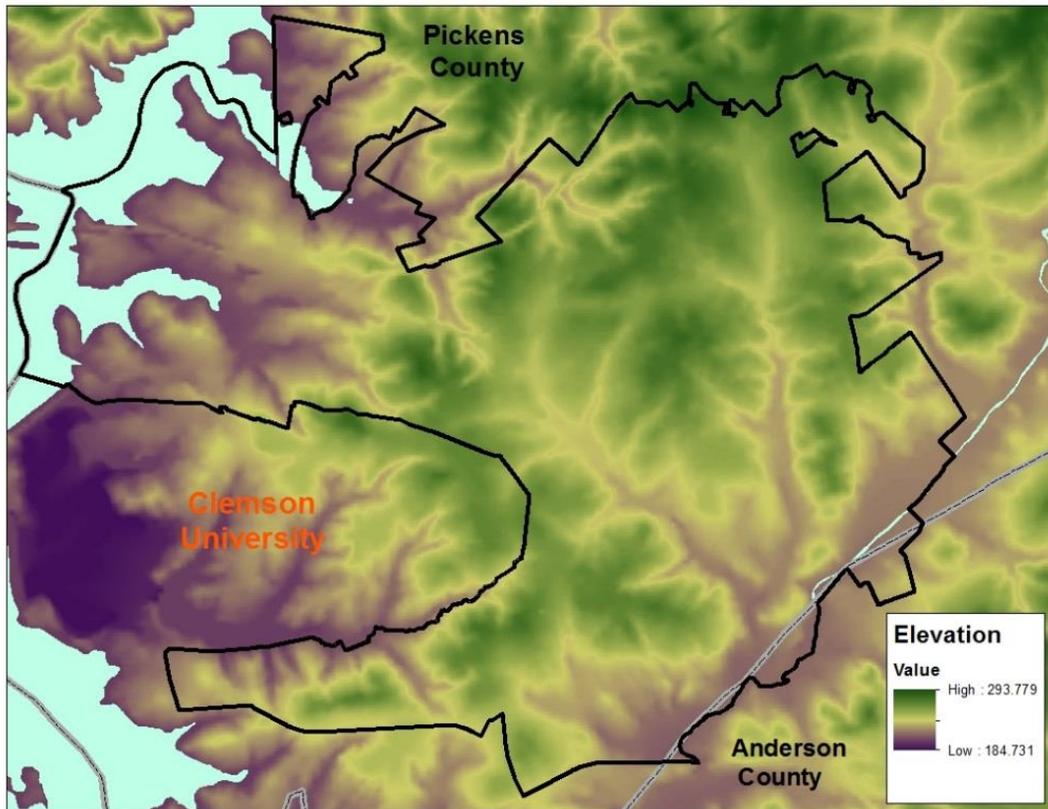
Links to the data collected can be found on the SCDHEC website ([www.scdhec.gov](http://www.scdhec.gov)). This data is continually updated to reflect conditions reported within the last few hours.

**B. TOPOGRAPHY**

**1. SLOPES**

The City of Clemson lies in the Piedmont Plateau Topographic Region. Elevations of the City range from 700 feet to approximately 900 feet. The rolling hills of the City are predominately between 10%-25% in slopes. Slopes under 15% are considered low load bearing and appropriate for development. Slope areas greater than 25% are usually considered to be constraints to development. Map VII-2 shows elevation changes within the City. The darkest areas shown in green are higher elevations and the darker purples are the lowest elevations. Slopes can be inferred by reviewing the color gradations.

MAP VII-2. ELEVATION CHANGE



Source: United States Geologic Survey, 1999

## 2. SOILS

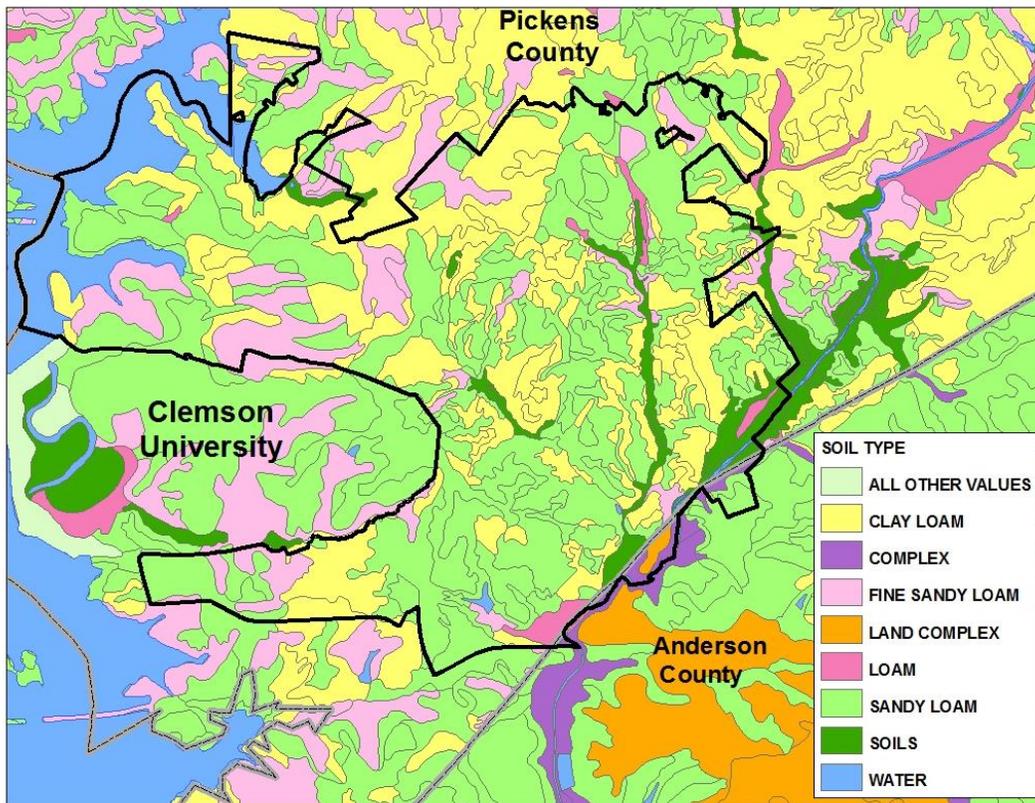
Though many different soil types exist throughout the City, the majority of soils - fall within one of four categories: Cecil Sandy Loam, Cecil Clay Loam, Pacolet Clay Loam and Pacolet Fine Sandy Loam. The distinction between Cecil and Pacolet is very minimal, thus they are considered nearly identical.

**Sandy Loams and Fine Sandy Loams** are well drained and aerated and workable for most of the year. They are very light to handle and quick to warm up in the Spring. Unless they have very high organic matter content they are prone to drying out too quickly and additional watering is needed to support healthy plant growth. This extra watering also helps to wash out plant foods and lime from the soil, contributing to acidity (except for some coastal soils). They are often referred to as “hungry” soils and need feeding to promote optimal growing conditions. However, with careful management they can be among the most productive soil types.

**Clay Loams** are difficult to work and manage. They usually have good supplies of plant foods and lime. The main drawback to these soils is a high water holding capacity which may

contribute to construction delays during periods of heavy rain. It is important to catch the right weather conditions to avoid damage to the soil structure during construction. The use of heavy machinery should be avoided, particularly when the soil is wet.

