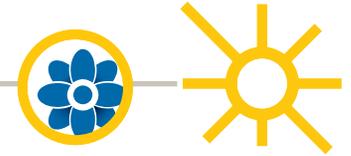


## 5.0 NATURAL RESOURCES



### 5.1 OVERVIEW

Natural resources encompass any naturally occurring element in the environment such as climate, water features, soil types, plant and animal species, and more. A community's natural resources are a vital component to the comprehensive planning process because they play an important role in the quality of life for residents and their management impacts the sustainability of a community. The natural resources in the area helped define North Charleston through history since the first inhabitants lived along the Ashley and Cooper Rivers. During the mid-twentieth century, the City's natural resources played an integral role in developing North Charleston as a center for trade, manufacturing, and regional transportation. Conserving these natural resources is essential to maintaining the quality of life and economic well-being in North Charleston.

### 5.2 CLIMATE

One of the most attractive natural characteristics of North Charleston and the region is the climate. Winters are commonly mild while spring, summer, and fall are all typically well suited for outdoor recreation and plant growth. North Charleston has a temperate to subtropical climate with the region averaging 230 days of sunshine each year. The average daily high is 75.7 degrees Fahrenheit, and precipitation averages 50.14 inches each year. However, due to its proximity to the coast, the City is also impacted by tropical storms and hurricanes during hurricane season which typically lasts from late summer to the end of November.

North Charleston's proximity to open water, tidally influenced rivers, low-lying areas, and flat terrain makes it vulnerable to the threats or hazards that are associated with tropical storms and hurricanes including high winds, tornados, intense rainfall, storm surge, and severe flooding. Major hurricanes that have affected the tri-county area were Hugo, a category 4 hurricane which made landfall in September 1989, Matthew, a Category 4 hurricane in October 2016, and Irma, which made land fall in Florida in 2017, then influenced water events later around North Charleston. However, tropical storms and less severe hurricanes often bring higher tides and an abundance of rain which increase flooding in low lying areas. To prepare for storm damage and flooding from storm events and heavy rainfall, North Charleston has taken protective measures, including improving building codes and adopting stormwater management regulations. North Charleston developed and implemented a Stormwater Management Plan and Program to help protect the surrounding waters from polluted runoff, and in 2008 they developed a Stormwater Permitting and Design Manual. In 2009, North Charleston adopted a riparian buffer Ordinance that seeks to maintain the natural ecological systems along waterfronts. In 2019 the City adopted an amendment in its Building Code that provides for a significant update to the City's floodplain regulations which sets a two-foot "freeboard" requirement – where the lowest floor of a building must be elevated at least two feet higher than the base flood elevation (BFE) – in an effort to minimize instances of structural damage should future water events exceed recognized standard flooding levels.

## 5.3 LAND

### 5.3.1 Seismic Activity

Approximately 20 earthquakes are recorded each year in South Carolina, with approximately 70% of those located near Charleston in the Middleton Place-Summerville Seismic Zone.<sup>12</sup> One of the most significant historical earthquakes to occur in the Berkeley-Charleston-Dorchester region was the 1886 Charleston/Summerville earthquake which was the most damaging earthquake ever to occur in the eastern United States in terms of lives lost, human suffering, and infrastructure loss. Earthquakes in South Carolina have the potential to cause great and sudden loss because devastation can occur without warning. Forecasts indicate there is a 40 to 60 percent chance of a magnitude 6 earthquake occurring somewhere in the central and eastern United States within the next 30 years. Figure 31 shows where seismic monitoring stations are located in and around North Charleston.

### 5.3.2 Environmental Hazards

Environmental hazards refer to any event or situation, resulting from human activities or natural processes, which poses a threat to the surrounding natural environment and has the potential to adversely affect people's health. Hazards can include pollutants, such as heavy metals, pesticides, biological contaminants, chemicals, and toxic waste. Figure 31 provides the location of hazardous sites in and around North Charleston which were sourced from the Environmental Protection Agency's Facility Register Service.<sup>13</sup> The hazardous waste generation sites indicate where small quantities of hazardous materials are being treated or disposed. The medical and pharmaceutical sites indicate locations associated with medical facilities and services, which are required to report annually to the South Carolina Department of Health and Environmental Control (DHEC) on the amount of waste generated. Monitoring these sites provides accountability for organizations to make sure that they are correctly disposing of waste and protects against future cleanups.

