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In late 2020, Cabarrus County, North Carolina purchased a 616-acre parcel from The Conservation Fund through a three-year purchase agreement. Lying in the northeast portion of the County, this parcel possesses significant natural features such as an Upland Depression Swamp Forest, a Dry Oak-Hickory Forest, and an active farm to be managed by a private operator. Cabarrus County plans to eventually develop a portion of the land into a passive park, while concurrently conserving a large amount of land that is unique to the region.

To assist with this vision, Cabarrus County commissioned the help of Gerald G. Fox Master of Public Administration (MPA) students at the University of North Carolina Charlotte (UNCC) during the Spring 2021 semester. The MPA team compiled research to provide recommendations for future park development, with a specific objective to illustrate passive park development strategies grounded in the standards of conservation and recreation.

Methodology

The MPA team utilized the following research methods to gather relevant information, conduct a comprehensive analysis, and offer recommendations regarding the St. Stephens Church Road Property:

- Conducted reviews of both academic and non-academic literature;
- Developed existing Cabarrus County Citizen input data through stakeholder interviews;
- Gathered expert opinions through parks and recreation professional interviews; and
- Performed a site visit to gain a clearer understanding of the landscape and its natural features.

Through this research methodology, 7 key themes emerged:
These themes provide a framework for the discussion of best practices as it pertains to the vision for the Park as well as the existing landscape and natural features.

**Recommendations**

The MPA team recommends the following to Cabarrus County in order to develop the park property with respect to conservation, recreation, education, and the needs of the community.

**Table A: Recommendations**

<table>
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<tr>
<th>THEMES</th>
<th>#</th>
<th>RECOMMENDATIONS</th>
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<td>Conservation</td>
<td>1</td>
<td>Avoid Fragmenting Natural Areas</td>
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<td></td>
<td>2</td>
<td>Preserve the Site’s Natural Drainage</td>
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<td></td>
<td>3</td>
<td>Apply Forest Management Guidelines</td>
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<td></td>
<td>4</td>
<td>Protect Fragile Natural Areas with a Conservation Easement</td>
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<td>Establish and Protect Riparian Zones</td>
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<td></td>
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<td>Conduct an Updated Site Survey</td>
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<td>Nature-Based Recreation</td>
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<td>Provide Recreation Opportunities for All Ages and Abilities</td>
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<td>8</td>
<td>Practice Sustainable Trail Development</td>
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<td>Collaborate with Volunteers and Community Partners</td>
</tr>
<tr>
<td>Education</td>
<td>10</td>
<td>Continue Ongoing Education Programs</td>
</tr>
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<td></td>
<td>11</td>
<td>Install Permanent Education Opportunities</td>
</tr>
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<td>Facilities</td>
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<td>Develop Parking Areas that Protect Natural Elements</td>
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<td>Provide Adequate and Appropriate Parking</td>
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<td>14</td>
<td>Consider the Most Appropriate Restrooms for the Site</td>
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<td></td>
<td>15</td>
<td>Embody the Principles of Crime Prevention Through Environmental Design (CPTED)</td>
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<td>Amenities</td>
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<td>Build Accessible Shelters on the Property</td>
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<td></td>
<td>17</td>
<td>Provide Sufficient Sitting Places Across the Park</td>
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<td></td>
<td>18</td>
<td>Provide Shade in High-Traffic Areas of the Park</td>
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<td>The Active Farm</td>
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<td>Coordinate Educational Opportunities at the Farm</td>
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<td>Promote Community Engagement Activities at the Farm</td>
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<td>Stakeholder Involvement</td>
<td>22</td>
<td>Explore Various Strategies for Stakeholder Involvement</td>
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In late 2020, Cabarrus County, North Carolina conducted a review of potential land parcels available for purchase with the intention to conserve and protect unique natural features in the County. The County’s evaluation team, including the Soil & Water Conservation Board and the Board of Commissioners, used the National Heritage Inventory (NHI) as a guide to help them weigh the ecological significance of each area under review. The NHI is a resource of the North Carolina Natural Heritage Program (NCNHP), which identifies unique or vulnerable features contributing to the culture, natural character, and economy of the state. Through this work, the NHI helps landowners and government planners make development decisions that provide the highest benefit to land users while minimizing ecological impact.

One of the parcels identified by the NHI as possessing significant natural features was subsequently acquired by Cabarrus County. This 616-acre parcel lies north of NC-49, between St. Stephens Church Road and North Lentz Harness Shop Road. A previously conducted survey of the land includes features such as an Upland Depression Swamp Forest and a Dry Oak-Hickory Forest. The Property also contains active farmland to be used by a private operator. Figure 1.1 below illustrates key sections of the parcel.

Figure 1.1: Aerial Map
Cabarrus County purchased the Property from The Conservation Fund through a three-year purchase agreement, allowing the County to immediately move forward with planning and management activities. As this parcel is a mix of wetland, forest, and farmland, Cabarrus County plans to eventually develop a portion of the land into a passive park, while concurrently conserving a larger amount of land that is unique to the region.

To assist with this vision, Cabarrus County has commissioned the help of students of the Gerald G. Fox Master of Public Administration program at UNC Charlotte (henceforth, the MPA team) during the Spring 2021 semester. The MPA team compiled research from relevant literature, park management plans, and interviews with local experts and stakeholders regarding passive park development and natural resource conservation. This report provides findings and recommendations, with a specific objective to illustrate passive park development strategies grounded in the standards of conservation and recreation.

**Passive Parks: Cabarrus County’s Vision**

A passive park (also referred to as a nature park) is generally a minimally developed area designed to provide amenities and features that promote health and well-being, preserve wildlife, and protect natural resources (City MTB, 2018; S. Nagid, March 4, 2021). As opposed to an active park, with ball fields or swimming pools, Cabarrus County’s vision for the 616-acre parcel is to create an inclusive, nature-based park centered around passive recreation amenities such as walking trails, picnic areas, and visitor education. This minimalist approach will facilitate dual objectives of environmental conservation and recreation, while retaining the land’s unique identity.

St. Stephens Park visitors will be able to create their own adventure among the unique natural features of the region. Located in the foothills of the Uwharrie Mountains, the Property provides access to the more rugged landscapes in Cabarrus County. At this Park, visitors will have the opportunity to explore preserved wilderness areas around the wetlands and streams and learn about the flora and fauna on the Property.

**History of St. Stephens Church Road Property**

The earliest known indigenous inhabitants in and around the parcel were the peoples of the Catawba Nation, or “people of the river.” The Catawba Nation’s sphere of influence aligns with the modern-day Carolina Piedmont region. Some of the individual tribes in the area included the Waxhaws, the Sugarees, and the Esaws. These tribes would ultimately form part of the Catawba Indian Nation (Beck, 2013). The Catawba were in the Siouan language group of tribes, and their story is one of coalescence. By the early 1700s, many tribes in the Southeast were enslaving other tribes to be sold. Many of the indigenous refugees from these areas arrived around the Catawba Valley and were integrated into the groups which ultimately comprised the Catawba Indian Nation (Beck, 2013).

Maps from the early 1700s depict a strong presence of the Catawba Nation throughout the Piedmont region, including modern day Cabarrus County. These maps depict a consolidation of Native American settlements in the area who allied due to the realities of the political landscape around them (Beck, 2013). Early explorers identified a unique relationship between all the “towns” of the Catawba; despite their interconnectedness, they all maintained their distinct cultural heritages (Beck, 2013, p. 255). The documented history of the Property begins with the sale of 12,500 acres of land, known as Great Tract Number 6, from King George III to William Hoston, who subsequently sold the land to the
Governor of North Carolina, William Tryon, in 1745 (Cowan & Osborn, 1795; Simpson & Pruitt, 2010). In 1750, King George III granted 500 acres of the Great Tract to Captain Charles Hart, a veteran of the French & Indian War with the South Carolina Militia (Simpson & Pruitt, 2010). According to Ben Callahan, Historical Researcher for Eastern Cabarrus County Historical Society, several of Captain Hart’s soldiers followed him to the area, becoming some of the first settlers of the Site (B. Callahan, February 20, 2021).

While Captain Hart and his men were making their settlement, North Carolina and South Carolina were engaged in ongoing disputes regarding properties along the banks of the Rocky River. At the time, the Rocky River was the biggest geographical feature residents used for land boundaries; however, many properties were actually on one of the creeks or tributaries that fed into the Rocky River, not the river itself. As both North and South Carolina claimed the Rocky River as part of their state due to this confusion, certain residents believed they resided in both Craven County, South Carolina and Anson County, North Carolina (Simpson & Pruitt, 2010). The land dispute went on until 1772, when the land was surveyed. Subsequently, the area around Captain Hart’s plantation and the proposed park were placed solidly within Mecklenburg County (B. Callahan, February 20, 2021; Simpson & Pruitt, 2010).

In April 1777, the State of North Carolina passed legislation that forbid legal agreements with the King of England (Harrell, 1926). The state confiscated land from offenders and sold it to finance the construction of the University of North Carolina in Chapel Hill. A deed from November 7, 1795 details the sale of Tract 16 from Great Tract Number 6 from the Trustees of the University of North Carolina to David Cowan (sometimes spelled Cowen). According to historical records, the St. Stephens Church Road Property is in the northwest corner of the original property that Cowan purchased, meaning that the Property was sold by the State of North Carolina to finance the construction of the University of North Carolina in Chapel Hill, NC.

Once people began buying tracts of land from David Cowan, the Property was split off and sold in plots to individual owners over several decades. In 1989, Porter Byrum, the owner of the Park Road Shopping Center in South Charlotte, began purchasing plots of land with the intent to consolidate. Byrum later sold the land to Pittenger Land Investments, a land investment company founded and owned by former United States Congressman Robert Pittenger. Mr. Pittenger continued the process of consolidating other tracts of land into this parcel until he sold it to a Georgia-based land investment company in 2017. The Property then changed hands one final time, when it was purchased by The Conservation Fund for Cabarrus County in late 2020.
In order to develop recommendations for the St. Stephens Church Road Property, the MPA team: conducted reviews of both academic and non-academic literature; developed existing Cabarrus County citizen input data through stakeholder interviews; interviewed conservation and recreation professionals; and performed a site visit to gain a clearer understanding of the landscape and its natural features.