MAP VII-3. SOIL TYPES

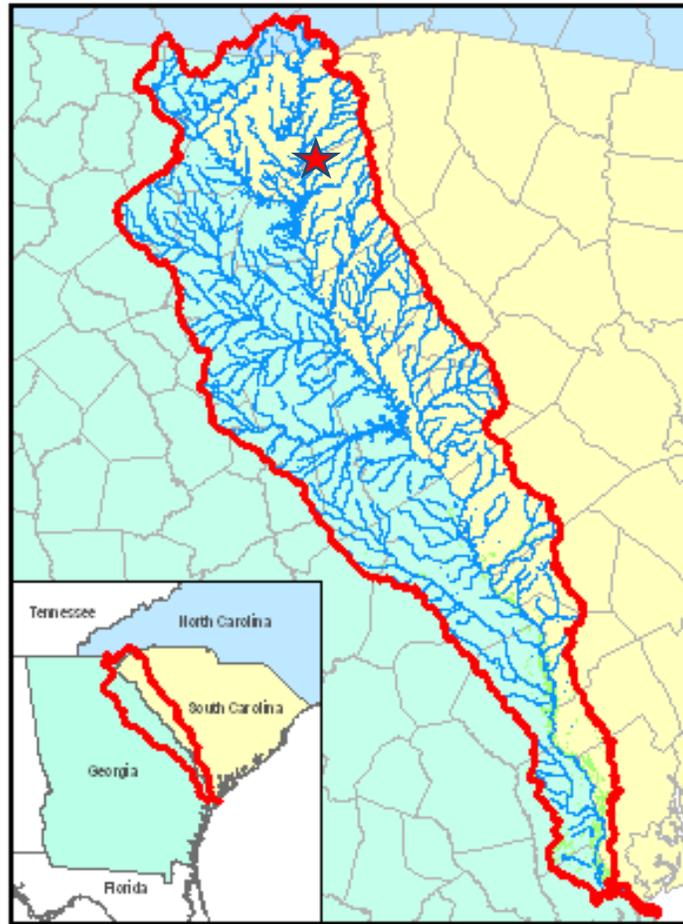


Source: United States Department of Agriculture, 2001

### C. HYDROGRAPHY

The City of Clemson is located in the northwest corner of the Savannah River Basin Watershed. A watershed is a natural boundary for the distribution of water resources. Any ground pollution within a watershed may seep into the ground, tainting the ground water for that watershed. The water quality at any given point in a watershed determines the quality of water for the rest of that water resource.

MAP VII-4. SAVANNAH RIVER BASIN



Source: Savannah River Basin Partnership, 2014

### 1. LAKE HARTWELL

Lake Hartwell is the main water feature in the City of Clemson. The Lake straddles the border between Georgia and South Carolina where the Seneca and Tugaloo Rivers join to form the Savannah River. Lake Hartwell was built by the U.S. Army Corps of Engineers between 1955 and 1963 as part of a flood control and hydropower project and remains in their control. The Lake is in both Georgia and South Carolina and covers approximately 56,000 acres and 962 miles of shoreline. One of the Southeast's largest and most popular public recreation lakes, Lake Hartwell is home to numerous natural sand beaches along the shoreline in addition to campgrounds, recreation areas and boat access areas.

FIGURE VII-5. VIEW OF LAKE HARTWELL FROM 12-MILE BEACH



Source: City of Clemson, Planning and Codes Administration Department, 2014

The City of Clemson has approximately 6.5 miles of shoreline along Lake Hartwell. Public access to the Lake is provided at two locations in the City. *Larry Abernathy Lakefront Park* opened in the summer of 2004 and provides trail areas, wooden observation and boardwalk areas with swing structures, a parking lot for 15 vehicles, two boat docks that accommodate up to eight non-commercial boats with no overnight stay, a canoe/kayak launch site, picnic tables in a designated picnic area, and benches throughout the entire park. Access into the area is provided by paved walks connecting to Jaycee Park, a parking lot on Keowee Trail Road, a sidewalk to Tiger Blvd beside Lakeside Apartments, and a paved walk from US Hwy 123 across from Lakeview Plaza.

The second access to Lake Hartwell in the City is at *Mountain View Park*, located at the end of Mountain View Lane. Mountain View Park is the only large-scale natural recreation area on Lake Hartwell and features nature trails, a fitness walk, access to the Lake, a boat ramp, and boat trailer parking. The Park preserves a small wooded peninsula that extends into Lake Hartwell.

As noted above, Lake Hartwell is a Corps of Engineers owned and maintained reservoir, subject to the rules set by that agency. Both the Corps and SC Department of Health and Environmental Control have issued fish consumption warnings for portions of the lake, including several close to the City. These warnings stem from polychlorinated biphenyl (PCB) contamination of the lake prior to this material being banned in 1976. The Corps maintains management plans for wildlife, fisheries, forestry, aquatic plant, and environmental

stewardship. Copies of each can be found on the US Army Corps of Engineers, Savannah District website (<http://www.sas.usace.army.mil/>).

As discussed in the section above regarding precipitation, Lake Hartwell has been impacted regularly by cyclical periods of drought and heavy rain. The average Lake elevation is 657.5 feet and full pool is 660 feet, but those levels have fluctuated widely in recent years. The lowest lake level for Lake Hartwell was reached on December 9, 2008 at 637.49 feet. The previous record low at Hartwell Lake was 642.4 ft. recorded on December 24, 1981. The highest lake elevation reached was 665.4 feet on April 8, 1964, with a recent high water level of 663.8 feet in July 2013. This was a 23.31 foot fluctuation in a five year period.

**FIGURE VII-6. DROUGHT IMPACTS LAKE HARTWELL, FEBRUARY 2008**



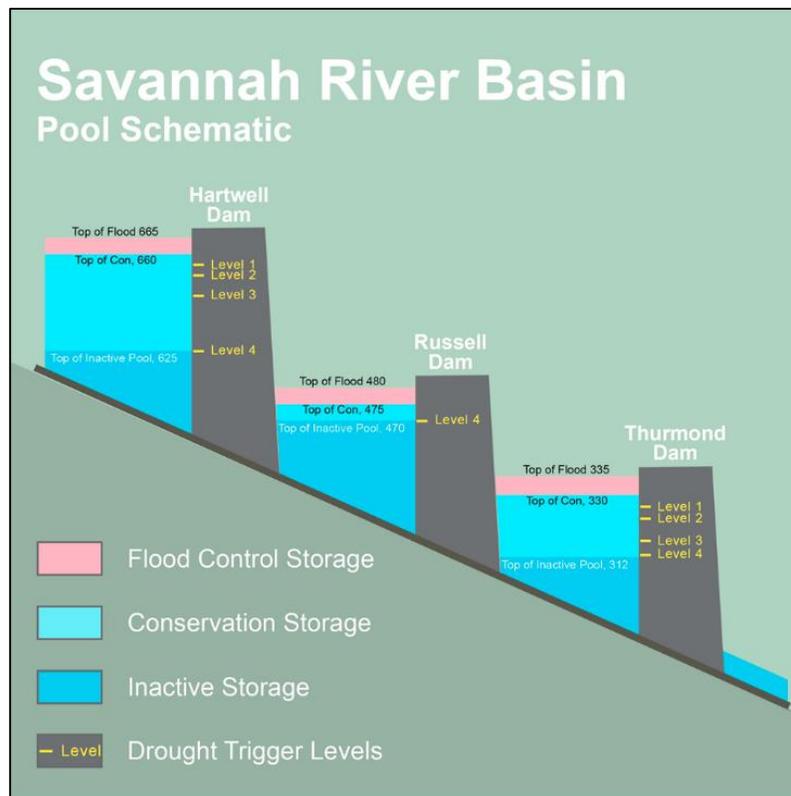
*Source:* South Carolina Department of Natural Resources, 2008

On July 30, 2012, the U.S. Army Corps of Engineers Savannah District released findings of an environmental assessment (EA) of drought impacts on the Savannah River Basin. Based on this report, the Corps determined that it needed to set lower wintertime outflows to allow for improved water storage for future droughts. Additionally, the EA added stream flow as an indicator for drought trigger levels. Previously, the Corps of Engineers only used reservoir levels as an indicator of drought levels. Stream flow will be considered using the U.S. Geological Survey gauge at the Broad River, located near Bell, Georgia. Because the Broad River is a large, unregulated tributary that flows into the Thurmond reservoir, it provides an accurate representation of natural inflow to the Savannah River Basin. Previous policy allowed for the wintertime outflows that dropped water levels in Lake Hartwell well below full pool.

As Lake Hartwell is a Corps of Engineers reservoir, the Lake is used for flood management during periods of heavy rain. In 2013, Lake levels exceeded full pool for significant periods of the year. Boat access ramps and other public ingress/egress points were under water during these occasions.

These changes have impacted the overall use of the Lake. The City activated a Drought Management Plan and imposed conservation measures to curtail water consumption. Recreational use of the Lake was likewise impacted as boating and other activities were forced into sections of the Lake with sufficient depth to allow safe navigation. Trees, building foundations, and other debris left when the original reservoir was filled were exposed, becoming hazards to the boating public. Drought conditions also impact electrical production. The average annual generation from the Hartwell Powerplant is approximately 470,000 megawatt hours. Megawatt hours produced in 2008 were 217,423 during a period when lake levels reached historic lows.