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or "Superfund" in the 1980s. The Act established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund which helps to pay for the cleanup of sites when no responsible party could be identified. The major goals of CERCLA are to:

1. Protect human health and the health of the environment by cleaning up contaminated sites;
2. Make responsible parties pay for cleanup work;
3. Involve communities in the Superfund process; and
4. Restore Superfund sites to safe, productive use

12. <https://www.scmd.org/prepare/types-of-disasters/earthquakes/>

13. <https://www.epa.gov/frs/epa-regional-kml-download>

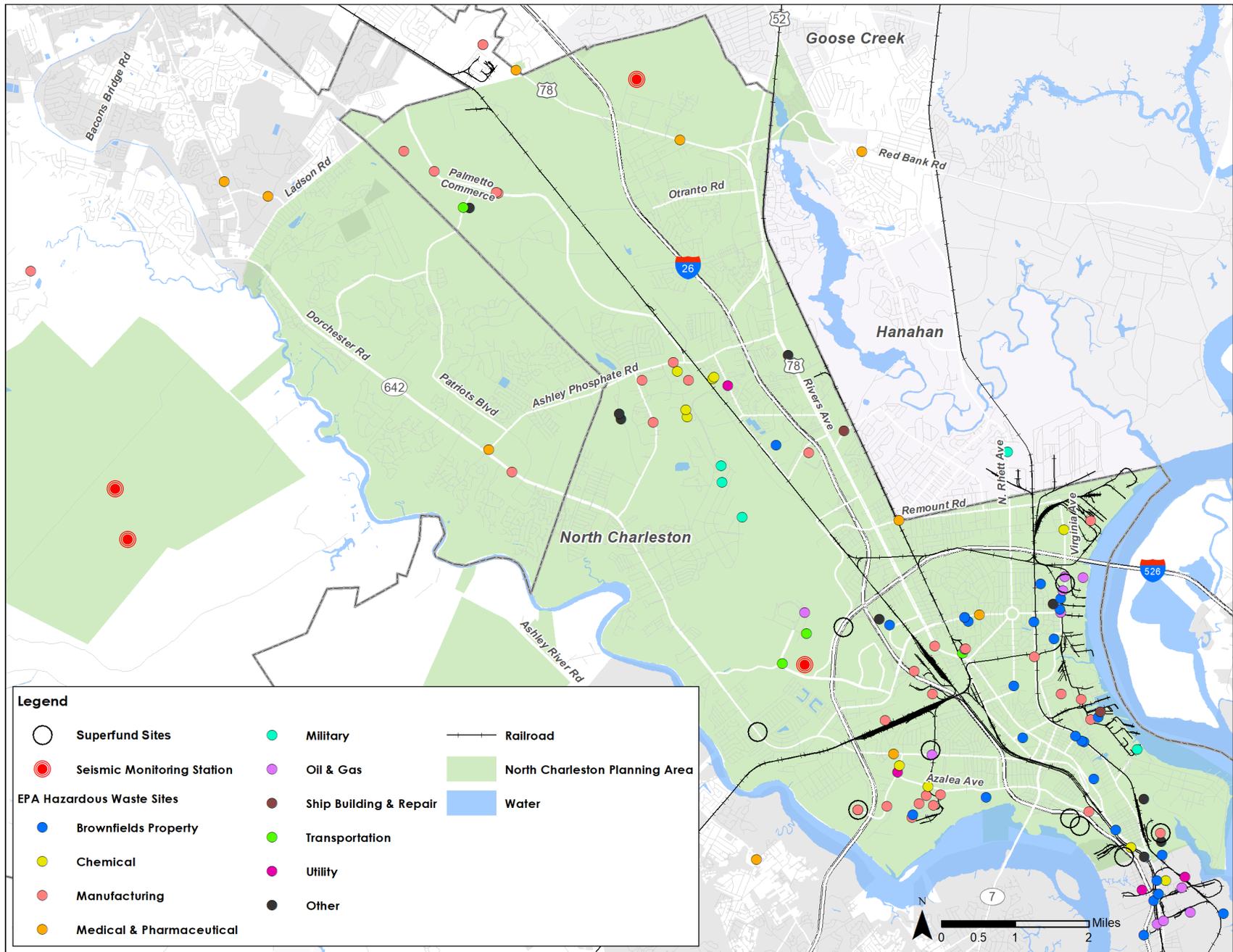


Figure 31: Seismic Monitoring Stations & Hazardous Waste Sites

### 5.3.3 Soils

Soil is a mixture of organic material, minerals, gases, and liquids on the Earth's surface that is capable of supporting life. It is formed by the geography and topography of an area, and can be divided into numerous associations and types based on its formation and characteristics. By identifying and understanding the types of soil in an area and their suitability and limitations for various land uses, more informed decisions regarding land use and development can be made, and this valuable natural resource can be preserved.