**Literature Review**

The MPA team conducted research on the following topics:

- Notable examples of public recreation areas within and around conservation areas,
- Notable examples of public recreation areas within and around Upland Depression Swamp Forests,
- Best practices for the conservation of endangered flora and fauna identified on the Property,
- Specific mandates or protections enacted by government or conservation entities (e.g., The Conservation Fund) given the endangered species, farmland, and other unique natural features of the Site,
- Best practices for the development of various recreational amenities typically found at passive parks,
- The history of the Property and existing utilities,
- The conservation of cultivated land as a natural and economic resource, and
- Opportunities for community engagement, recreation, and/or education.

To adequately understand the nuances of these topics, the MPA team obtained information regarding both the theoretical background (e.g., blending conservation and recreation) and the practical implications (e.g., how to build sustainable trails) of various subjects. Additionally, the team gathered information from various types of sources such as academic journals, exemplar passive parks master plans, government reports, and nonprofit articles.

**Community Stakeholder Interviews**

The team utilized the County’s Master Plan to develop interview questions for community stakeholders. A total of 20 stakeholders were contacted and 14 were interviewed. Team members conducted interviews via phone or video calls on platforms such as Zoom, WebEx, and Microsoft Teams and transcribed notes for the purpose of data collection and analysis (See Appendix A: Interviewees; Appendix B: Interview Instrument).

**Expert and Professional Interviews**

In addition to interviewing community stakeholders, the MPA team interviewed experts and professionals in conservation, parks and recreation, and education. The team conducted research and compiled a summary literature review in order to draft high-quality interview questions. The questions align with key themes and seek to obtain information localized to the region. The team contacted a total of 19 key experts and professionals, of whom 14 were available for interviews. Team members
conducted interviews via phone or video calls, on platforms such as Zoom, WebEx, and Microsoft Teams and transcribed notes for the purpose of data collection and analysis (Appendix A: Interviewees; Appendix B: Interview Instrument).

Site Visit

On February 20, 2021, several team members visited the St. Stephens Church Road Property to better understand the natural features of the land and report back to the team. Gathering eye-witness information regarding the topography, water features, access points, and flora and fauna allowed the team to make better-informed recommendations. Several pictures and maps based on the site visit can be found throughout the report.

Key Themes

Through this rigorous research methodology, the MPA team developed recommendations based on best practices for both recreation and conservation as it pertains to the vision for the Park as well as the existing landscape and natural features. The report categorizes the research, findings, and recommendations into seven themes:

- Conservation
- Nature-Based Recreation
- Education
- Facilities
- Amenities
- The Active Farm
- Stakeholder Involvement
In 1973, heeding the warnings presented by the scientific community, the U.S. Congress passed the Endangered Species Act based on the understanding that “species of fish, wildlife, and plants are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people” (United States, 1983, p. 1). Conservation has since become a national priority—in 2017, Federal and State expenditures for the protection of endangered plant and animal species exceeded $1.3 billion (U.S. Fish & Wildlife Service, 2017). Unfortunately, development in the U.S. continues to pose a threat to the environment. According to the Center for American Progress (2019), agricultural, residential, and commercial development in the U.S. impacted more than 24 million acres of natural land between 2001 and 2017.

As pristine natural land disappears, so does its ability to filter the Earth’s water supply, fill aquifers, prevent floods and erosion, regulate climate, and support the millions of species that exist on Earth (Ewing & Kostyack, 2005). On a global level, these processes exist within the biosphere, a “complex, often delicately balanced network” of ecosystems held together by networks of food chains, water flow, pollination, and other natural processes (U.S. Fish & Wildlife Service, 2005, p. 5). On a smaller scale, nature works its magic within natural communities—collections of plants, shrubs, trees, and associated animal species. When plant and animal species are diminished or disappear completely, these networks can begin to unravel. It is understood that plant and animal species naturally disappear through a process known as speciation, where new species emerge at about the same rate as other species become extinct. However, due to human activity, more vulnerable species are disappearing faster than the speciation rate, leading to gaps in the fragile network of natural ecosystems (U.S. Fish & Wildlife Service, 2011). These gaps impact plants and animals as well as humans, as we depend on natural processes for medicine, food, and recreation. The full impact of extinction may not be known until it is too late (Ewing & Kostyack, 2005; U.S. Fish & Wildlife Service, 2011).

The ecosystems of the Carolina Piedmont region are in the direct path of development. Over the last decade, the Charlotte-Concord-Gastonia-Rock Hill metropolitan area ranked among the ten fastest growing metro regions in the U.S. (Ordonez, 2020), and ranked sixth most sprawling large metro area in the U.S. (Ewing & Hamidi, 2014, p. 7).1 In light of this growth, and for the sake of regional diversity and environmental health, it will be crucial to protect the natural communities, plants, and animals existing on the Cabarrus County Site throughout the park development process and into the future. According to North Carolina Natural Heritage Program data, notable populations observed on or near the Property include Upland Depression Swamp Forest, Dry Oak-Hickory Forest, and Carolina Creekshell. Multiple resources note explicitly that Upland Depression Swamp Forest (NatureServe Explorer, 2020b) and Carolina Creekshell (NatureServe Explorer, 2021) are directly threatened by urban development in the Charlotte metro area.2 Other vulnerable species, including those not observed on the Property, rely on the wetland and forest areas. These considerations are discussed below, along with a description of the existing natural areas at the Site, associated plants and wildlife, and issues to be addressed on a local and national scale, followed by recommendations for maintaining the integrity of the Site’s natural features as development moves forward.

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1 Metrics are based on metro areas with a population of at least one million.
2 Although not observed at the Property, the Federally Endangered Schweinitz’s Sunflower has also been impacted by growth in the region (U.S. Fish & Wildlife Service, 2011).
Existing Natural Areas

The ideal approach to land use planning begins with a complete understanding of “the ‘integral reserve’ or undeveloped bioreserve,” so that decisions made about a site “copy nature and hasten her work,” rather than oppose it (Lacaze, 2000, p. 139). Local experts agree. Scott Pohlman of the NC Natural Heritage Program suggests identifying those areas to be protected and designing compatible development plans accordingly. Another expert finds that passive park visitors “are looking for a nature-based experience, so that should be the focus” (C. Matthews, March 8, 2021). This advice sets the stage for a development plan that prioritizes natural area conservation at the Cabarrus County Site. The primary natural areas include seasonal wetlands and an oak-hickory forest.

Wetlands

The wetlands at the Site are classified as Upland Depression Swamp Forest (UDSF), defined as “isolated wetlands primarily of the Piedmont in small, shallow basins in upland settings where water pools due to limited soil drainage” (NatureServe Explorer, 2020b, n.p.). UDSFs are seasonal wetlands, as they fill up over the winter rainy season and dry out over the summer. The UDSF natural community is unique to the Piedmont region of the Eastern/Southeastern United States. These communities are considered “rare, unique, and imperiled” (Baranski et al., 2015, p. 40; NatureServe Explorer, 2020a, n.p.; Veverka, 2012). According to the United States Department of Agriculture (USDA) protection system, UDSFs are classified as G2G3 (Imperiled-Vulnerable) (NatureServe Explorer, 2020a). UDSFs are not as susceptible to development or other economic uses due to their small size and poor drainage. These same characteristics, however, mean they are often not protected under standard wetland regulations (NatureServe Explorer, 2020b).

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3 G2 Imperiled: “At high risk of extinction or collapse due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.” G3 Vulnerable: “At moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.” Source: <https://explorer.natureserve.org/AboutTheData /Statuses#Global>. Two different ratings may be provided when there is insufficient evidence to choose only one categorization.
The St. Stephens Church Road Property is also home to a Dry-Oak Hickory Forest (DO-HF). This natural community, found largely in the southeastern United States from Alabama to Virginia, is considered to be among “the most natural community types in the Piedmont landscape,” (NCWRC, 2021a, n.p.). Dominant tree species observed at the Site include White Oak, Post Oak, Chestnut Oak, and Shagbark Hickory, along with numerous other species of trees, shrubs, herbs, and ferns. (For a complete listing of observed species, see Appendix C: Lower Butcher Branch Inventory.) According to the NC Wildlife Resources Commission (2021a), Dry-Oak Hickory Forests are home to several vulnerable wildlife species, which require large, undisturbed forested areas to thrive. Although most of these animal species have not been observed on the Property as of late, proper conservation management may encourage native wildlife species to return. Table 1.1 lists the most vulnerable species native to the DO-HF community. (For a full listing of relevant animal species, see Appendix D: Forest Priority Species).