FIGURE VII-7. SAVANNAH RIVER BASIN, POOL SCHEMATIC



Source: US Army Corps of Engineers, Savannah District, 2014

Over the coming decades, demand for water from the Savannah River Basin is projected to increase drastically as both the Upstate of South Carolina and Northeast Georgia (including the

Atlanta metro area) seek additional sources to support their growing populations. Because Lake Hartwell is in both states water rights and the equitable distribution of this limited resource are likely to become a political battle. Both states have developed plans for long-term management of the Lake but any plan should be monitored as demand grows. These evolving demands must be weighed against the environmental impacts they will undoubtedly have on this ecosystem. Since the City of Clemson is the only municipality in the state located on Lake Hartwell, the City has a vested interest in the outcome of the issues involved.

While Lake Hartwell is a major focal point the City's visual and natural resources, there is very little public or commercial development on the shores of the lake within the City of Clemson. Development along Lake Hartwell is 95% residential within the City's corporate limits. Despite this limited commercial frontage, the City's economy has benefited from events that utilize the Lake. In Summer 2014 the FLW Fishing Tournament brought thousands of fishermen and their teams to the area. The annual Rowing Weekend Regatta draws rowing teams from across the country to practice on Lake Hartwell in the spring warmth.

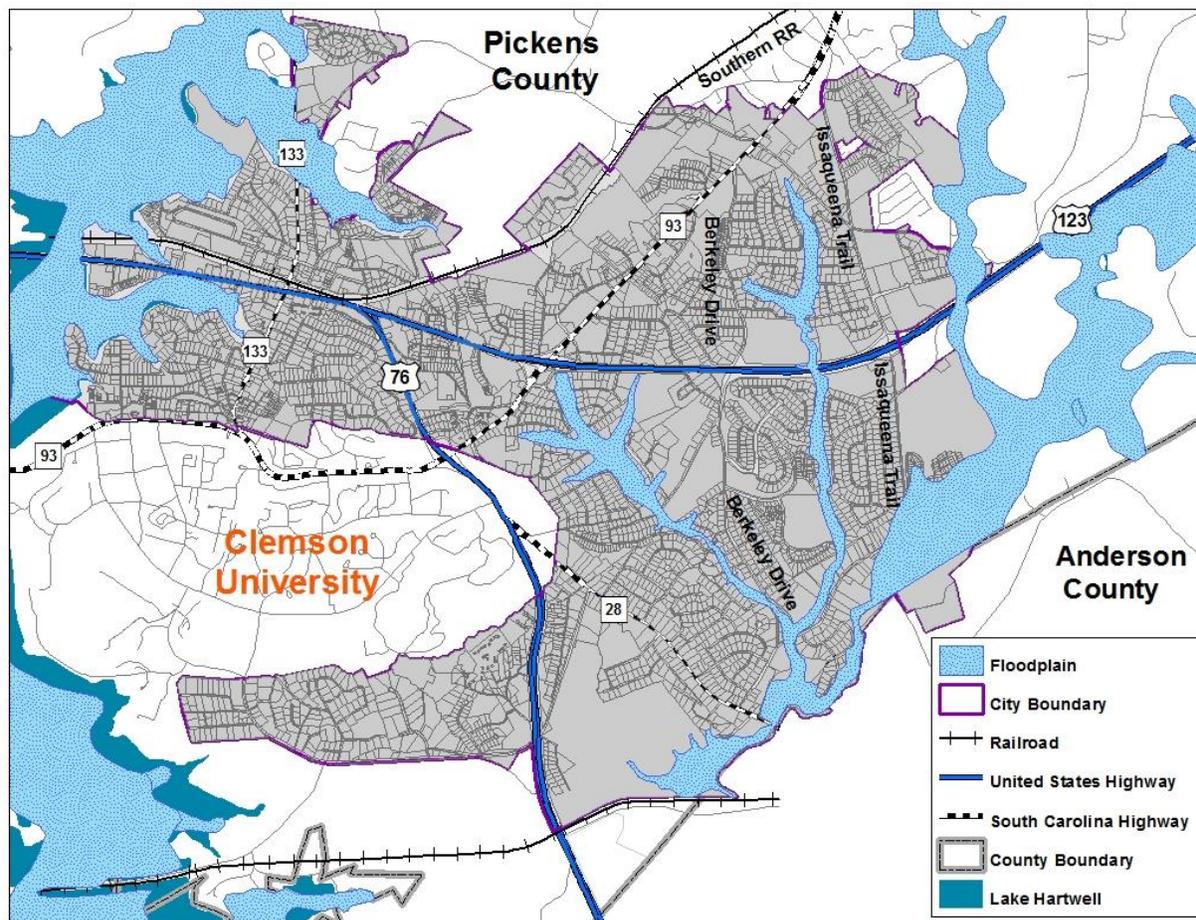
## **2. CREEKS, RIVERS, AND STREAMS**

Eighteen Mile Creek is located along the east section of the City of Clemson and drains into Lake Hartwell. This Creek is protected by a naturally occurring riparian buffer, as are most of the streams and creeks within the City. A riparian buffer is a vegetated area along either side of a waterbody that helps protect both water quality and the overall environment of the waterway. Many people live along Eighteen Mile Creek, even though it is in the 100-year floodplain. A number of tributaries drain into Eighteen Mile Creek within the City of Clemson.

## **3. FLOOD ZONES**

Based upon the Flood Insurance Rate Maps (FIRM) produced by the Federal Emergency Management Agency (FEMA), the City of Clemson has two flood zones within the 100-year flood plain. Within flood Zone 'A' no base flood elevation has been determined. This zone predominately includes Lake Hartwell and areas close to the Lake. There are three additional areas within the City in Zone 'A' that are at the terminus of some tributaries. A base flood elevation has been determined within Zone 'AE' and is indicated on the FIRM. There are five large areas within the City located within the Zone 'AE'. The City of Clemson has adopted a Flood Damage Prevention Ordinance that require structures be constructed with the first finished floor is elevated one foot above the base flood elevation. The vast majority of the City is located within Zone 'X'. Areas within Zone 'X' are outside of the 500-year flood plain. Updates of the FIRM are managed by FEMA as shown on Map VII-5. Floodplains in Clemson.

MAP VII-5. FLOODPLAINS IN CLEMSON



Source: City of Clemson, Planning and Codes Administration Department, 2014.

#### 4. WATER QUALITY

Two major pieces of legislation have been adopted that help to protect our water from contamination and pollution. The Federal Clean Water Act (CWA) and the South Carolina Pollution Control Act (PCA) work together to make polluting state water a criminal activity. These acts are administered by the South Carolina Department of Health and Environmental Control (SCDHEC) and make it illegal for any person to “throw, drain, run or allow to seep or otherwise discharge into the environment” any contaminants. When a polluted liquid, solid or gas is flowing directly out of a pipe, or other vessel of distribution, into the water, it is referred to as “point source” pollution, or pollution we can see. This is an illegal activity according to the CWA. Residents can get involved by reporting any “point source” pollution violations to the local environmental organization.

In 2013, the Clemson area experienced higher than normal annual rainfall. As a result, Lake levels exceeded full pool for significant periods of the year. The heavy run-off of rainwater into

Lake Hartwell and the inundation of areas previously above the water line, in some cases areas exposed by prior droughts, resulted in an increase in organic matter in the Lake including both algae and decaying plant material. This impacted the taste and smell of the water pulled from Hartwell by the Anderson Joint Regional Water Authority (AJRWA). The City is a member of this organization and the Authority provides the City with drinking water. Resolution of this problem has required system modifications, but has not yet been fully corrected as of October, 2014.

## D. RECREATIONAL AND OTHER OPEN SPACES

### 1. BEACHES

Although no established beaches along Lake Hartwell exist within the City limits, there are two beaches just outside of the City. West of the City of Clemson, the Foothills Area YMCA has both a beach and a marina. Along SC Hwy 133 and just outside of the City's boundary is the Twelve-Mile Recreation Area, which is operated by the U.S. Army Corps of Engineers. This recreation area has a beach, picnic area, and a launch ramp.