The United States Department of Agriculture (USDA) provides soil data for more than 95% of the nation's counties. These soil surveys can be used for area planning in North Charleston. The Field Office Technical Guide Soils Information, developed by the United States Department of Agriculture for Charleston County, helps to determine the slope, farmland suitability, erosion scale, drainage class, hydric soil rating and land capability class of soils within the area. Dorchester County has a Field Office Technical Guide as well that is also used for conservation purposes. While the Field Office Technical Guide lists all the sands in Charleston and Dorchester Counties, Figure 32 shows the types of soils in North Charleston. Note that some of the sands, fine sands, and loamy fine sands have been merged to produce a map that is easier to read. Thirty-eight (38%) percent of the land in North Charleston is of soil type UR: Urban Land–Yauhannah–Yemessee–Ogeechee Association, which is considered poor for farming and is typically poor to moderately-well drained. This soil type generally covers the more urban areas of North Charleston, south of Ashley Phosphate Road.

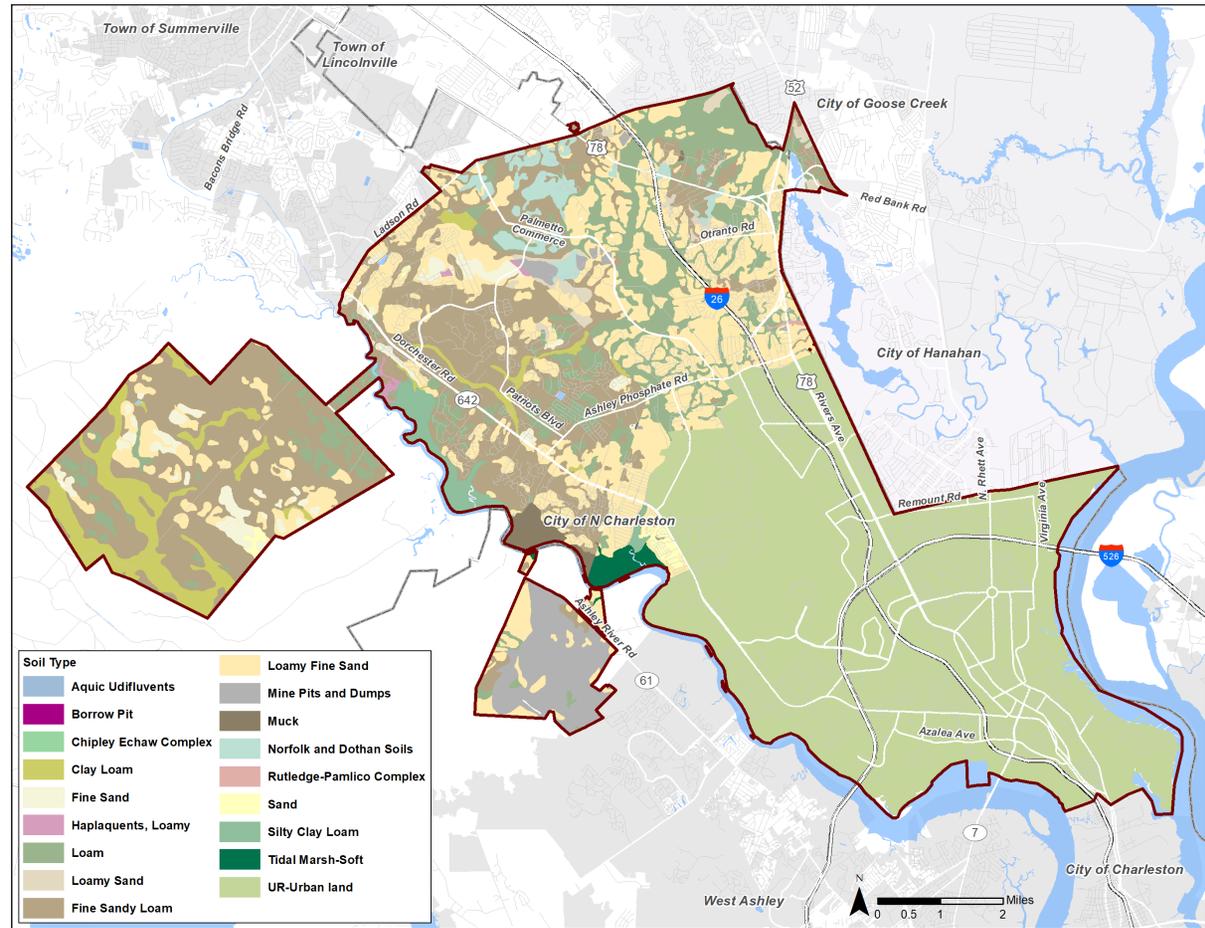


Figure 32: North Charleston Area Soils

## 5.5 HYDROLOGY

### 5.4.1 Watersheds

A watershed is an area of land that channels water until it reaches a common low point, such as a bay, lake, or the ocean. This means that every stream, brook, tributary, and river will eventually reach a larger body of water within its associated watershed. A water supply watershed is the area where rainfall runoff drains into a river, stream, or reservoir used downstream as a source of public drinking water. The protection of these water sources is critical for the safety and public health of the community. The replacement of natural vegetation with impervious surfaces such as