### Table 1.1: Threatened Wildlife Species Native to Dry-Oak Hickory Forests

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>COMMON NAME</th>
<th>PROTECTED STATUS</th>
<th>RELEVANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Accipiter cooperii</em></td>
<td>Cooper’s Hawk</td>
<td>Special Concern</td>
<td>Site represents known habitat</td>
</tr>
<tr>
<td><em>Crotalus horridus</em></td>
<td>Timber Rattlesnake</td>
<td>Special Concern</td>
<td>Site represents known habitat</td>
</tr>
<tr>
<td><em>Helianthus schweinitzii</em></td>
<td>Schweinitz’s sunflower</td>
<td>Endangered</td>
<td>Site represents known habitat</td>
</tr>
<tr>
<td><em>Hemidactylium scutatum</em></td>
<td>Four-toed Salamander</td>
<td>Special Concern</td>
<td>Observed on the Site</td>
</tr>
<tr>
<td><em>Hyla versicolor</em></td>
<td>Northern Gray Treefrog</td>
<td>Significantly Rare</td>
<td>Site represents known habitat</td>
</tr>
<tr>
<td><em>Sistrurus miliarius</em></td>
<td>Pigmy Rattlesnake</td>
<td>Special Concern</td>
<td>Site represents known habitat</td>
</tr>
</tbody>
</table>

As discussed above, threats to natural habitats represent threats to the plant and animal species that live in them. Between 1990-2002, this forest type declined by 400,000 acres nationwide (7%) due to conversion to residential, commercial, and agricultural uses (Brown & Sheffield, 2003). Other risks to this type of forest community include fire suppression and conversion to pine plantations (NCWRC, 2021a), both of which have occurred at the St. Stephens Church Road Property (see Appendix C: Lower Butcher Branch Inventory). According to NC Natural Heritage Program data, the DO-HF at the Site is the best-known example of this natural community type in Cabarrus County, strengthening the case for its continued protection.
The Larger Ecosystem

The Cabarrus County Site is especially valuable due to the combination of Upland Depression Swamp Forest (UDSF) and Dry Oak-Hickory Forest (DO-HF) communities, which provide habitat for the wildlife in the area. Within singular ecosystems such as these, threats and associated management practices are universal—in many cases, protecting animal species involves protecting their habitats, and threats to the former represent threats to the latter. It follows that recommendations for the conservation of wildlife populations are similar to those of the UDSF and DO-HF communities. Thus, recommendations for protecting wildlife on the Property will offer concurrent benefits for the larger ecosystem. The following subsections describe the needs of, threats to, and benefits of specific wildlife species at the Park Site.

Amphibians and Reptiles

Wetland communities like the Upland Depression Swamp Forest (UDSF) are important habitats for species of frogs, toads, salamanders, snakes, and lizards—collectively known as *herpetofauna*. Animals such as the Fowler’s Toad (above right) and Spotted Salamander (below right) thrive in UDSF because these habitats do not support fish which may otherwise prey on amphibian larvae. These species also use seasonal wetland areas as breeding sites during the wet seasons and migrate to forested areas in dry seasons (Bailey et al., 2006; Moorman et al., 2017). These *life zones* are crucial to the well-being of these species and showcase the value of intact upland forested areas in close proximity to wetland sites (Bailey et al., 2006; S. Pohlman, March 10, 2021; NCWRC, 2021b).

Conservation of amphibian species is a primary concern in wetland areas because of the ecological benefits they provide. Herpetofauna may be predators that regulate populations of insects or rodents, or they may be important food sources for many species of birds, mammals, and other amphibians and reptiles (Moorman et al., 2017). Herpetofauna also serve as indicators of overall environmental health. A diverse community “indicates that an area can support the plants and insects herps need for food and that the area has a habitat available for a variety of wildlife” (Moorman et al., 2017, n.p.). Table 1.2 provides additional information on herpetofauna conservation.
Table 1.2: Conservation Spotlight: Amphibians and Reptiles

<table>
<thead>
<tr>
<th>Threats and Best Practices for Amphibians and Reptiles</th>
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<tbody>
<tr>
<td>The natural areas at the Cabarrus County Site are home to various species of herpetofauna (amphibians and reptiles), including an abundance of Spotted Salamander (<em>Ambystoma maculatum</em>). These animals are vulnerable to specific threats, such as:</td>
</tr>
<tr>
<td>● <strong>Habitat Loss and Fragmentation.</strong> Forest clearing, leveling terrain, and fragmentation due to development all pose significant risks to herpetofauna habitat.</td>
</tr>
<tr>
<td>● <strong>Sedimentation and Pollution.</strong> Soil disturbed due to construction and development allows sediment to wash into wetlands. Sediment collects in hiding places between rocks and lowers the oxygen level in the water, harming herpetofauna and the plant species they eat.</td>
</tr>
<tr>
<td>● <strong>Altered Hydrology.</strong> Disturbed rainwater flow may also bring insecticides, herbicides, petroleum products, and other pollutants into the wetland area, which can harm herpetofauna directly and contaminate their food supply (Moorman et al., 2017).</td>
</tr>
<tr>
<td>Best Practices for Preservation</td>
</tr>
<tr>
<td>● Maintain the integrity of wetland and forest areas as a complete habitat by leaving ‘safe corridors’ between various sections of the Park.</td>
</tr>
<tr>
<td>● Avoid diverting water from impermeable surfaces into the wetland area to minimize sedimentation and pollution.</td>
</tr>
<tr>
<td>● Avoid ditching and draining wetlands.</td>
</tr>
<tr>
<td>● Do not disturb <em>buffer zones</em>, areas with trees and shrubs adjacent to wetland habitats.</td>
</tr>
<tr>
<td>● Reduce the potential for road mortality by limiting automobile or ATV traffic to the Park exterior.</td>
</tr>
<tr>
<td>● Protect streamside vegetation during development (Bailey et al., 2006; Moorman et al., 2017).</td>
</tr>
</tbody>
</table>

**Carolina Creekshell**

The Cabarrus County Site shares tributary streams with neighboring water bodies that provide a habitat for the Carolina Creekshell (*Villosa vaughaniana*), a freshwater mussel classified as *G2 (Imperiled)* by the United States Department of Agriculture4 (NatureServe Explorer, 2021) and *Endangered* by the State of North Carolina.5 The Carolina Creekshell contributes to rich diversity found in the Carolina Piedmont, an ecosystem with the highest number of native fish, mussels, and crayfish species found in North America (Abell et al., 2000). The Carolina Creekshell is endemic to the Charlotte metropolitan area, and so is at significant risk due to the continuing development in this region. Threats to this species include urban development, excessive water use, and dams and impoundments, calling for careful land use planning as a primary mode of conservation (NatureServe Explorer, 2021).

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4 Ibid.
5 "Any native or once-native species of wild animal whose continued existence as a viable component of the State's fauna is determined by the Wildlife Resources Commission to be in jeopardy or any species of wild animal determined to be an 'endangered species' pursuant to the Endangered Species Act" (Article 25 of Chapter 113 of the General Statutes; 1987). Source: NC Department of Natural and Cultural Resources: [files.nc.gov/dncr-nhp/nheo_tier_1_and_2_attribute_info.pdf](http://files.nc.gov/dncr-nhp/nheo_tier_1_and_2_attribute_info.pdf)
Recommendations

This section offers recommendations for conservation of the Park Site. Each recommendation includes a description of the issues, concrete strategies for implementation, examples of similar efforts and initiatives, and resources available to the County as future how-to guides.

**Recommendation 1: Avoid Fragmenting Natural Areas**

*Description*

Natural ecosystems thrive when they are left intact and contiguous (S. Pohlman, March 10, 2021). Adjacent residential and commercial development and roadways can result in landscape fragmentation within or between natural communities (NatureServe Explorer, 2020a, b; NCWRC, 2021b). Additionally, wildlife migration patterns exist between wetlands and their surrounding buffer zones, known as *amphibian life zones* (S. Pohlman, March 10, 2021). Amphibians and reptiles rely on uninterrupted access between forested areas and wetland breeding grounds to sustain their annual life cycle (Bailey et al., 2006; NCWRC, 2021b).

*Strategies*

- Limit all roads and major facilities construction to the exterior of the Park.
- Leave trees and shrubs along waterways intact. Avoid clearcutting large swaths of forested area.
- Monitor for invasive species, pests, and disease.
- Minimize the impact that construction projects (e.g., trails and interpretive signage) have on forested areas.

*Examples*

- **NC Zoo Natural Areas.** Dry-Oak Hickory Forest adjacent to the NC Zoo in Randolph County is a pristine example of this natural community type, providing a natural habitat for wildlife and federally endangered plant species. The Zoo has acquired specific properties to connect its adjacent forests with other local natural areas such as Richland Creek, Harvey’s Ridge, and Selma Cornelison Ward Preserve. These efforts provide larger sections of contiguous habitat, which is critical to preservation of key species in the area like Bobcat, Timber Rattlesnake, and Schweinitz’s sunflower. The NC Zoo provides visitors and with low-impact recreation opportunities such as hiking on its four miles of trails. In 2016, 6th grade students mapped and identified and collected invasive species on the property and compiled findings into a community awareness resource.

- **R. Wayne Bailey-Caswell Game Land.** A significant example of Dry Oak-Hickory Forest is at the R. Wayne Bailey-Caswell Game Land, a 18,000-acre site in Caswell County, NC. The game land is a rarity because of its size and continuity, which offers a thriving habitat for plants and wildlife as well as hunting, fishing, birdwatching, and other recreation opportunities. Disconnected

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6The NC Zoo Natural Areas are ranked ‘A’ for “excellent estimated viability/ecological integrity” by the NC Natural Heritage Program, which factors in criteria for size, condition, and landscape context (data and information courtesy of Scott Pohlman).
parcels of poor-quality farmland were transformed through conservation efforts including regular prescribed burns, minimal road and facilities, and selective thinning to achieve a “diversity of upland hardwood species and various age class compositions” (Baranski et al., 2015, p. 38). Outcomes include a healthy forest community with sustained and restored populations of birds, mammals, reptiles, amphibians, and plants.

Key Resources


Recommendation 2: Preserve the Site’s Natural Drainage

Description

Disrupting the natural flow of water within a watershed can have adverse impacts on seasonal wetlands. Once water is diverted from a site because of drainage, ditching, or impermeable surfaces, wetland areas may not refill during wet seasons, causing permanent damage to the habitat. Development activity may also harm these communities. Direct harm may come from construction in and around an Upland Depression Swamp Forest, which could damage the impermeable substrate and preclude normal water refill. Indirect harm may be caused by sedimentation and pollution. Soil disturbed due to construction and development can wash into wetland areas, filling hiding places between rocks and lowering the oxygen level in the water. This is detrimental to amphibians and reptiles and the plant species they eat (Baranski et al., 2015; NatureServe Explorer, 2020a, b; NCWRC, 2021b). Further, diverted rainwater flow may also bring insecticides, herbicides, petroleum products, and other pollutants into the wetland area, which can harm amphibians and reptiles directly and contaminate their food supply (Moorman et al., 2017).