**FIGURE VII-8. VIEW FROM THE YMCA BEACH**

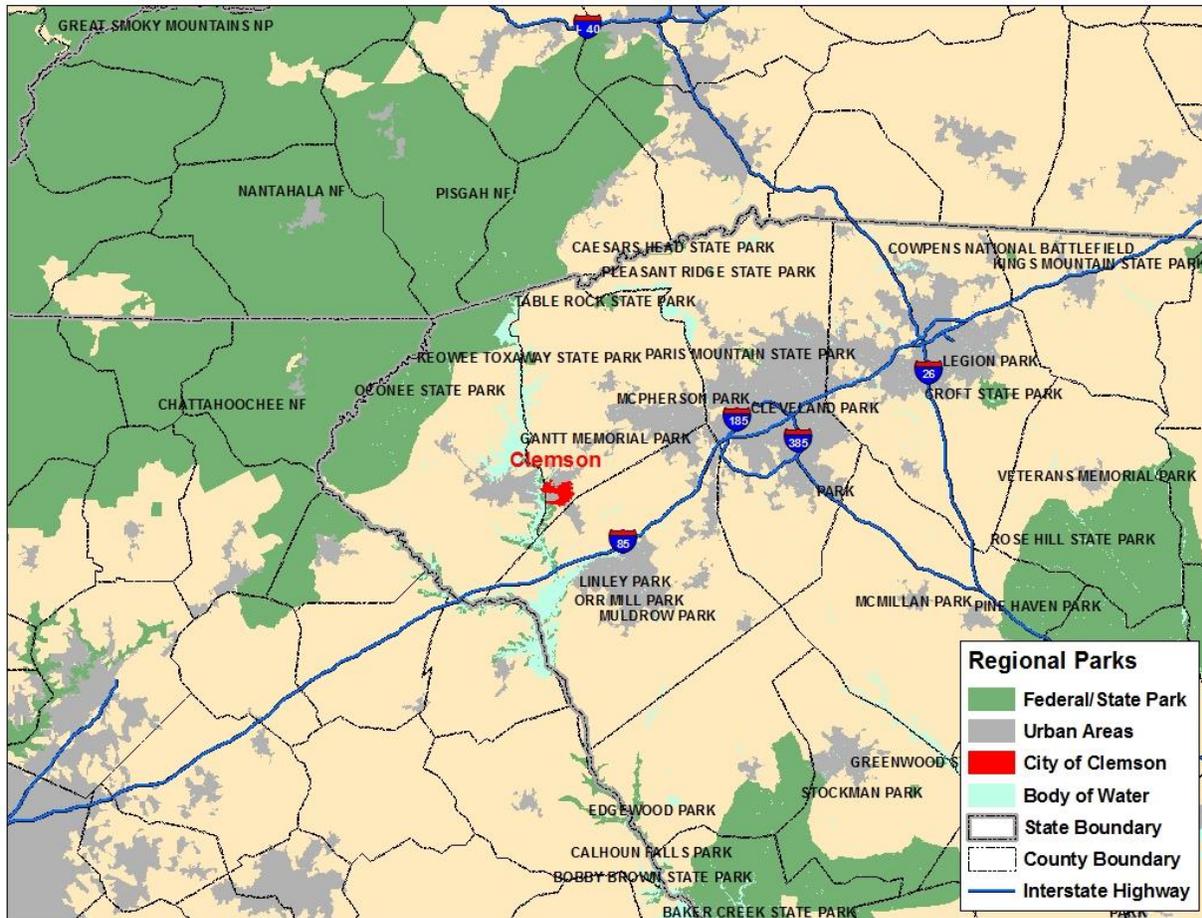


Source: City of Clemson, Planning and Codes Administration Department, 2014.

**2. US ARMY CORPS OF ENGINEERS PROPERTIES**

In addition to management of the Twelve-Mile Recreation Area, the U.S. Army Corps of Engineers controls all property along the Lake Hartwell shoreline. An easement ranging from five to 15 feet exists along the shore of the Lake and falls under the jurisdiction of the U.S. Army Corps.

**MAP VII-6. FEDERAL AND STATE PARKS IN THE REGION, 2014**



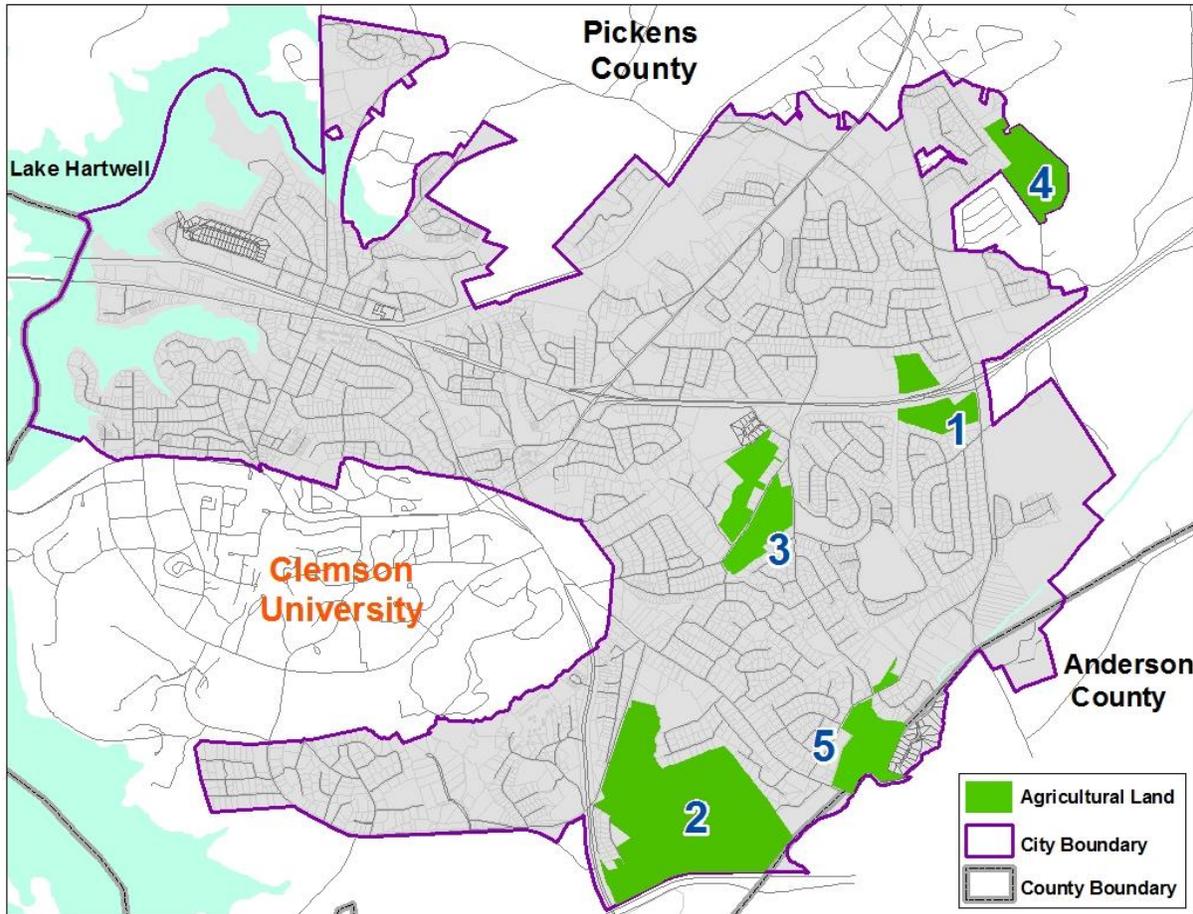
Source: Department of Natural Resources, 2014

**3. AGRICULTURAL LANDS**

Although no land within the City limits is zoned for agricultural use, several properties located mainly in the eastern section of the City are classified as non-conforming agricultural uses. These properties (see Map VII-7) are zoned for uses other than agricultural and have been grandfathered as agricultural lands. They are:

1. An existing horse farm is located in the southeast section of the City, just off Issaquena Trail adjacent to the off-ramp of Hwy 123. This parcel is split into two parcels and divided by US Highway 123. The total acreage is approximately 33.5 acres.
2. The Pacolet-Milliken Corporation (PMC) owns a large tract located in the southern section of the City, off of US Highway 76 and Old Stone Church Road that is currently planted in timber, subject to periodic harvesting. The City and the Town of Pendleton have entered into a master planning agreement with PMC. Beginning in early 2015, a public engagement process will be initiated to solicit public input into the development of a master plan for the approximate 240 acres of the project already in the City, as well as the approximate 200 acres comprising the remainder of the overall tract. This may result in the annexation of some portion of land into the City of Clemson. While parts of the portion of the land currently within the City will likely remain as open space, the rest is likely to be developed based on the plan produced by the pending effort.
3. Pasture lands that flank either side of Clarendon Drive are zoned low density residential. The property is approximately 58 acres and is owned by a trust.
4. A 41-acre tract on Vickery Drive that is zoned for low density residential is being used as pasture lands.
5. An historic 40-acre farm exists along Issaquena Trail and Pendleton Road. A prominent feature of this tract is its National Register of Historic Properties barn. Horses are kept on the property and a large portion of the tract is used for timber production, most of which is located in a flood plain. The property is split into several parcels and is in both Pickens and Anderson Counties.