roads, roof tops and parking lots increases runoff, which leads to contamination of surface water and potable water supply. North Charleston's Stormwater Management Plan plays a major role in protecting the water quality of the watersheds within North Charleston by preventing pollution and runoff. As such, the program components are always evolving to improve the effectiveness of the plan. The City, for example, adopted a riparian buffer requirement in 2009 to limit impervious coverage within environmentally sensitive areas.

North Charleston falls primarily within two watersheds; the Ashley River and Cooper River watersheds (Figure 33). Areas of the City to the west of the Norfolk Southern rail lines drain into the Ashley River Watershed, via Eagle, Coosaw, Popperdam, and BrickYard Creeks. The east and southeastern parts of the City are located in the Cooper River Watershed and drain to the Cooper River via MuChune Branch (Goose Creek), Turkey, Filbin, Noisette, and ShipYard Creeks. The North Charleston planning area to the west of the Ashley River also falls within the Stono River and Rantowles watersheds. Roughly 60% of the Watson Hill area annexed into North Charleston in 2011 lies within the Rantowles Creek watershed, while a very small section of an area recently annexed into the City of North Charleston falls within the Stono River Watershed.

The waterways surrounding the City support major Port activity, especially along the Cooper River. These rivers and streams support the eco-tourism resource that the region is known for by providing recreational uses to the local community and regional visitors, and also adds scenic and aesthetic value to the local residential real estate market. Figure 37 in Chapter 6, Cultural and Historic Resources, shows and discusses the Ashley River Scenic and Historic Districts which provide protections for the Ashley River.