Strategies

- Maintain the natural grade of the land.
- Implement low-impact construction projects.
- Opt for permeable building materials in place of concrete and asphalt when building areas with large surface area, such as parking lots (See Recommendation 12: Develop Parking Areas that Protect Natural Elements).

Examples

- **Flat Branch Nature Preserve, Charlotte, NC.** Located in South Charlotte, the Flat Branch Nature preserve includes an Upland Depression Swamp Forest similar to that at the Cabarrus County Site. In 2016, the Mecklenburg County Parks Department installed a concrete boardwalk across the wetland, providing visitors with an up-close look at this unique natural feature. Using modern, ‘top-down’ technology, the boardwalk installation offers a long-lasting recreational amenity while keeping the fragile wetland substrate intact. Additionally, the site has minimal
built features to provide “much needed open space in a rapidly developing area of the county” (Mecklenburg County, 2021, n.p.). Of its 42 acres, only 1.1 are developed with basic facilities—a parking lot, shelter, restrooms, the boardwalk, and interpretive signage. mecknc.gov/ParkandRec/StewardshipServices/Pages/NPTextDetail.aspx.

- **Hawksbill Greenway, Luray, VA.** The Hawksbill Greenway utilizes a permeable paving surface in its parking lot and rain gardens to allow for natural stormwater runoff into adjacent Hawksbill Creek. Permeable surfaces are built using porous asphalt or permeable interlocking pavers, and are appropriate for walking, biking, and normal auto traffic. Typically, a drainage system beneath the surface prevents paved areas from flooding and allows stormwater to keep its natural course.

**Key Resources**


### Recommendation 3: Apply Forest Management Guidelines

**Description**

According to NC Natural Heritage Data, the Dry Oak-Hickory Forest on the St. Stephens Church Road Property is the best-known example of this community type in Cabarrus County, and should be managed as the valuable resource that it is. Data show that fire suppression, pine cultivation, and invasive species are observed or highly likely. Regular fire in these forests is important because it controls invasive species, creates woody debris and tree snags available for wildlife habitat, and creates canopy gaps which allow natural understory growth (NCWRC, 2021a). Prolonged fire suppression can lead to mesophication, or dominance of plant species which thrive in fire-suppressed environments. As this process continues, it becomes increasingly difficult to restore natural habitat through fire, leading to poor species diversity (Nowacki & Abrams, 2008). As species diversity diminishes, natural areas more closely resemble a monoculture, where a singular plant species dominates. Monocultures are more vulnerable to catastrophic losses from disease or pests and support fewer wildlife species (A. Reynolds, March 3, 2021). Specifically, the loblolly pine plantation on the Site is more prone to Southern Pine Beetle outbreaks. Also, if left unchecked, loblolly pines can topple over due to weakened root systems, posing serious threats to visitors and park staff (C. Rogers, March 17, 2021).

**Strategies**

- Conduct prescribed burns every 3-7 years to discourage invasive species and improve the overall health of the Property.
- Perform selective tree thinning to achieve desired species diversity and age class compositions.
- Monitor for invasive species, pests, and diseases, specifically species which contribute to mesophication.
- Thin or clear the loblolly pine forest on the Property to encourage restoration of the Dry Oak-Hickory species. These trees can be sold for timber as a one-time source of income, but replanting and selling as an ongoing operation is highly discouraged. Ensure the project is not
rushed, so that loggers are able to cut in a way that protects the land. If logging is on a strict timeline, cutting in poor conditions (e.g., very rainy periods) could damage the land.

- Use profits from timber sales to train staff and enhance the County’s capacity to conserve the Property.

**Examples**

- **Mecklenburg County Natural Resource Management Plan.** The management plan outlines objectives and targets for land managed by Mecklenburg County. Relevant objectives include:
  - Plan and conduct restoration timber operations in low quality forests to increase groundcover, seral stage, and stand structure diversity. Timber operations should push communities to pine/oak/hickory forests and target at least 70 acres (1%) every five years until community goals are achieved.
  - Plan and conduct prescribed burns on 6-10% of preserve acres per year, varying seasons when possible. Conduct prescribed fire treatment of non-native invasive plant species on at least 10 acres of nature preserve annually.


**Key Resources**


**Recommendation 4: Protect Fragile Natural Areas with a Conservation Easement**

**Description**

Conservation easements are temporary or permanent legal protections placed upon a piece of land. Government and nonprofit entities monitor development and usage of the land under protection to ensure compliance with the easement. The Upland Depression Swamp Forest (UDSF) on the Site may be an ideal piece of the Property in need of protection. Because UDSFs are seasonal wetlands, they are often not eligible for normal wetlands protection programs (NatureServe Explorer, 2020b). Ensuring that the UDSFs do not become destroyed through development or unnecessary construction at the Site will protect it and the plant and animal life that call it home.

**Strategies**

- Establish the Site as a Dedicated Nature Preserve with the state of North Carolina. This is the highest form of land protection in the state (See Appendix E: NHP Chapter 13H Rules).
Examples

- **Embro Game Land Dedicated Nature Preserve, Warren & Halifax Counties, NC.** In 2012, the NC Wildlife Resources Commission designated over 8,000 acres of state-owned land for protection. The property’s notable features include a Piedmont Alluvial Forest, Piedmont Swamp Forest, Floodplain Pools, beaver ponds, rare plants, and other remarkable features which provide important ecological functions. Intended uses include fishing, hunting, birdwatching, and education. [ncnhp.org/media/4/open](http://ncnhp.org/media/4/open).

Key Resources


**Recommendation 5: Establish and Protect Riparian Zones**

Description

Riparian zones are vegetated areas surrounding streams, rivers, wetlands, lakes, ponds, or other bodies of water. According to Osmond and Burchell (2017), vegetation can act as a ‘buffer’ to:

- Filter stormwater runoff by capturing sediments and nutrients. When planned appropriately, these buffers can be particularly effective at filtering agricultural pollutants.
- Provide shade to the water which helps maintain water temperature at ideal levels.
- Stabilize stream banks.
- Retain water within wetland areas.
- Enhance species diversity.

Chris Matthews, Director of Nature Preserves and Natural Resources for Mecklenburg County, points out the need to manage entire watersheds, not just land within property lines. “You preserve this [wetland] and develop all around,” he observes, “you kill the wetland.” While protection of water on the Site is important, “the watershed also needs to be protected, because that’s the source of water” (as cited in Veverka, 2012). Protecting and promoting riparian zones on and around the Cabarrus County
Property will enhance the health of the wetlands on the Site and protect water quality from potential agricultural runoff (S. Pohlman, March 10, 2021).

**Strategies**

- Plant trees, shrubs, and grasses along tributary streams around the Property.
- Avoid disturbing trees and shrubs which provide shade and filtration for the ponds, streams, and wetlands on the Site.
- Communicate with adjacent property owners and the community at large about the benefits of land conservation. Several conservation easement programs provide tax incentives to landowners who dedicate their land to the protection of plants, wildlife, water sources, and other natural or cultural features on the land. Landowners may register some or all of their property as a conservation easement with a nonprofit or government entity on a temporary or permanent basis in order to receive these benefits.

**Examples**

- **Creek Releaf.** The Charlotte Public Tree Fund hosts the annual Creek Releaf project with the help of donors, volunteers, and various community and local government partners. Planting projects are designed to restore water and air quality, tree canopy, and wildlife habitat. Volunteers install tree seedlings and weed mats, tree tubes, and stakes which protect young trees from invasive species, flooding, and animal damage. As of 2018, the Creek Releaf initiative planted over 23,000 trees and spread community awareness of the benefits of riparian zones. [charlottetreefund.org/creek-releaf](http://charlottetreefund.org/creek-releaf).

**Key Resources**


**Recommendation 6: Conduct an Updated Plant and Wildlife Inventory**

**Description**

“Mapping and analysis of ecological conditions are at the basis of all decisions taken in the context of improvement,” writes Lacaze (2000, p. 140). Thus, he recommends that management “undertake an inventory of...particular habitats, interesting animal or plant populations, landscapes or remarkable
viewpoints, which would then be the object of specific measures in each working [land management] plan.” Unfortunately, the existing data of the Cabarrus County Property is not current; the most recent observations were documented in 2012, with some ranging as far back as 1992. Local experts recommend performing an updated natural resources inventory to determine the viability of the land and identify those species that may garner priority protection status (S. Pohlman, March 10, 2021; A. Reynolds, March 3, 2021).

**Strategies**

- Apply for a BioBlitz through WakeNature Preserves Partnership. During BioBlitz events, the Partnership coordinates local experts and government agencies to identify and survey living species on pieces of publicly-owned land, such as the St. Stephens Park property. See the example, “Procter Farm Preserve,” below.
- Host a BioBlitz, inviting community members and school groups to find and identify “as many species as possible in a specific area over a short period of time” with the help of smartphone technology (National Geographic, 2021). (See also, Recommendation 10: Continue Ongoing Education Programs.)
- Enlist the help of the NC Natural Heritage Program (NCNHP). As the Site includes an existing natural area, the NCNHP is a great resource for conducting a natural inventories survey and assisting with land management. [ncnhp.org/contact](http://ncnhp.org/contact)
- Collaborate with local conservation groups to document various species. Options include:
  - NC State Extension Master Gardener Volunteers of Cabarrus County
  - Mecklenburg Audubon Society
  - NC Native Plant Society, Southern Piedmont Chapter
  - Sierra Club, Central Piedmont Group

**Examples**

- **Procter Farm Preserve.** In 2018, WakeNature Preserves Partnership coordinated a natural resources inventory project at Procter Farm Preserve, a 571-acre equestrian and hiking facility in Wake County, NC. Participants searched for various species such as birds, reptiles and amphibians, insects, and plants, and eventually found and documented over 300 species.