MAP VII-7. LAND CURRENTLY IN AGRICULTURAL USE, 2014  
CITY OF CLEMSON



Source: City of Clemson, Planning and Codes Administration Department, 2014.

E. BIOLOGICAL RESOURCES

1. SENSITIVE HABITATS

Although no formal areas of natural habitat control exist within the City of Clemson, many unofficial habitats do exist. The wetland areas on the north side of the City, off SC Hwy 133 and Clemson Street, are home to many species. The rivers, creeks, and Lake Hartwell also provide the natural habitat for countless numbers of plants and animals.

A formal inventory of wildlife in the City limits has not been conducted. However, Clemson University has performed a campus-wide study that contains a list very similar to the plants and animals found within the City. A list of plants and animals found on University property can be found at [http://www.clemson.edu/cafls/cef/plants\\_and\\_animals.html](http://www.clemson.edu/cafls/cef/plants_and_animals.html).

## 2. URBAN FOREST

The City of Clemson has taken the following steps in recent years to ensure that Clemson's urban forest is protected.

1. A survey of trees along the US Hwy 123 corridor was performed to establish an inventory, determine the condition of the current trees, and set a foundation for a tree planting program.
2. Trees were planted along College Avenue and Hwy 123 as part of a multi-year streetscaping effort begun by the City in the 1990's. The most recent planting occurred in 2011.
3. The City Horticulturist sought and obtained "Tree City USA" status in 2004.
4. The City celebrates Arbor Day.
5. The City amended the Zoning Ordinance in 2014 to establish new standards for preservation of trees during development within commercial districts. These standards include tree surveys and evaluation to determine the suitability of preserving trees under specific situations.
6. The Zoning Ordinance was updated in 2014 to encourage the retention of open space and areas suitable for tree plantings.

FIGURE VII-9. KEITH STREET IN DOWNTOWN CLEMSON



Source: Planning and Codes Administration, 2014

### 3. LOCALLY GROWN/PRODUCED FOOD

The last decade has seen an increase in the awareness of the health and nutritional benefits of locally grown and/or produced food. Issues include access to fresh food, environmental impacts of where and how food is produced, sustainability, and the nutritional quality of the food. City zoning regulations allow private gardens for non-commercial horticulture and private greenhouses. The keeping of livestock is regulated and requires approval from the City's Board of Zoning Appeals as a special exception. The keeping of poultry is not currently allowed, nor is beekeeping. The City has received requests to allow both practices over the last decade, but has not amended its programs to permit either use. In the coming decade, this issue should be reviewed and considered.

Several local food initiatives have emerged in recent years. These include:

- The Clemson Farmer's Market was started in 2010 as a City of Clemson project, utilizing the parking lot in front of Cross Point Church. Since then, the Market has grown and is operated by a partnership among the City, the Clemson Area Chamber of Commerce, and Patrick Square. The Market operates on Friday from 3:30 to 6:30 p.m., May through October at the Village Green at Patrick Square. Items sold include locally grown produce, locally produced meats and other specialty foods, and homemade crafts and

art. First Friday markets include entertainment and educational programs offered by the Osher Lifelong Learning Center. Information on the Market can be found at <http://www.cityofclemson.org/our-community/clemson-farmers-market>.

FIGURE VII-10. CLEMSON FARMERS MARKET



Source: City of Clemson Planning and Codes Administration, 2014

- The Clemson Student Organic Farm (SOF) is devoted to intensive production of organically grown crops such as seasonal vegetables, herbs, and cut flowers. Since its inception the SOF mission has been to explore more profitable and environmentally-friendly farming practices through research, education, and public service. In 2012 the SOF began providing shares in its member-based vegetable share program, with weekly pickups available at the farm.

The Clemson Campus Supported Agriculture (CSA) program began in the summer of 2002 as a public outreach effort. The program is modeled after the Community Supported Agriculture concept whereby members buy seasonal shares in exchange for weekly supplies of produce and cut flowers. The [CSA information page](#) provides additional information on this program.

- Upstate Food Co-op is “a member-owned volunteer organization that incorporated as Share Food Co-op in 1978 and reincorporated as Upstate Food Co-op in 2003 for the purpose of providing natural and organic food to its members.” The Co-op sells commonly used bulk items, beverages, produce, prepackaged products, refrigerated

and frozen products, as well as culinary and medicinal herbs and supplements. More information can be found at <http://www.upstatefoodcoop.com/>.

- The Clemson Area Food Exchange (CAFE) is an online marketplace of locally grown and produced food. Its goal is to make it possible for farmers to work together to meet the growing demand for local, sustainable food in upstate South Carolina. Farmers benefit from the marketing, selling, packaging and delivering of their produce and prepared foods. The marketplace brings fresh, healthy, locally grown and produced food to buyers in a cost-effective manner on a weekly basis. Clemson residents pickup their orders at the Arts Center on Butler Street in the City. For more information, go to <http://clemsonareafoodexchange.com/Default.aspx>.

The City of Clemson is fortunate to be located next to Clemson University, with its agriculture programs and services. A fact sheet with related information can be found at [http://www.clemson.edu/extension/county/horry/documents/local\\_fact\\_sheet.pdf](http://www.clemson.edu/extension/county/horry/documents/local_fact_sheet.pdf).

## F. PARKS AND RECREATION AREAS

The City of Clemson has 96.15 acres of land set aside for parks and recreational areas. Table VII-1 provides a listing of the City's parks and recreational areas, including location, classification, and size. The location of the parks is provided in Map VII-9.

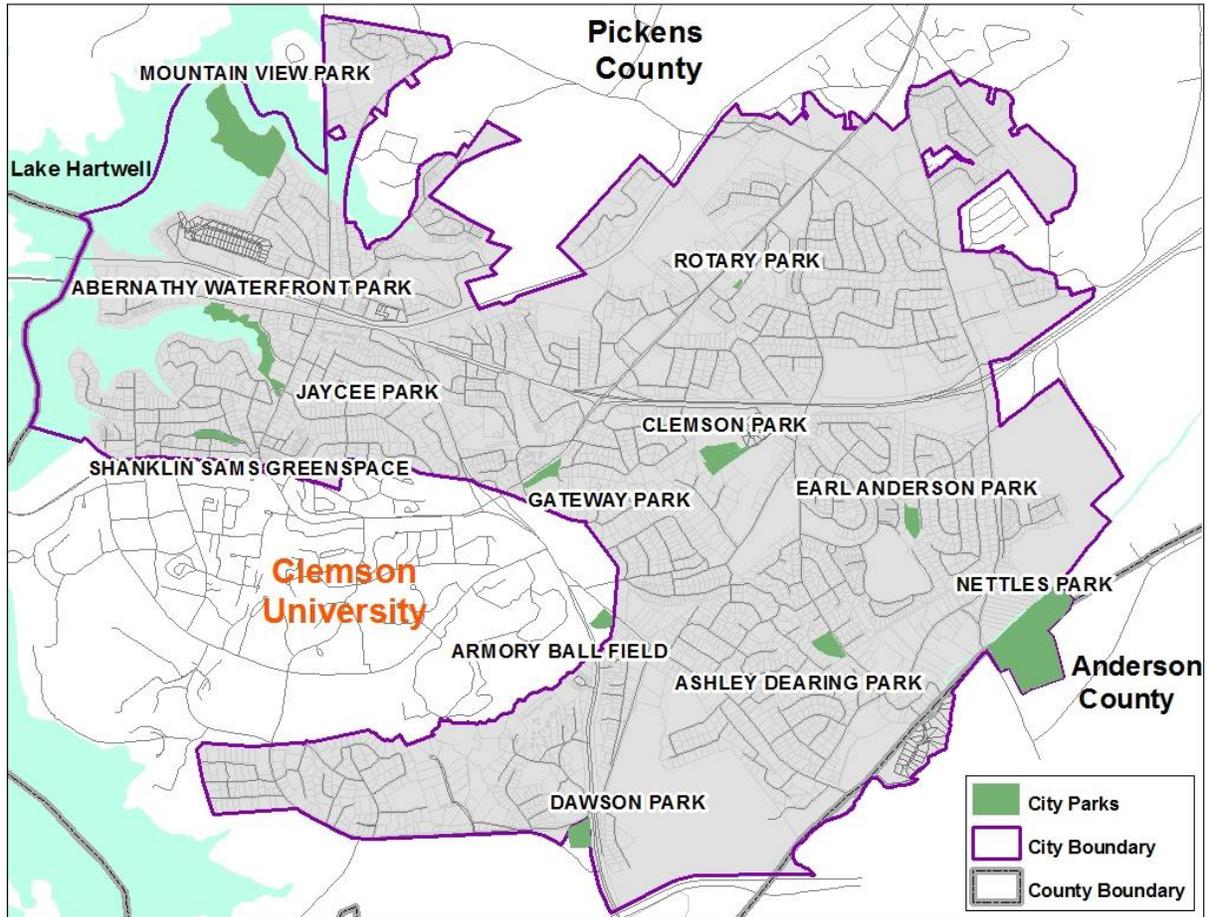
TABLE VII-1. CLEMSON PARKS AND RECREATION AREAS