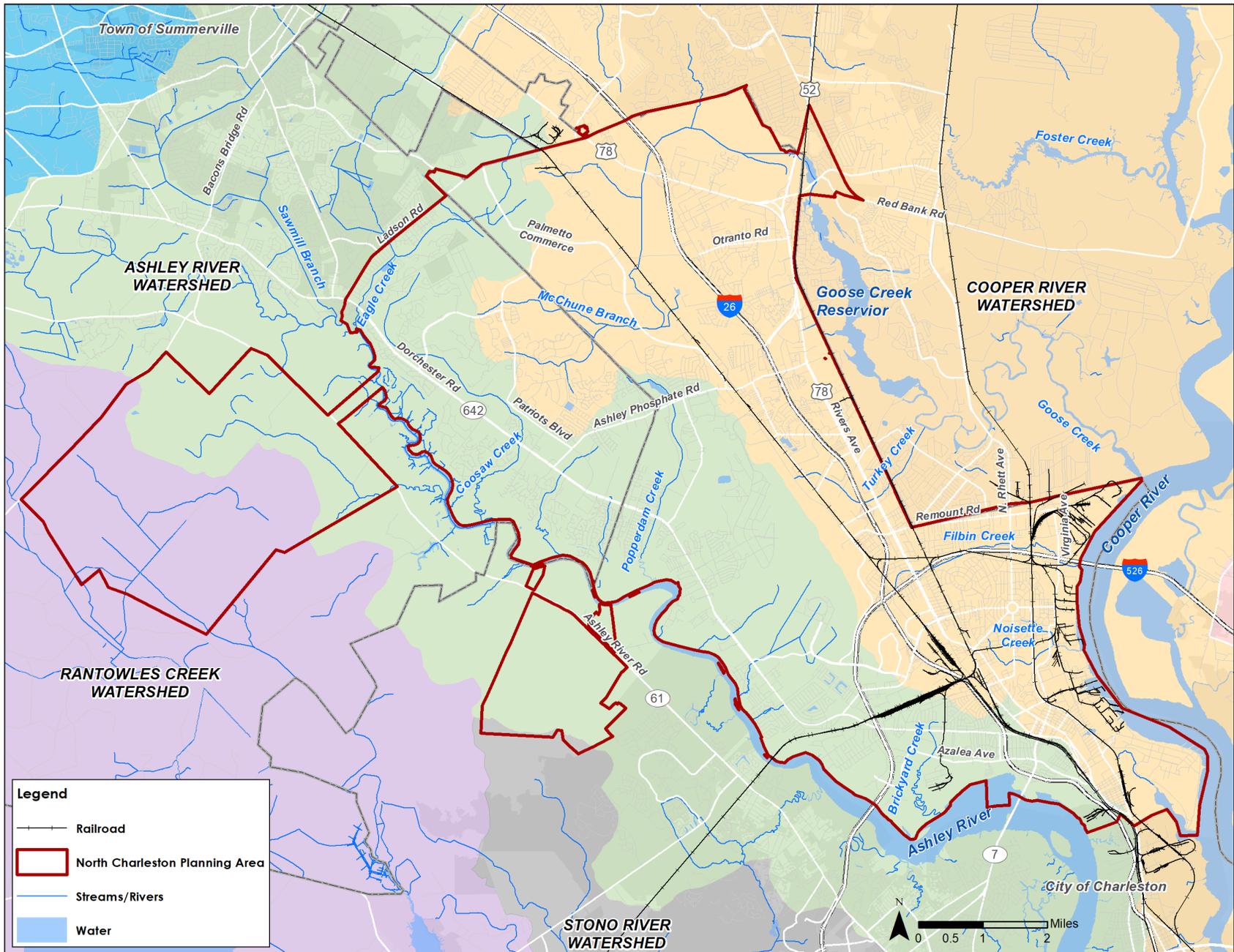


Figure 33: Area Watersheds and Major Waterways

### **5.4.2 Groundwater**

Groundwater is a valuable natural resource found beneath the earth's surface and is a source of fresh water for a variety of uses, most importantly drinking water. Groundwater is contained within and extracted from an aquifer, which is an underground layer of water absorbent rock or other loose materials (gravel, sand or silt) capable of providing economically viable amounts of water to wells or springs.

The South Carolina Groundwater Use and Reporting Act gave South Carolina DHEC the legal authority and mandate to develop and implement a local groundwater management program for the Trident Capacity Use Area (Trident Area) which consists of Berkeley, Charleston, and Dorchester Counties. The major goals of the Trident Area Groundwater Management Plan is to ensure sustainable development of the groundwater resource by management of groundwater withdrawals; protect groundwater quality from salt-water intrusion; and monitor and evaluate groundwater quality and quantity conditions.

### **5.4.3 Floodplains**

North Charleston is located near the coast, has low elevations, and is bounded by the Cooper and Ashley Rivers. Several areas in the City are designated as wetlands or within a FEMA-designated flood zone. A 100-year flood event is the maximum flood level expected to occur an average of once every 100 years, in other words, there is a 1% chance of a 100-year flood happening in a given year. Similarly, a 500-year flood has a 1 in 500 or 0.2% chance of occurring in a given year. FEMA maintains flood maps that detail the location and severity of flood zones in any given location. The two most at risk zones for flooding are VE and A/AE zones, which ideally function as natural water storage, help maintain water quality, and assist with groundwater recharge. In addition to these ecological functions, these areas serve as vital habitat to diverse species, some of which are extremely vulnerable. These zones require substantial flood insurance, and FEMA recommends keeping development out of these areas for not only the protection of life and property, but also for the preservation of the natural functions of the ecosystem. Figure 33 provides the Federal Emergency Management Agency (FEMA) preliminary 100- and 500-year flood zone designations.