**Key Resources**

Nature based recreation is defined as “outdoor activities in natural settings or...elements of nature” (Cordell, 2008, p. 4), and includes walking, hiking, biking, horseback riding, and more (The Wilderness Society, 2021). These activities are widely popular, as parks and protected areas in North America receive over 3 billion visitors per year (Anderson et al., 2015). Park patrons may enjoy improved physical health, lower stress levels, and stronger community cohesion (AARP, 2018), and nature-based recreation opportunities are frequently cited as a primary measure of a community’s quality of life (EKU Recreation and Park Administration, n.d.). Furthermore, the economic impact of tourism and recreation can be substantial (Anderson et al., 2015). Because this thriving industry is reliant on sustained species biodiversity and natural aesthetic beauty, conservation efforts can lead to economic, recreational, and educational benefits (AARP, 2018; Dunk et al., 2006; Macaulay, 2016; Rocchi et al., 2020). Park developers can secure these benefits within their own communities by offering creative, conservation-minded opportunities for park visitors.

Considering its unique natural features and rich biodiversity, the St. Stephens parcel offers an excellent opportunity to provide various types of nature-based recreation, specifically those occurring on and within trails and open spaces on the Property. The following section outlines basic requirements for popular nature-based recreational activities and corresponding recommendations for development and management. These recommendations align the needs and interests of the local community with critical protections for the land itself.

**Trails**

With the help of public, private, and nonprofit initiatives and thousands of volunteers, trails have exploded across the country in the last several decades. Nearly 30,000 miles of walking, hiking, and mountain biking trails have been constructed since 1966, providing adventure, urban renewal, health and economic benefits, social connections, and immersion into history and culture for trail users and nearby communities (American Hiking Society, 2015).

According to the National Park Service (2012, pp. 9-11), there are five common trail classifications installed according to the trail’s intended users, the surrounding natural area, weather and climate conditions, and the availability of funding and labor. These are:

- **Class 1: Minimal/Undeveloped.** This trail type offers users a primitive, natural experience along a natural ‘tread,’ or the specific area of the trail where hikers walk. The tread is narrow, offering minimal passing opportunities, making these trails appropriate for more skilled hikers. Structures and amenities may be nonexistent or lacking, and the natural trail bed requires infrequent maintenance.

- **Class 2: Simple/Minor Development.** This trail type is slightly more developed but tends to remain relatively narrow. Biking and equestrian activities are possible in some cases. The natural trail bed may include primitive drainage features and footbridge crossings, but these trails are unlikely to have amenities or structures.

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7 Another consideration for choosing trail types is safety. Due to their width and navigable surfaces, more developed trails will allow paramedics to bring medical equipment or ATVS onto trails in the event of a rescue. These safety features, however, may detract from the natural aesthetic of the park.
• **Class 3: Developed/Improved.** This trail type supports hiking, biking, equestrian, cross country skiing, and snowshoeing. The trail tread is an uninterrupted path with no ambiguity about the direction in which the hiker should travel. These trails are made of natural materials and provide occasional allowances for passing. Trail structures, amenities, and bridges are common. This trail type is generally appropriate for users with moderate skills and abilities.

• **Class 4: Highly Developed.** Highly developed trails comfortably support the activities included on Developed/Improved trails and are found in more populated areas near parking lots and nature centers. The tread is wide and smooth, is often made of native or imported materials, and consistently supports two-way travel. The grade is often flat, and structures, amenities, and bridges are common, providing opportunity for users of all ability types.

• **Class 5: Fully Developed.** Fully developed trails are continuous, constructed with asphalt or other hardened materials, meet the requirements of the Americans with Disabilities Act (ADA), maintain a generally flat grade, and are always near facilities and roads. Drainage structures, safety information, and signage are common, and maintenance plans are designed to achieve accessibility for users of all ages and abilities.

Trail sustainability is another important aspect of trail design. Sustainable trails are long-lasting, low-impact trails that “complement and flow with the natural landscape” (Maricopa County Parks and Recreation Department, 2018, p. 26). Beers (2009) explains that sustainable trails are those that: (1) do no harm to natural and cultural resources; (2) withstand impacts from recreation with only routine maintenance; and (3) offer exactly what the intended user needs, eliminating the urge for visitors to leave the trail. Sustainable trails are ideal because they protect the natural environment, require less maintenance, and provide trail users a satisfying experience (Maricopa County Parks and Recreation Department, 2018, p. 26; National Park Service, 2012). Different trail uses include walking and hiking, mountain biking, and equestrian.

**Walking and Hiking Trails**

According to the National Recreation and Parks Association, 45% of American’s say walking and hiking are their top outdoor activities (NRPA, 2021). Additionally, trails and their associated activities are perennial favorites in Mecklenburg County’s annual community survey, spurred by visitors looking for an opportunity to recreate at their own pace in a quiet, natural environment (A. Reynolds, March 3, 2021;
Walking and hiking trails provide physical and mental health benefits. They also can be designed to minimize damage to natural surfaces and features of a site when built according to established sustainability standards. Further, the inclusion of walking and hiking trails in parks is a great way to attract users with a variety of skillsets and interests (Carolina Thread Trail, 2021; Washington State Recreation and Conservation, 2021). The St. Stephens Church Road Property is conducive to the full range of walking and hiking trails, from primitive, natural hiking routes to paved, ADA-compliant paths.

**Mountain Biking Trails**

Mountain biking trails are designed for the sport of riding bicycles over rough terrain. Mountain biking has grown steadily; between 2005 and 2015, use of mountain biking trails increased by 8.1%. Mountain biking trails can diversify park activities and encourage a wider visitor base (BLM & IMBA, 2017). There are several considerations for mountain biking trails, including trail types, specifications, special features, downsides, and community involvement.

*Mountain Biking Trail Types*

Mountain biking trails are similar to walking trails in terms of trail length, surface type, width, and grade, but use of these trails is often specified as single-use or shared-use by trail or park management (BLM & IMBA, 2017). Single use trails are designed specifically for bikers’ needs by offering technical challenges, such as difficult terrain with steep inclines or sharp turns. Shared-use trails will accommodate additional uses such as hiking and trail running. These trails require more moderately sloped terrain to accommodate walkers, and trail length may be designed to match standard running distances (e.g., five kilometers). Trail managers may integrate different user needs by limiting routes based on user types. For example, bikers ride in one direction and walkers and runners travel in the opposite direction. Trails at Rob Wallace Park utilize this technique and include signage specifying the direction of travel for bikers and walkers.

*A mountain biking trail with a raised berm*
**Trail Specifications**

The ideal terrain for mountain biking trails includes hard soil with frequent changes in elevation (BLM & IMBA, 2017). Mountain biking trails are generally constructed from compacted dirt. Other materials like gravel and asphalt may be used but can reduce traction and increase wear on bicycle tires.

The Carolina Cycling Club recommends a minimum trail length of 10 miles but suggests that 20 miles would create a more attractive regional biking destination (M. Hartman, March 3, 2021). While 10 miles is feasible for biking enjoyment at the Cabarrus County site, it would require a high trail-to-land area ratio, otherwise known as **trail density**. Low trail density helps retain undisturbed land, provides enough mileage to minimize redundant riding experiences, and discourages bikers from cutting across trails. It is estimated that mountain biking trails at the Cabarrus site would require at least 200 acres of trail, with a density of 1 mile per 20 acres. Compared to other parks in the area, this is relatively high density:

- Rob Wallace Park has 4.2 miles of trails at a density of 1 mile per 34 acres (Cabarrus County, 2021). At this density, trail users will be unable to see other users on different parts of the trail. This isolation is desired and leaves plenty of undisturbed land.
- The U.S. National Whitewater Center, the fifth most popular mountain biking location in NC, has over 50 miles of trail at a density of 1 mile per 26 acres (USNWC, 2021). At this level, mountain bikers may see others, but there exists enough trail mileage to minimize redundant riding experiences.
- Rocky River, the most popular trail in Cabarrus County, has 11.5 miles of trails at a density of 1 mile per 7 acres (MTB Project, 2021). At this level, there is considerable visibility from one trail section to the next, and bikers may be tempted to cut across trails and disturb natural areas.

**Pump Tracks**

A specific type of single use trail suggested by Cabarrus County is a pump track. The origin of this type of trail comes from BMX racing. A pump track is a mountain biking course set with rolling hills and turns, and is designed so that pedaling is minimal. The rider builds momentum through weight manipulation on their bike (pumping) and going down hills. These hills are usually formed dirt mounds but can be made of more permanent materials such as cement, asphalt, or wood. At an average length of only 110 meters, pump tracks can provide a diverse range of jumps and terrain within a limited space, making them ideal for urban areas or even backyards. These trails are not recommended for a passive park as their iconic dirt berms are continually worn down and require high maintenance. They are also prone to flooding and erosion. In addition, a pump track could present a safety and liability issue.

**Downsides to Mountain Biking Trails**

Despite being a popular sport, mountain biking has its share of downsides that should be considered. First, trails may see only seasonal use. Because trails are closed during rain to decrease the wear on the trail and prevent accidents, the mountain biking season peaks in August when temperatures are mild and rain less frequent. Second, mountain bikes can create an increased risk for invasive species dispersal as seeds travel in dirt collected on mountain bike tires (S. Nagid, March 4, 2021). This impact can be reduced by providing washing stations so that bikes can be cleaned of debris before and after riding, but these amenities will incur additional cost and park space. Because of these issues, mountain biking trails may not be a beneficial investment for the entire community.
Community Involvement

According to area experts, decisions about mountain biking at the Park should consider both local interest in mountain biking and trail construction costs (Paris, March 4, 2021). Further community discussion and planning may be required, including exploring how current mountain biking trails within the County are being used. For example, data on the daily or seasonal number of mountain bikers on Cabarrus County trails would provide an accurate look at the demand for public mountain biking in the area. Finally, if there is community support, future planning of mountain bike trails should involve significant input from relevant community groups (USDA, 2008), including the opinions and expertise of the local mountain biking community.

Potential community partners include the Central Carolina Cycling Club and the Tarheel Trailblazers, both of which are active in Cabarrus County. Park officials may be able to partner with these groups to improve the mileage, quality, and diversity of trails in the County. One example of such a partnership exists between the Tarheel Trailblazers and the Charlotte-Mecklenburg Parks and Recreation Department. Formalized through a Memorandum of Understanding, this agreement allows the Trailblazers to perform mountain biking trail design and maintenance in Mecklenburg County (for the full document, see Appendix F: Tarheel Trailblazers Memorandum of Understanding).