Park Name	Classification	Location	Size
Armory Softball Field	Athletic	US Hwy 76/Old Stone Church Rd	2 acre
Ashley Dearing Park	Neighborhood park	Berkeley Dr	4 acres
Catherine Smith Plaza	Mini park	College Ave	0.5 acres
Central-Clemson Indoor Recreation Center	Indoor swimming pool, heated therapy pool, two basketball courts, aerobics room, workout facility	130 Commons Way, Central	2.66 acres
Clemson Park	Neighborhood park	Frontage Rd	4.5 acres
Earl Anderson Park	Neighborhood park	Lancelot Drive	3 acres
Gateway Park	Linear park	SC Hwy 93	3.15 acres
Jaycee Park	Mini park	College Ave	0.5 acres
Larry Abernathy Lakefront Park	Trail/shoreline	Keowee Trail/US Hwy 123	8 acres
Mountain View Park	Neighborhood park/Natural area	Mountain View Ln	34 acres
Nettles Park	Athletic	Nettles Rd	33 acres
Old Stone Church	Athletic	Old Stone Church Rd/US Hwy 76	1 acre
Rotary (Abel) Park	Mini park	Abel Rd	0.5 acre
Shanklin-Sams	Mini park	N. Clemson Ave	2 acres

Source: City of Clemson, Planning and Codes Administration Department, 2014.

The City adopted a Comprehensive Parks and Recreation Plan in 2000 and is currently implementing the plan. The plan was updated by Seamon-Whiteside and Associates in 2012. The plan provides budgetary projections for FY 2012/13 -OFY 2017/18 through an up-to-date inventory of the City's facilities, an assessment of necessary improvements required at each, and a plan for upgrading and/or updating these important facilities. Funding for the proposed improvements is earmarked from a variety of sources, including hospitality tax/fees, TIF, grants, and other sources. A copy of the plan may be viewed by visiting the Parks and Recreation page of the City of Clemson website ([www.cityfclemson.org](http://www.cityfclemson.org)).

MAP VII-8. LOCATION OF PARKS AND RECREATION AREAS, 2014  
CITY OF CLEMSON



Source: City of Clemson, Planning and Codes Administration Department, 2014.

FIGURE VII-11. VIEW OF THE LARRY ABERNATHY LAKEFRONT PARK



Source: Planning & Codes Administration, 2014

## G. SCENIC ROADWAYS

Four major scenic roadways travel through Clemson. Pendleton Road, extending from US 76 to Pendleton, (SC 28) features numerous historical buildings, homes, and sights. While traveling on Issaquena Trail, near the US 123 Overpass, there is a command view to the east of the rolling hills near Clemson. When leaving the City on US Highway 123 or SC Highway 93, there is a great view of Lake Hartwell from the bridges. College Avenue also has scenic value, with many iconic stores and buildings showcasing the past and present relationship of the community with Clemson University. SC Highway 93 just east of College Avenue offers a nice view of Clemson University's Bowman Field and Tillman Hall.

FIGURE VII-12. VIEW FROM DOWNTOWN AND COLLEGE AVENUE



Source: Planning and Codes Department, 2014

FIGURE VII-13. VIEW ALONG ISSAQUEENA TRAIL



Source: Planning and Codes Department, 2014

FIGURE VII-14. VIEW ALONG PENDLETON ROAD



Source: Planning and Codes Department, 2014

## H. SUMMARY FINDINGS

Several key findings are likely to have significant impact on the natural resources of the City of Clemson in the future.

- Clemson has been proactive and continues to need to be vigilant in protection and replanting of the tree cover in commercial developments.
- Clemson is valued in part for being a bio-diverse ecosystem and is served by a wide variety of outdoor recreational opportunities.
- City residents are served by Farmer's Markets operated by the City and University that provide access to locally grown food.
- A greenway network that connects natural areas as well as other major destinations would be of long-term and wide-spread value.
- The City has and continues to modify its Ordinance to promote the proper placement and protection measures necessary for the long-term survival of trees.

- The Parks and Recreation Plan provides the City with a framework for future parks and recreation needs. The city owns and maintains 12 parks and recreational facilities, an impressive number for a city of Clemson's size.

## I. ISSUES AND TRENDS

- Though identified as a need in both the 1994 and 2004 Comprehensive Plans, the City has yet to adopt a tree preservation ordinance.
- There is increased interest in growing and/or purchasing locally grown produce. The City needs to explore additional methods to expand opportunities to its residents.
- The City should ensure protection of its attractive tree cover.
- The City should evaluate its landform grading and development regulations to ensure that resulting developments complement the natural features and enhance the natural beauty of the community.
- There are opportunities to educate and motivate citizens and community leaders regarding the benefits of protecting our natural resources.
- As the existing tree canopy ages and development has increased the removal of older mature trees at both the commercial and residential level, consideration needs to be given to revising city regulations to require compensating replacement of canopy trees with canopy trees.
- There is an increased interest in the benefits of utilizing native plant species in landscaping where feasible. Such benefits include reduced costs through better pest, disease, and drought resistance, and through the expansion of vegetative habitats for local fauna species.
- The increased level of development in the City accelerates the need for adopting proactive measures to minimize the impacts of stormwater management issues during construction.
- As the only City located along the Lake Hartwell shore, the City of Clemson has received an MS4 designation from the SC Department of Health and Environmental Control (DHEC). This designation requires the City to develop, fully implement, and monitor a stormwater management program.
- While the City owns 12 parks and recreational facilities and is contiguous to both Clemson University and several State facilities, organized linkages are lacking that tie these resources together into a cohesive network. Developing these linkages should be a priority for the coming ten years.