### **5.4.4 Wetlands**

Wetlands are categorized by their characteristic vegetation, and can be classified as saltwater, freshwater, or brackish, which is a mixture of salt and fresh water. Wetlands are some of the most ecologically important areas on earth and have many functions. Wetlands provide wildlife habitat and are a safe breeding ground for many species. Wetlands also help improve water quality and provide flood protection to the surrounding land uses by filtering pollutants and providing a necessary buffer to development. Figure 34 illustrates the designated wetland areas in and around North Charleston.

The Federal Clean Water Act grants the United States Army Corps of Engineers (USACE) protection powers over wetlands. USACE processes permits that will minimize disturbance for wetlands as infrastructure is improved. More specifically the type of activities in wetlands subject to regulations include: filling, dredging, or draining; constructing and land clearing activities in wetlands; mining or creating impoundments; and managing stormwater runoff. Most agricultural and forestry activities are exempt from the permitting process. The City of North Charleston's Zoning Ordinance generally requires a 50-foot undisturbed riparian buffer, and in areas within some overlay districts, a 25-foot undisturbed buffer is required.



#### **5.4.5 Sea Level Rise**

Due to climate change, accelerated sea level rise is an ongoing threat to coastal cities. As the Earth warms and ice sheets and glaciers melt, the seas rise each year globally and locally. Resource extractions can draw down coastal aquifers, resulting in subsidence of land; this, with the accelerated sea level rise, can lead to chronic inundation. Within 50 years, it is expected that the region will experience a 1-3-foot rise in sea level; however, scientists believe that this is a conservative estimate, and damaging changes in sea level rise could happen even sooner. While North Charleston does not lie directly on the coast, major water bodies that surround it will be affected as the sea level rises. Sea level rise could especially present problems for North Charleston areas that are near the Ashley and Cooper Rivers.

#### **5.4.6 Water Quality**

Many of the tributary creeks that feed the Ashley and Cooper Rivers are tidally influenced, meaning they rise and fall with the tide and contain brackish water. Tidal streams have unique ecosystems that are extremely diverse and fragile. These streams typically have low oxygen levels which support or provide protection for juvenile fish populations since the low levels of dissolved oxygen prevent larger predators from being able to survive in these streams. These tidal streams are valuable ecological resources, but they are highly susceptible to damage from pollution, such as runoff from adjacent land uses. The South Carolina DHEC Office of Ocean and Coastal Resource Management recommends a 50-foot riparian buffer to protect tidal streams from the negative impacts affecting water quality, which as mentioned under Wetlands, North Charleston has adopted as a requirement in most areas of the City.

Best Management Practices exist as recommendations in order to prevent damage to the water supply. BCDCOG regularly updates its 208 Water Quality Management Plan pursuant to Section 208 of the Federal Clean Water Act. The purpose of the 208 Plan is to preserve and enhance water quality and to meet the goals of the Federal Clean Water Act and the South Carolina Pollution Control Act. The 208 Plan serves to guide local decision makers when addressing issues and opportunities related to water quality, including the regulation of discharges by utility providers and industries. In addition to the regional 208 Water Quality Management Plan, North Charleston developed and implemented a Stormwater Management Program based on EPA regulations. The program is also consistent with the Federal Clean Water Act and South Carolina Pollution Control Act and requires stormwater discharge permitting to reduce pollutants from stormwater runoff. DHEC monitors water quality from numerous areas located in and around North Charleston (Figure 35). DHEC monitors surface water to make sure it meets water quality standards; identify locations that need extra attention; determine long term trends; provide background data for permitting and planning; and to formulate permit limits for wastewater discharge. DHEC monitors macroinvertebrates, fish tissue, and dissolved oxygen in to insure the water quality is appropriate for the species that exist within it.<sup>14</sup>

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14. <https://scdhec.gov/environment/your-water-coast/how-dhec-measures-surface-water-quality>