Equestrian Trails

Equestrian trails are designed to provide an enjoyable recreation opportunity for riders and safe passage for horses. In order to accommodate equestrian activity, park developers should be mindful of the numerous requirements associated with horses. First, trucks and trailers require wide turning lanes, designated parking lots with pull-through parking spaces, and entrance roads which loop back to the park entrance, rather than terminating at ‘dead-ends.’ Second, equestrian trails require a large ‘box,’ or clearance around the horse and rider, requiring frequent pruning of trees and shrubs adjacent to the trail (See Figure 4.1 below). Third, equestrian trails are frequently damaged by horses’ considerable weight and small trail contact points. Soil should be compact, rocky, and drain easily to support equestrian activity and prevent erosion and unsafe conditions for horses (See Appendix I: Soil Data for soil composition information). Fourth, equestrian trails should be long enough (at least 5 miles) to allow riders a sufficiently intensive recreation experience. Finally, equestrian activity requires certain amenities. These include a warm-up area for the horses, concrete pads with tie off posts to wash horses, frequent water sources for horses along trails, and clearly marked trail designations to keep all park visitors safe (A. Reynolds, March 3, 2021; C. Matthews, March 8, 2021; Hancock et al., 2007).

In some cases, equestrian accommodations may require expensive and time-consuming maintenance and create conflicts with other trail users. Compared to biking and hiking trails, equestrian trails can degrade trails to an extreme degree (Osleger, 2019). Hikers and bikers also tend to dislike sharing trails with horses. For example, horse manure is displeasing to those on bikes and on foot (S. Nagid, March 4, 2021), and horses may be ‘spooked’ by speedy mountain bikers and children who are not “horsewise” (Hancock et al., 2007, n.p.).

Several parks experts and community stakeholders interviewed by the MPA team voiced some of these concerns. One member of the local mountain biking community pointed out that horses often undo the hard work his club devotes to building and maintaining safe, pristine mountain biking trails. Similarly,
one Mecklenburg County park manager noted that most nature preserve trails are too soft or narrow for horse trails. Another expert from Mecklenburg County Parks finds that, along with considerable trail maintenance needs, the parking areas for equestrian trailers often require clearing and developing an excessive amount of land where conservation may be the ultimate priority. Finally, Cabarrus County Active Living and Parks questioned whether equestrian activity should be a priority at St. Stephens Park. Horseback riding, they discussed, is an activity enjoyed by a limited number of citizens, and may not be a proper use of public funds and precious park space. Considering these issues, the MPA team cannot recommend an activity that could introduce intensive management requirements and visitor conflict at the Park. Further community discussion and planning may be required (See Section IX: Stakeholder Involvement).

Open Spaces

For the purpose of this study, open spaces are treeless, grassy areas. Open spaces provide multiple benefits for park visitors and the surrounding community. For example, open spaces enhance the beauty of the neighborhood, improve users’ social and psychological conditions, improve conservation efforts, provide economic growth, and reduce crime (EPA, 2017; Yuniastuti & Hasibuan, 2019). For children in particular, open space promotes numerous functions: physical health and weight management, motor skills and cognitive development, socialization and independence, and self-esteem and self-confidence (CPHA, 2019;
Yuniastuti & Hasibuan, 2019). These benefits may also be extended to the larger population as friends and neighbors come together for exercise and social activity (University of Idaho, 2016). However, in order to reap these benefits, communities must undertake active, deliberate planning strategies. Even if open space is provided, it may be underutilized if it fails to meet user needs or if the community views the space as unsafe or unattractive (Institute for Local Government, 2015; Sherer, 2003). To decide how exactly open space should be designed, Veal (2020) suggests consultation with community members and local organizations to reach some level of demand-based park planning.

Recommendations

This section offers recommendations for nature-based recreation at the Park. Each recommendation includes a description of the issue at hand, concrete strategies for implementation, examples of similar efforts and initiatives, and resources available to the county as future how-to guides.

Recommendation 7: Provide Recreation Opportunities for All Ages and Abilities

Description

Gil Penalosa, the founder of nonprofit 8 80 Cities, believes that “if everything we do in our public spaces is great for an 8-year-old and an 80-year-old, then it will be great for people of all ages” (as cited in AARP, 2018, p. 3). Indeed, parks should address special requirements for accessibility and inclusivity so that individuals of varying ability and age levels can enjoy recreation opportunities together. Unfortunately, this is not always the case. The AARP (2018) finds that parks are “falling short” for adults aged 60 and over, a group that will be 20% of the U.S. population by 2050 (U.S. Census Bureau, 2014). And children, despite their high park use rates relative to other groups, are now spending an average of five minutes outdoors and up to seven hours a day on electronic media (NRPA, n.d.). And while parks are working hard to include disabled populations, insufficient funding and staff training remain widespread obstacles to progress (NRPA, 2018). Trails and open spaces at parks are vital to these groups: trails provide a fundamental service to park visitors and should be designed to meet the needs of the widest possible range of users (NACTO, 1999); open, natural spaces initiate *unstructured play*, by which children “follow their instincts, ideas, and interests without an imposed outcome” (CPHA, 2019, n.p.); and a variety of sensory and tactile experiences ensure that disabled individuals are not excluded from recreation activities (CPHA, 2019).

Aware of these concerns, Cabarrus County Active Living and Parks noted that older citizens frequent the trails at Rob Wallace Park, and so are ‘must-haves’ at any future site. Additionally, they are concerned that children are spending more time on technology-based entertainment than in years past. By addressing these needs, interesting and accessible natural recreation opportunities can provide a foundation for community health and cohesion.

Strategies

- Follow ADA specifications and guidelines and provide sensory and tactile experiences for the hearing and vision impaired. This will facilitate park accessibility for disabled persons.
- Clear a small amount of forested area for green open space available for passive recreation. (See strategies for clearing trees in Recommendation 3: Apply Forest Management Guidelines).
• Provide natural play areas to allow children to use their imagination and enjoy the benefits of unstructured play.
• Construct trails and walking paths with varying degrees of difficulty, distance, and grade. Figure 4.2 offers suggestions for land use planning. The following areas and trail types are recommended:
  o Flat lowland area: Flat, paved trail with minimal grade changes, close proximity to parking lots, and wheelchair accessibility (Trail Class 4 & 5).
  o Steeper forested area: More rugged hiking and biking trails (Trail Class 2 & 3).

Examples

• **Carvers Creek State Park.** Located in Cumberland County, NC, this state park includes several accommodations for individuals with disabilities. These include accessible parking spaces, a ramp at the park office, and accessible restrooms. Additionally, the park has an ADA-compliant picnic area to allow close vehicle access upon request. The park also provides a shuttle program for visitors with disabilities and senior citizens who are unable to make certain trips across the park.

• **Fort Macon State Park.** This state park in Carteret County, NC includes standard ADA-compliant accommodations as well as several features designed for individuals with vision and hearing loss. These include a park video tour with subtitles and closed captions, an audio description with volume control, a tactile model of the fort, and restroom signs written in Braille.

**Figure 4.2: Map of Usage and Terrain**
Sustainable trail design and construction will consider needs related to drainage, vegetation, soil conditions, and regulations (National Park Service, 2012). First, trails in steep areas may disrupt runoff if water is unable to cross trails along natural drainage patterns. If water is diverted down the trails themselves, erosion will begin, triggering a pattern that will lead to degraded habitats, poor user experiences, and increased maintenance costs (Favro, 2018; R. Gilson, March 11, 2021). If left unchecked, this phenomenon will uproot trees and plants, redirect entire watersheds, and detract from the aesthetic and recreational value of the Park (PCTA, 2011). Second, trails should be routed around fragile natural species or features to prevent harmful visitor traffic. Third, trails constructed on poor quality soils (e.g., low permeability or soil density) or that host high-impact activities (e.g., horseback riding) may ultimately be unsustainable (Bott et al., 2012; C. Matthews, March 8, 2021; National Park Service, 2012). Finally, signage can also improve trail sustainability by encouraging trail stewardship. Signs, like the example at right, can help prevent erosion and protect fragile plants by encouraging visitors to stay on trails. Signage may also remind visitors to respect others and avoid unsafe activities, like hiking at night.

Strategies

- Avoid constructing traditional walking trails through rare or fragile natural areas. Instead, consider modern approaches that provide recreation opportunities while protecting natural areas (for an example, see Recommendation 2: Preserve the Site’s Natural Drainage).
- Post park safety and stewardship guidelines. Established frameworks include Leave No Trace ([Int.org/why/7-principles](http://Int.org/why/7-principles)) and Recreate Responsibly ([recreateresponsibly.org](http://recreateresponsibly.org)).
- Build trails along natural land contours rather than straight up and down steep areas.
- Consider the drainage requirements of the Site:
• Utilize the Site’s natural mineral soil when constructing trails on steep land with minimal drainage issues.
• Use an imported surface (e.g., crushed stone; asphalt) for flat trails with high foot traffic and poor drainage.

- Avoid equestrian trails to protect against erosion and excessive maintenance requirements.

**Examples**

- **Cuyahoga Valley National Park Trails.** Located in Cuyahoga Valley National Park, Ohio, these trails adhere to sustainability guidelines set forth by the National Park Service. Three principles are used to guide trail design and maintenance: respect local ecology and natural elements, be aware of the existing natural form and safety requirements, and promote and inspire stewardship among trail users. [americantrails.org/resources/cuyahoga-valley-national-park-sustainable-trail-guidelines](http://americantrails.org/resources/cuyahoga-valley-national-park-sustainable-trail-guidelines).