J. GOALS, OBJECTIVES AND STRATEGIES FOR IMPLEMENTATION

<b>NATURAL RESOURCES ELEMENT VISION</b>			
<i>“The City of Clemson should be known as a community whose informed stewardship of its natural resources seeks a thoughtful balance between the built and natural environment, contributes to a healthy community, promotes sustainable habitats for future generations, and helps the citizens of Clemson and beyond recognize, appreciate and enjoy these resources.”</i>			
<b>Goals/Objectives/Strategies</b>	<b>Accountable Agencies</b>	<b>Time Frame for Completion</b>	<b>Completion Date</b>
<b>Goal IV.1. Sustain healthy communities through maintaining sustainable ecosystems.</b>			
<b>Objective IV.1.1. Promote conservation of natural resources.</b>			
<u>Strategy IV.1.1.1.</u> Hire a consultant to identify, inventory, and develop a report on significant natural features.	City Council Administration Planning and Codes Dept	Short-Term	
<u>Strategy IV.1.1.2.</u> Assess the current conditions of the City’s natural resources through regularly scheduled inventories.	Friends	Ongoing	
<u>Strategy IV.1.1.3.</u> Utilize the City website and <i>Community Connections Newsletter</i> and other forms of public communication for natural resources tips for the public.	City Horticulturist Planning and Codes Dept Friends	Ongoing	
<u>Strategy IV.1.1.4.</u> Establish a Green “think tank” to provide ecological input to help the Mayor, Council, and Planning Commission make decisions.	City Council Administration Planning and Codes Dept	Short-Term	
<b>Objective IV.1.2. Restore and improve natural habitat communities.</b>			
<u>Strategy IV.1.2.1.</u> Create protection plans to maintain and support natural features.	Planning and Codes Dept	Long-term	
<u>Strategy IV.1.2.2.</u> Promote the use of native plant materials in new public and private landscaping projects.	City Horticulturist Planning and Codes Dept	Ongoing	
<u>Strategy IV.1.2.3.</u> Maintain and enhance habitat diversity for wildlife.	SC DNR Friends Planning and Codes Dept Engineering Dept City Horticulturist	Ongoing	
<u>Strategy IV.1.2.4.</u> Promote the preservation of wildlife habitats in backyards, parks, and public spaces.	City Horticulturist Planning and Codes Dept Friends	Ongoing	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<u>Strategy IV.1.2.5.</u> Through codes and education, protect natural resources as an integral part of the development process.	City Council Planning Commission Planning and Codes Dept	Ongoing	
<u>Strategy IV.1.2.6.</u> Develop and implement an invasive species eradication program.	City Horticulturist	Mid-term	
<b>Objective IV.1.3.</b> Ensure that City ordinances reflect a high priority for environmental concerns.			
<u>Strategy IV.1.3.1.</u> Review and, where necessary, revise ordinances to ensure that developers provide adequate open space or conservation areas for the residents of their developments.	City Council Planning Commission Planning and Codes Dept	Ongoing	
<u>Strategy IV.1.3.2.</u> Explore incentives in the Zoning Ordinance to encourage developers to provide additional open space amenities beyond the minimum requirement.	City Council Planning Commission Planning and Codes Dept	Ongoing	
<b>Objective IV.1.4.</b> Encourage citizens about the benefits of and encourage citizens to produce locally grown food.			
<u>Strategy IV1.4.1.</u> Expand and improve the community garden to include on-site education and Produce Swap Days.	City Horticulturist	Ongoing	
<u>Strategy IV1.4.2.</u> Develop an educational home-gardening programming for dissemination on-line and at various events.	Parks and Recreation Dept Extension Service	Ongoing	
<u>Strategy IV1.4.3.</u> Research how other communities have dealt with the issue of backyard poultry and see if any of the approaches apply to Clemson.	City Council Planning Commission Planning and Codes Dept	Short-Term	
<u>Strategy IV1.4.4.</u> Revise the Zoning Ordinance to allow non-noxious agriculture production on lands zoned for low density residential uses, including standards to ensure residential protection.	City Council Planning Commission Planning and Codes Dept	Mid-Term	
<b>Goal IV.2. Protect, maintain, and enhance the City's tree canopy, including trees on public and private properties.</b>			
<b>Objective IV.2.1.</b> Preserve existing trees and forests.			
<u>Strategy IV.2.1.1.</u> Hire a consultant to conduct a tree canopy inventory of trees on public property using manual and/or GIS technology.	City Council Planning Commission Planning and Codes Dept	Short-Term	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<u>Strategy IV.2.1.2.</u> Develop criteria for identifying, designating, and recognizing historic/landmark trees located on both public and private property.	Consultant City Horticulturist Planning and Codes Dept	Short-Term	
<u>Strategy IV.2.1.3.</u> Develop and adopt a Grand Tree Ordinance to identify and preserve significant specimens.	City Horticulturist Planning Commission	Short-term	
<u>Strategy IV.2.1.4.</u> Provide means for the City Horticulturist to consult with a certified arborist quarterly.	City Council Consultant	Ongoing	
<u>Strategy IV.2.1.5.</u> Discourage rezoning any R-12 or R-20 land to a designation of higher density.	Planning Commission City Council	Ongoing	
<u>Strategy IV.2.1.6.</u> Revise the Land Development Regulations to ensure planting of new trees and the retention of existing trees is considered an integral part of land development.	City Council Planning Commission Planning and Codes Dept	Ongoing	
<b>Objective IV.2.2.</b> Invest in the reforestation of the City.			
<u>Strategy IV.2.2.1.</u> Develop a site appropriate list of canopy trees.	City Horticulturist Extension Service	Short-Term	
<u>Strategy IV.2.2.2.</u> Propagate trees from local specimens for both public and private plantings. This will include a greenhouse and/or irrigation as well as plant rescues.	City Horticulturist	Ongoing	
<u>Strategy IV.2.2.3.</u> Provide educational materials for citizens and City staff to learn the value of having the right tree in the right place.	City Horticulturist Extension Service	Ongoing	
<u>Strategy IV.2.2.4.</u> Develop and adopt a comprehensive tree plan for all public property.	Consultant Planning Commission	Mid-term	
<b>Objective IV.2.3.</b> Preserve and improve the quality of the growing environment for street trees.			
<u>Strategy IV.2.3.1.</u> Develop cultural (plant conditions) criteria and guidelines for the selection of street trees.	City Horticulturist	Short-Term	
<u>Strategy IV.2.3.2.</u> Increase the amount of space allotted for planting street trees.	Planning and Codes Dept	Short-Term	
<u>Strategy IV.2.3.3.</u> Select street trees for diversity and suitability.	City Horticulturist	Short-Term	
<u>Strategy IV.2.3.4.</u> Select efficient planting locations.	City Horticulturist	Ongoing	
<u>Strategy IV.2.3.5.</u> Review the status, condition, and applicability of all tree grates on public property and establish new standards for both public and private use.	City Horticulturist Planning and Codes Dept	Short-Term	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<b>Goal IV.3. Maintain the quality and quantity of surface water.</b>			
<b>Objective IV.3.1. Manage stormwater as a resource rather than a problem.</b>			
<u>Strategy IV.3.1.1.</u> Encourage the use of stormwater best management practices (porous pavements, green roofs, etc) beyond what is required by DHEC through the use of incentives.	City Council Engineering Dept Planning and Codes Dept	Ongoing	
<u>Strategy IV.3.1.2.</u> Collaborate with the Clemson Extension Service to develop educational materials for homeowners who would like to implement low impact stormwater strategies on their properties.	Extension Service Engineering	Short Term	
<u>Strategy IV.3.1.3.</u> Monitor rainfall to be able to better manage stormwater issues across the City.	Parks and Recreation Dept	Ongoing	
<u>Strategy IV.3.1.4.</u> Conduct a survey of the existing stormwater infrastructure (quantitative and qualitative) to improve the City's GIS database and stormwater management program.	Engineering Dept Public Works Dept	Short Term	
<b>Objective IV.3.2. Preserve and enhance the existing network of streams, ponds, and lake watersheds and their aquatic habitats.</b>			
<u>Strategy IV.3.2.1.</u> Review existing zoning and land development regulations in regards to the management of riparian zones and revise as needed to provide more safeguards.	Planning Commission Planning and Codes Dept Engineering Dept	Short Term	
<u>Strategy IV.3.2.2.</u> Track sanitary sewer overflow events to identify choke points and possible stormwater interconnects as the basis for strategic improvements and repairs to the infrastructure to reduce the release of untreated sanitary sewer waste into surface water.	Public Works Dept Utilities Dept Engineering Dept	Ongoing	
<u>Strategy IV.3.2.3.</u> Create a monitoring system to establish a baseline of stream flow and health and track improvements over time.	Engineering Dept	Long Term	
<u>Strategy IV.3.2.4.</u> Develop a strategy to reinforce waterways as a regional resource through cooperation with surrounding communities and other jurisdictions in the watershed.	Pickens County Natural Resources Conservation Service Administration Engineering Dept	Ongoing	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<b>Goal IV.4. Promote pollution prevention practices to achieve sustainable use of natural resources, and to protect the environment and human health.</b>			
<b>Objective IV.4.1. Improve the City’s air quality.</b>			
<u>Strategy IV.4.1.1.</u> Regularly monitor and report on how well the City’s air quality complies with Federal regulations.	Planning and Codes Dept	Ongoing	
<u>Strategy IV.4.1.2.</u> Promote public transit, cycling, and pedestrian movement as alternative to automobile transportation.	City Council Planning Commission Planning and Codes Dept Friends	Ongoing	
<u>Strategy IV.4.1.3.</u> Place a high priority on low-emission systems when purchasing and maintaining public vehicles.	City Council All City Departments	Ongoing	
<u>Strategy IV.4.1.4.</u> Promote and encourage green development practices for private developers.	City Council Planning Commission Planning and Codes Dept	Ongoing	
<b>Objective IV.4.2. Improve City recycling efforts.</b>			
<u>Strategy IV.4.2.1.</u> Add more recycling bins to public parks and the downtown area.	Public Works Dept	Short-Term	
<u>Strategy IV.4.2.2.</u> Explore incentives to promote more recycling on the part of citizens and businesses.	Public Works Dept	Short-Term	
<u>Strategy IV.4.2.3.</u> Explore the development of a community composting program/facility.	Public Works Dept	Short-Term	
<u>Strategy IV.4.2.4.</u> Explore making larger home recycling bins available to those that need them.	Public Works Dept	Short-Term	
<b>Objective IV.4.3. Increase the use of solar energy.</b>			
<u>Strategy IV.4.3.1.</u> Provide the public and City officials with current data and research regarding how to apply solar power.	City Council Planning and Codes Dept	Short-Term	
<u>Strategy IV.4.3.2.</u> Explore the use of solar energy on every project built by the City.	City Council Administration	Ongoing	
<u>Strategy IV.4.3.3.</u> Explore providing incentives to encourage citizens to use solar energy.	City Council Administration	Ongoing	
<u>Strategy IV.4.3.4.</u> Work with surrounding communities to ensure an ongoing “solar friendly” relationship with local energy providers.	Friends ACOG Local Energy Providers	Ongoing	
<u>Strategy IV.4.3.5.</u> Explore the use of solar energy on all City equipment and machinery.	All City Departments	Ongoing	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<u>Strategy IV.4.3.6.</u> As public and private development occurs, be vigilant in seeking and maintaining opportunities for solar fields.	Planning and Codes Dept	Ongoing	
<u>Strategy IV.4.3.7.</u> Require all developments over two acres in size to provide evidence of having explored solar energy options as part of the approval process.	City Council Planning Commission Planning and Codes Dept	Mid-Term	
<b>Goal IV.5. Protect and preserve the City's existing soils.</b>			
<b>Objective IV.5.1. Promote soil conservation practices to reduce erosion and sediment control.</b>			
<u>Strategy IV.5.1.1.</u> Encourage development that is compatible with the area's underlying geology and topography and encourage slope preservation.	Planning and Codes Dept Engineering Dept	Ongoing	
<u>Strategy IV.5.1.2.</u> Identify current codes and enforcement mechanisms relating to slope requirements to determine if adequate and revise if needed.	Planning and Codes Dept Engineering Dept	Short Term	
<u>Strategy IV.5.1.3.</u> Develop and distribute educational materials for homeowners interested in implementing erosion control on their property.	Clemson Extension Service Engineering Dept	Short Term	
<u>Strategy IV.5.1.4.</u> Monitor and enforce erosion practices on construction sites, such as silt fence installation and upkeep.	Engineering Dept	Ongoing	
<b>Goal IV.6. Protect and expand high quality, inviting passive park spaces.</b>			
<b>Objective IV.6.1. Increase green-space connectivity in the community to promote wellness, alternative transportation and socialization.</b>			
<u>Strategy IV.6.1.1.</u> Develop a Greenway/Greenlink system (signage, land acquisition). Hire an intern to work with neighborhood associations and private citizens to communicate and implement plans.	City Council Planning and Codes Dept Park and Recreation Dept	Ongoing	
<u>Strategy IV.6.1.2.</u> Implement the signage, painting of lines, and widening of bikeways as recommended in the Bikeway Plan.	City Council Engineering Dept Public Works Dept Planning and Codes Dept	Ongoing	
<u>Strategy IV.6.1.3.</u> Use sidewalks and trails to connect public and private spaces.	City Council Planning and Codes Dept Park and Recreation Dept Homeowners Assoc.	Ongoing	
<u>Strategy IV.6.1.4.</u> Develop a Blueways or "water path" program that informs and connects people to amenities, points of interest, and attractions near water features and launch points.	US Army Corp of Engineers SC DNR Planning and Codes Dept	Short Term	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<b>Objective IV.6.2.</b> Maintain a balance of active and passive park use based on the usability and appropriateness of the land.			
<u>Strategy IV.6.2.1.</u> Maintain the land-to-people ratio recommended by National Park and Recreation Association (NRPA) of 6.25-10.5 acres per 1000 people as the population grows.	Planning and Codes Dept Parks and Recreation Dept	Ongoing	
<u>Strategy IV.6.2.2.</u> Inform residents and visitors of park options and resources so that the services are used and valued (signage about perimeter trail systems in active parks).	Parks and Recreation Dept	Ongoing	
<b>Goal IV.7. Protect and maintain high quality active parks.</b>			
<b>Objective IV.7.1.</b> Encourage use of parks and recreational amenities so that citizens achieve desired health and social benefits.			
<u>Strategy IV.7.1.1.</u> Follow/support existing master-plan for Parks and Recreation at City and County level.	Parks and Recreation Dept	Ongoing	
<b>Objective IV.7.2.</b> Monitor growth opportunities as demand for specific uses increase and implementation is feasible.			
<u>Strategy IV.7.2.1.</u> Within the park system, monitor current use and respond to trends via the strategic and master plan process (update planned for 2018).	Parks and Recreation Dept	Ongoing	
<u>Strategy IV.7.2.2.</u> Repurpose parks as needed to respond to current and future needs and model new initiatives.	Parks and Recreation Dept	Ongoing	
<b>Goal IV.8. Increase community awareness, appreciation, and stewardship of Clemson’s natural resources.</b>			
<b>Objective IV.8.1.</b> Educate citizens regarding ecological issues and stewardship practices that lead to improved livability and quality of life.			
<u>Strategy IV.8.1.1.</u> Educate the public, City decision-makers, community groups, schools, and City staff through social outreach programs and activities such as <i>Clean Sweep</i> and other clean-up efforts.	Various Staff Friends Clemson University	Ongoing	
<u>Strategy IV.8.1.2.</u> Increase public involvement through activities such as Arbor Day and Earth Day, particularly engaging school-aged children.	School District Churches Parks and Recreation Dept	Ongoing	
<u>Strategy IV.8.1.3.</u> Develop a parks and recreation newsletter to promote natural resource-based activities and events.	Parks and Recreation Dept	Short-Term	
<u>Strategy IV.8.1.4.</u> Work with the Clemson University Extension Service to provide residents of Clemson with relevant information regarding ecological issues.	All City Departments Extension Service	Ongoing	