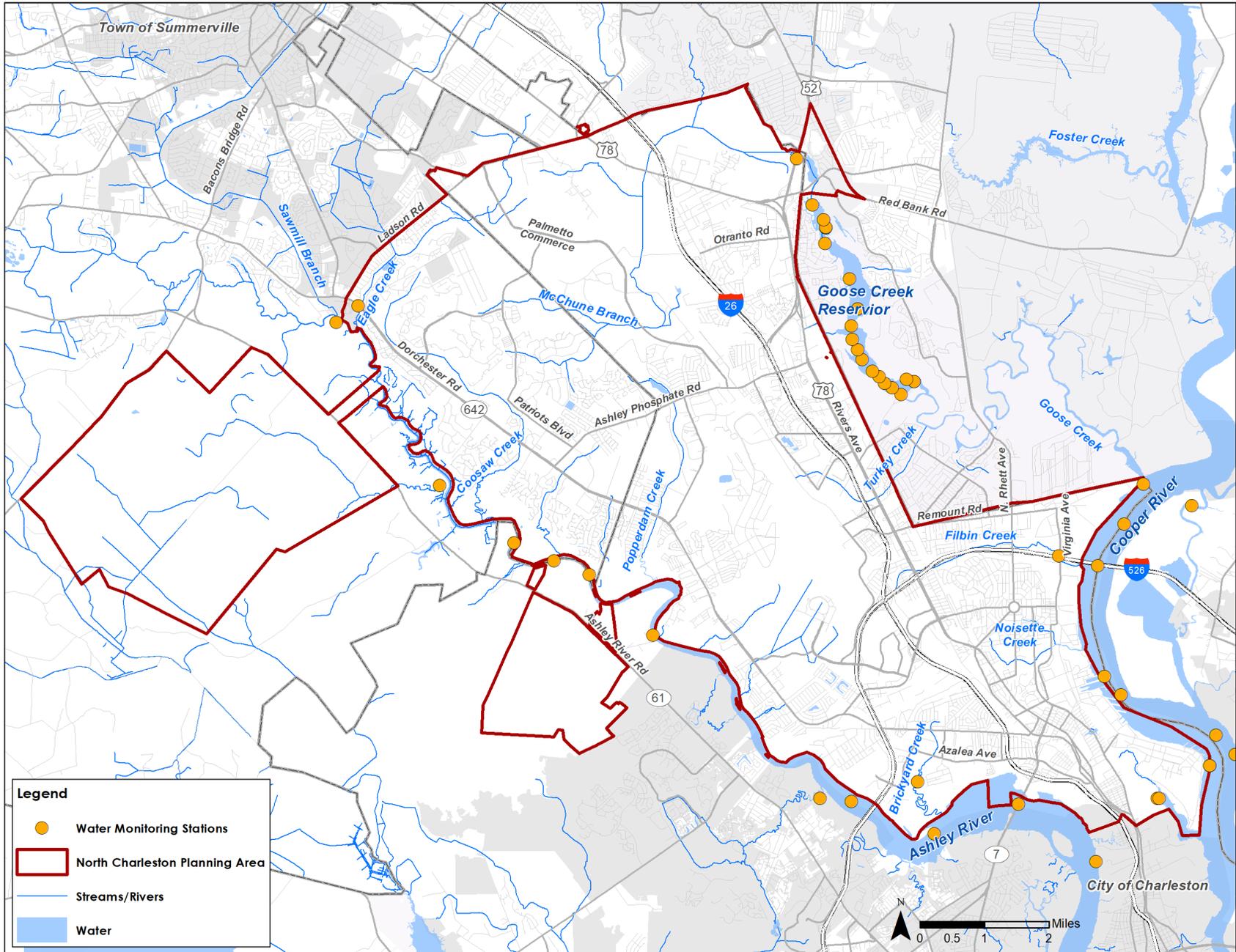


Figure 35: North Charleston Area Surface Water and Water Monitoring Station Locations

#### **5.4.7 North Charleston At Work**

Approximately 68% of Charleston County is within a flood plain. The City of North Charleston is aware of the differing flood events that occur in the region and is working to be more proactive in addressing them. Most of the events that occur can be classified as a rain event, tidal flooding, or storm surge. The City has identified consequences of reoccurring flooding:

- **Street Flooding**
- **Street Closure**
- **Damage to Personal Property**
- **Congestion**
- **Loss in Business Revenue**
- **City Resource Allocation**

The City is currently developing a Flood-Wise Action Group who will develop strategies to guide flood issues moving forward. These strategies will be prioritized to guide their implementation in an effort to minimize future flood events and prepare City staff for their response. These actions will ultimately save the tax payers money over the long term.