- **Lake Raleigh Woods Trail Development.** Trail design was completed on this 96-acre parcel on the NC State University campus in 2019. Primary design considerations included conservation, intended user needs, and long-term maintenance costs, as well as site history, site analysis, and basic elements of sustainable trail design. [wellrec.dasa.ncsu.edu/wp-content/uploads/sites/110/2020/04/Lake-Raleigh-Woods-Trail-Plan_Destination-by-Design.pdf](http://wellrec.dasa.ncsu.edu/wp-content/uploads/sites/110/2020/04/Lake-Raleigh-Woods-Trail-Plan_Destination-by-Design.pdf)

**Key Resources**


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**Recommendation 9: Collaborate with Volunteers and Community Partners**

**Description**

Designing and constructing miles of trails can require a large amount of maintenance, manpower, and funding, creating a burden for park staff. Thus, many park professionals turn to volunteer groups for help (Moody, 2016). Hiring or coordinating with community conservation and recreation groups can provide an affordable yet practical source of high-quality trail design and construction. Additionally, encouraging stewardship among community partners and volunteers is a great way to “engage and energize” the community while creating a park (AARP, 2018, p. 10).

**Strategies**

- Form partnerships with community organizations with the expertise and resources necessary to help design and build trails at the Site. Local possibilities include:
  - Carolina Thread Trail Volunteers. [carolinathreadtrail.org/how-you-can-help/volunteer](http://carolinathreadtrail.org/how-you-can-help/volunteer)
  - Tarheel Trailblazers [tarheeltrailblazers.com/](http://tarheeltrailblazers.com/)
- Central Carolina Cycling Club [centralcarolinacycling.com/](http://centralcarolinacycling.com/)
  - Collect and consider the opinions of the community. (See Section IX: Stakeholder Involvement.)

**Examples**

- **Mecklenburg County Parks and Recreation and the Town of Matthews, NC.** Mecklenburg County has contractual partnerships with the Tarheel Trailblazers to build and maintain trails in approved parks. As experts and users of the trails, these volunteers prioritize accurate and appropriate trail design for mountain biking use. *(Appendix F: Tarheel Trailblazers Memorandum of Understanding.)*

- **Conservation Corps NC.** Formerly known as NC Youth Conservation Corps, this program provides youth the opportunity to maintain and build trails, grow their leadership skills, and either earn community service hours or minimum wage. Past projects areas include the Blue Ridge Parkway, Beaver Marsh Nature Preserve in Durham, Latta Plantation and McDowell Nature Preserve in Mecklenburg County, and Harris Lake County Park and Crabtree County Park in Wake County. (See resources below.)

- **Carolina Thread Trail Volunteers.** The Carolina Thread Trail is a network of trails throughout Cabarrus County. Volunteers help build and maintain trails and restore the surrounding habitat. (See resources below.)

**Key Resources**

“Parks must be designed in ways that encourage active use, but their presence alone cannot guarantee that people will visit them—programming, outreach, and education are needed to draw people to parks and build healthy habits” (NRPA, 2017, p. 25). This quote from the National Parks and Recreation Association represents the driving spirit of federal public land policy for the last century. The National Park Service (NPS) was established in 1916 with the mission to “preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations” (National Park Service, 2020). Since the inception of the NPS, Park Rangers have furthered this mission by inspiring and educating park visitors through interpretation, making “the most complicated natural phenomena understandable to visitors from all walks of life” (U.S. Educational Division, 1929). In 2016, by passing the National Park Service Centennial Act, Congress turned this tradition into an explicit mandate for environmental education, confirming protected federal lands as ‘America’s largest classroom’ (Houseal & Thompson, 2020).

The value of environmental education initiatives has been realized at the state and local levels as well. North Carolina’s Environmental Literacy Plan, for example, includes three objectives for youth outdoor education:

1. Prepare students to understand, analyze and address major environmental challenges facing the state and the nation.
2. Provide field experiences as part of the regular school curriculum and create programs that contribute to healthy lifestyles through outdoor recreation and sound nutrition.
3. Create opportunities for interdisciplinary professional development for teachers, including field experiences, research opportunities, and innovative instructional technologies (NC Environmental Education, 2017).

By meeting these objectives, educators ensure that children become environmentally literate, possessing “the ability to make informed decisions about issues affecting shared natural resources while balancing cultural perspectives, the economy, public health and the environment” (NC Environmental Education, 2017, p. 7). Further, research shows that natural education is best disseminated outdoors in natural, wild places, leaving kids with pro-environmental attitudes and behaviors (Szczytko & Stevenson, 2017). The following section outlines what Cabarrus County is currently doing to build on these education initiatives, what additional educational opportunities exist at the new St. Stephens Park, and recommendations for furthering the mission of environmental education for park visitors of all ages.

**Environmental Education in Cabarrus County**

Much like Federal and State entities, Cabarrus County has played a strong role in securing the benefits of natural education for its citizens. The Cabarrus Soil and Water Conservation District (SWCD), for example, has championed informed natural resource stewardship for the community since 1973.
(Testerman, 2017). Cabarrus County’s focus on environmental education has been furthered by educators and park professionals as they teach a new generation of citizens about the wonders and benefits of the natural world.

**Existing Internal Programming**

Several Cabarrus County departments and programs engage in regular environmental education initiatives. The Soil and Water Conservation District (SWCD), for example, provides volunteer opportunities, student conservation workshops, resources and trainings for educators, and cleanups like NC Big Sweep (Cabarrus County, 2017). The SWCD also hosts competitions in which area students research and present an important conservation topic or theme. Additionally, SWCD sponsors student teams to compete at Envirothon, an event where middle and high school students from across North America train in soils, aquatics, wildlife, forestry, and current environmental issues and test their knowledge in a competition against other groups (Cabarrus County, 2017).

The Active Living and Parks Department (ALP) offers a recreational component to outdoor education. ALP has compiled several standardized programs designed for varying grade levels, examples of which are outlined in Table 5.1 (See Appendix G: Cabarrus County Active Living & Parks School Field Trip Information for a full list of programs).

**Table 5.1: Cabarrus County Active Living and Parks Department Program Descriptions**

<table>
<thead>
<tr>
<th>GRADE LEVEL</th>
<th>PROGRAM DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-K to K</td>
<td>Backyard Buddies (APL-1, APL-2, K.L.1, K.P.2) Young scientists will investigate living and non-living things and explore the interdependence of all life. Students will be thrilled to observe and investigate some exciting native animals including a corn snake, tree frog and decomposers.</td>
</tr>
<tr>
<td>1st–2nd Grade</td>
<td>Creek Stompers (1.L.1, 1.L.2, 2.L.1z) There is nothing better than a good ole’ creeks stomp to discover nature at its finest...from catching crayfish to salamanders, this trip will be unforgettable.</td>
</tr>
<tr>
<td>3rd–4th Grade</td>
<td>Healthy Waters (3.E.2, 3.L.2, 4.L.1): Students will gain a better appreciation for the importance of clean water in the natural community. We will explore the creek and see what we can learn about its inhabitants, stream health, and human disturbance.</td>
</tr>
</tbody>
</table>
5th Grade  | Stream Scientists (5.L.2): Here we get our hands dirty! Students will investigate how living things depend on each other for survival in the microhabitat of one of our little creeks.

Middle School  | It's Not Easy Being Green (6.L.1): While being a tree or plant looks easy, there are a lot of challenges for our green friends! How do you find food when walking to the store is out of the question? How do you get your kids to move out? How might you defend yourself when you have no hands for fighting or legs for running away? These questions and more will be explored!

Source: Taken directly from: Cabarrus County Active Living and Parks (2021). Field Trips and School Visits. [See Appendix G: Cabarrus County Active Living & Parks School Field Trip Information for full document.]

External Partnerships

Ongoing efforts of Cabarrus County educators are enhanced by strategic partnerships with external programs. Partnerships provide additional resources and expertise to ensure that both children and adults receive a full measure of knowledge and appreciation for the natural world around them. Below are just a few of those partnerships and external programs the County has adopted or hosted.

- **Muddy Sneakers.** This program is hosted at Rob Wallace and Frank Liske Parks in Cabarrus County. Based out of Brevard, North Carolina, Muddy Sneakers focuses on the scientific education of fifth grade students and offers opportunities for these children to learn about the natural world in designated nature sites (Muddy Sneakers, 2016). Students take field trips to these parks to learn about local flora and fauna, fostering a new drive to learn about interesting natural features in their communities.

- **North Carolina Science Festival.** Sponsored by the Morehead Planetarium and Science Center and UNC Chapel Hill, the North Carolina Science Festival is an annual, month-long event which celebrates the educational, cultural, and financial impact of science in North Carolina. Events in Cabarrus County for 2021 are coordinated along with the Cabarrus Public Libraries and will include classes on gardening, constellations, and more (UNC Chapel Hill, 2021).

- **City Nature Challenge.** The California Academy of Sciences and the Natural History Museum of Los Angeles County puts on the annual City Nature Challenge, a worldwide, interactive competition between cities to document as many plants and animals in natural areas as possible. Participants use the smartphone application iNaturalist to take pictures of their findings, which are then verified by experts. The 2021 competition will focus on the “healing power of nature” and a celebration of biodiversity (City Nature Challenge, 2021).
- **Junior Ranger Program.** Cabarrus County environmental educators provide school children the opportunity to learn about and explore the natural world. Staff make regular visits to the classroom throughout the school year, and the year is capped off with a field trip. Children participate in several engaging activities and are able to earn badges to record their progress (North Carolina State Parks, n.d.).

**Educational Opportunities at St. Stephens Park**

The addition of the St. Stephens Park provides an exciting new venue for the County’s existing educational programs and partnerships. By taking advantage of the natural world at the Park, community projects can provide educational opportunities for members of the surrounding community, allowing educators to impart a sense of wonder and appreciation in students’ own backyards. Likewise, any individuals visiting a nature-based park may also take advantage of educational installations and programming on their own.

Ongoing citizen education around the unique natural features and conservation needs of the Site will encourage investment in the Park’s preservation and protection (NRPA, 2017). Education at this Site may encompass global-level awareness of the benefits of biodiversity and land preservation, which include cleaner water, reduced erosion, stable climate, and conservation of key species (Ewing & Kostyack, 2005). These opportunities begin with a solid understanding of what natural features and conservation needs currently exist at the Site. A few of these key plants, animals, and habitats are highlighted below. (For complete Natural Heritage Program Site Data, see Appendix C: Lower Butcher Branch Inventory).