Goals/Objectives/Strategies	Accountable Agencies	Time Frame for Completion	Completion Date
<b>Objective IV.8.2.</b> Institutionalize a City-wide focus on preserving and protecting Clemson's natural resources.			
<u>Strategy IV.8.2.1.</u> Designate one City Council member as a "champion" for natural resources in the City of Clemson.	City Council Administration	Ongoing	
<u>Strategy IV.8.2.2.</u> Designate a Planning Commissioner as a "champion" for natural resource initiatives.	City Council Planning Commission	Ongoing	
<u>Strategy IV.8.2.3.</u> Conduct an annual audit of progress in meeting the objectives of the natural resource component of the 2024 Comprehensive Plan.	Planning and Codes Dept	Ongoing	
<u>Strategy IV.8.2.4.</u> Develop a "Friends of the Environment" citizen group charged with serving as advocates for environmental stewardship.	City Council	Short-Term	
<b>Objective IV.8.3.</b> Increase community appreciation of the City's natural resources.			
<u>Strategy IV.8.3.1.</u> Establish a "Community Beautification" program that recognizes residents, developers, and business persons who have improved properties within the City.	Friends	Mid-Term	
<u>Strategy IV.8.3.2.</u> Support and involve community and neighborhood organizations in voluntary efforts to enhance community appearance such as a "Plant Bulb Swap Day."	Chamber of Commerce	Mid-Term	

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