North Charleston also participates in the National Flood Insurance Program (NFIP). NFIP developed a Community Rating System (CRS) that encourages community flood plain management activities. The CRS program recognizes various practices designed to make the community more flood resistant such as reducing flood damage to insurable structures. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk from the community strategies that are applied. Currently, North Charleston has a class rating of 7, City of Charleston has a rating of 6, and Charleston County has a rating of 4. The lower the rating number, the more a community can save in insurance premiums. Currently, the City of North Charleston earns an annual savings of about \$5 million for City residents.

## **5.6 PLANT AND ANIMAL HABITATS**

### **5.5.1 Threatened and Endangered Species**

The Endangered Species Act (ESA) of 1973 is designed to protect plants and animals and their habitats that are listed by the government as “endangered” or “threatened” from becoming extinct. Prohibiting any taking, disturbance, or destruction of a listed species and its habitat helps to thwart any loss of life that may ensue. Endangered species are any species in danger of extinction, and threatened species are any species likely to become endangered within the foreseeable future. Species are listed with their Federal and State status if found on either list. Specific locations of endangered and threatened species are not available to the public, in order to prevent poaching or any disturbance of the species’ habitat. The United States Fish and Wildlife Service (USFWS) provides a planning level evaluation of potential impacts to USFWS trust resources, such as migrating birds, species proposed or listed under the Endangered Species Act, interjurisdiction fishes, marine mammals, and wetlands, through their IPaC (Information for Planning and Consultation) service. For North Charleston, the following Migrating Birds and potential Endangered Species were identified:

MIGRATING BIRDS	BREEDING SEASON
American Kestrel	April 1 – August 31
American Oystercatcher	April 15 – August 31
Bald Eagle	September 1 – July 31
Black Skimmer	May 20 – September 15
Clapper Rail	April 10 – October 31
Common Ground-dove	February 1 – December 31
Dunlin	Breeds elsewhere
Eastern Whip-poor-will	May 1 – August 20
Gull-billed Tern	May 1 – July 31
Kentucky Warbler	April 20 – August 20
King Rail	May 1 – September 5
Least Tern	April 20 – September 10
Lesser Yellowlegs	Breeds elsewhere
Marbled Godwit	Breeds elsewhere
Nelson's Sparrow	Breeds elsewhere
Prairie Warbler	May 1 – July 31
Prothonotary Warbler	April 1 – July 31
Red-headed Woodpecker	May 10 – September 10
Red-throated Loon	Breeds elsewhere
Ruddy Turnstone	Breeds elsewhere
Rusty Blackbird	Breeds elsewhere
Seaside Sparrow	May 10 – August 20
Semipalmated Sandpiper	Breeds elsewhere
Short-billed Dowitcher	Breeds elsewhere
Swallow-tailed Kite	March 10 – June 30
Whimbrel	Breeds elsewhere
Willet	April 20 – August 5
Wood Thrush	May 10 – August 31

ENDANGERED SPECIES	TYPE	STATUS
Northern Long-eared Bat	Mammal	Threatened
West Indian Manatee	Marine Mammal	Threatened
Bachman's Warbler	Bird	Endangered
Eastern Black Rail	Bird	Proposed Threatened
Kirtland's Warbler	Bird	Endangered
Piping Plover	Bird	Threatened
Red Knot	Bird	Threatened
Red-cockaded Woodpecker	Bird	Endangered
Wood Stork	Bird	Threatened
Green Sea Turtle	Reptile	Threatened
Kemp's Ridley Sea Turtle	Reptile	Endangered
Leatherback Sea Turtle	Reptile	Endangered
Loggerhead Sea Turtle	Reptile	Threatened
Frosted Flatwoods Salamander	Amphibian	Threatened
American Chaffseed	Flowering Plant	Endangered
Canby's Dropwort	Flowering Plant	Endangered
Pondberry	Flowering Plant	Endangered
Seabeach Amaranth	Flowering Plant	Threatened

Table 17: Threatened and Endangered Species