**Pollinators and Plants**

One important feature of the Site is its collection of flowering plants, shrubs, and trees, and the pollinators they attract. Pollinators and flowering plants exist in a symbiotic relationship, where each depends on the existence of the other. Without bees, certain plants would be unable to reproduce; likewise, without flowering plants, many pollinator species would go without an important food source. The symbiosis of plants and pollinators creates numerous benefits for the natural world. For example, human survival is directly reliant on pollination. Eighty percent of our food crops are propagated through pollination, and the value of pollinated crops is estimated at as much as $10 billion per year. Additionally, pollination is critical for flowering plants that clean our air and water, provide oxygen, and prevent erosion (USDA-Forest Service, 2021). Considering these benefits, it is vital to protect pollinators and flowering plants at the Park. A decline in the diversity of pollinating plants, and insects and bees to pollinate them, could have negative effects on the health of natural communities.
The Carolina Piedmont region is home to two notable pollinating plant species: Carolina Birdfoot-trefoil and Schweinitz’s sunflower. Aside from aesthetic beauty, these species attract pollinators and strengthen the region’s ecosystems. Both are targeted for protective measures by government entities. If pollinators are able to flourish at the Park and adjacent areas, they could help revitalize the populations of these vulnerable plant species.

- **Carolina Birdfoot-trefoil (Acmispon helleri).** The Carolina trefoil (left), found near the Site in a 1992 survey, is classified by the State of North Carolina as *Special Concern-Vulnerable.* It is the only plant species specifically noted in NC Natural Heritage Program data. Because Carolina Birdfoot-trefoil does not reproduce vegetatively (via root spreading), pollinators play an important role in its vitality. Threats to the Carolina trefoil include the conversion of land to pine plantations, farmland, and residential and commercial use. Carolina trefoil may also be crowded out by other plants if routine fire is suppressed (Georgia Biodiversity, 2020).

- **Schweinitz’s Sunflower (Helianthus schweinitzii).** Although not observed on the Property itself, the Dry Oak-Hickory Forest on the Site possesses “the ecological attributes conducive to the restoration of Schweinitz’s sunflower” (USDA-Forest Service, 2012, p. 45). The sunflower (right) is a federal endangered plant species found only in the Piedmont region of the Carolinas and is a notable priority of both federal and state government conservation efforts. Many of the known communities of the sunflower exist along right-of-way areas and are harmed by improper management techniques (e.g., excessive mowing or herbicide use) (Fair Funding for Wildlife, n.d.; U.S. Fish & Wildlife Service, 2011). As 11 of 13 known populations lie within a 65-mile radius of Charlotte, urbanization poses a threat to the species, so widespread environmental education is critical for its continued vitality (U.S. Fish & Wildlife Service, 2011).

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8 “Any species or higher taxon of plant which is likely to become a threatened species within the foreseeable future.” Source: [files.nc.gov/dncr-nhp/nheo_tier_1_and_2_attribute_info.pdf](files.nc.gov/dncr-nhp/nheo_tier_1_and_2_attribute_info.pdf)

Wildlife and Their Habitats

Other important features of the Site are the Upland Depression Swamp, the Dry-Oak Hickory Forest, and the wildlife living in them.

- **Upland Depression Swamp.** The wetlands on the Property are unique natural areas found only in the Piedmont region of the Southeastern U.S. (NatureServe Explorer, 2020b), offering visitors access to a rare and obscure habitat. These wetlands are home to a diverse population of amphibians and reptiles. Because the Upland Depression Swamp does not support predatory fish due to seasonal wet-dry cycles, amphibians and reptiles are able to thrive (Bailey et al., 2006; Moorman et al., 2017). This seasonal nature usually discourages disruptive development but also means Upland Depression Swamps go without government wetland protections (NatureServe Explorer, 2020b).

- **Dry Oak-Hickory Forest.** This forest type is also unique to the southeastern U.S. and is home to a wide array of plant and wildlife species (NCWRC, 2021a). Forested areas are of particular importance when adjacent to wetland areas because certain species of amphibians and reptiles migrate between dry areas and wetland breeding grounds on a seasonal basis (Bailey et al., 2006; NCWRC, 2021b). Other key wildlife species commonly found in Dry Oak-Hickory Forests are the Cooper’s Hawk and the Timber Rattlesnake, two species classified as ‘special concern’ by the state of North Carolina (NCWRC, 2021a).

- **Amphibians and Reptiles.** The natural areas at the Cabarrus County site are home to various species of amphibians and reptiles, known as *herpetofauna*, or “herps.” According to NC Natural Heritage Program data, one species observed in abundance at the Site is the Spotted Salamander (*Ambystoma maculatum*). These species play valuable roles in the ecosystem, as they prey on harmful insects and rodents and provide a food source for larger animals.

By working to educate park visitors about the Park’s fragile natural habitats and protections, park staff can inspire a stewardship mentality among park visitors.

**Recommendations**

The following section offers recommendations for education about the natural features of the Site. Each recommendation includes a description of the need, concrete strategies for implementation, examples of similar efforts and initiatives, and resources available to the County as future how-to guides.

**Recommendation 10: Continue Ongoing Education Programs**

**Description**

Cabarrus County Active Living and Parks (ALP) has robust environmental education programming already in place. ALP offers curriculum for children of various grade levels, coordinates with schools to host field trips and visit classrooms, provides teacher classes and training, and adopts and partners with various external programs. It will be important to retain these initiatives as well as adapt them for use at the new Park.
Strategies

- Host a City Nature Challenge at St. Stephens Park. This would provide an introductory event at the Park and promote both education and conservation. (See also, Recommendation 6: Conduct an Updated Site Survey).
- Stay abreast of current environmental events in order to provide modern, culturally relevant programs for youth.
- Conduct routine research into new programs and partnerships available for adoption by Cabarrus County.

Examples

- **NC Envirothon.** This is the North Carolina chapter for the nationwide Envirothon, an outdoor competition for middle and high school students based on five core areas: wildlife, forestry, soil, aquatics, and current environmental issues. The following resource contains study guides, videos and podcasts, and volunteer opportunities to enhance the knowledge about natural resources and the environment for teachers and students in North Carolina. sites.google.com/site/envirothonncc/about?authuser=0.
- **Cabarrus Soil and Water Conservation District Classes.** These are free classes offered by the County that focus on education and conservation efforts. Topics can be tailored to specific educational needs. There is a wide range of topics including food webs, animal signs, endangered species, water quality testing, and habitats. cabarruscounty.us/resources/educator-resources
- **NC Star Party.** This annual event, held each April, includes guided stargazing and moon watching and offers professional educational presentations. ncsciencefestival.org/events/statewide-star-party-cabarrus-county-public-library

Key Resources

- Cabarrus County. (2017). *Conservation Education and Environmental Programs.* Cabarrus County

**Recommendation 11: Install Permanent Education Opportunities**

**Description**

Park planners may consider providing permanent educational opportunities such as interpretative signage and natural attractions. Interpretive signage can include displays and panels across trails or park features to convey a narrative or theme about plants, wildlife, and historical and cultural elements at the Park. Jonathan Williams, an Interpretive Manager with California State Parks, finds that interpretive signage “draws in the visitor, captures a curiosity, develops an interest, and leaves the visitor with an undeniable sense of place and a little bit more knowledge than he or she had before” (California State
Parks, 2018, n.p.). Permanent educational opportunities can teach and inspire the public about the natural habitats at the Park when park staff or local experts are unavailable, making this information available to any park visitor at any time (California State Parks, 2018; National Park Service, 2019).

Furthermore, permanent displays may serve a dual purpose, educating visitors about the natural characteristics within the Park while also enabling park managers to disseminate pertinent rules and recommendations. According to Guo et al. (2017), the placement of educational materials specific to the acts of hiking and walking encourage those visiting the Park to stay on marked pathways in order to avoid damaging more delicate elements of the Park. Thus, the inclusion of educational installations may also encourage more responsible behavior by park visitors.

**Strategies**

- Highlight information related to conservation at the Park, like the Upland Depression Swamp, the Dry Oak-Hickory Forest, amphibians and reptiles, and pollinators.
- Install a pollinator garden or honeybee hive with information about why pollinators are important, which plants are best for pollinators, and why humans rely on plant propagation. (See Appendix H: Pollinator Gardens for detailed instructions for pollinator gardens).
- Collaborate with national and local groups to establish best practices for implementation and upkeep of educational installations.
- Establish low-impact interpretive trails through the Upland Depression Swamp. A boardwalk through the wetland area would protect it from direct foot traffic while providing an up-close, educational experience (see Recommendation 2: Preserve the Site’s Natural Drainage.)
- Create a brochure that can aid in self-guided tours of the area. By implementing signage with Quick Response (QR) codes, visitors can scan the code with their mobile devices and be taken to a website with additional resources.10

**Examples**

- **Walton Interpretive Trail.** This western North Carolina trail includes interpretive displays that highlight the natural vegetation along the trail and specific wildlife that may be seen. [hikewnc.info/trails/nantahala-ranger-district/walton-interpretive](hikewnc.info/trails/nantahala-ranger-district/walton-interpretive)
- **CCC Heritage Trail.** This interpretive trail at Hanging Rock State Park highlights different spots along the trail where the members of Civilian Conservation Corps (CCC) Camp 3422 worked. The CCC group worked on the trail from 1935-1942 and built the majority of the facilities and roads still in use today. [ncparks.gov/hanging-rock-state-park/trail/ccc-heritage-trail](ncparks.gov/hanging-rock-state-park/trail/ccc-heritage-trail).
- **Duck Cove Trail.** Located at the Beaverdam Recreational Area in Wake Forest, NC, this trail is a

10 To use QR codes, visitors will need strong cellular reception. During a visit to the site, members of the MPA team had good reception, but this may vary according to service provider, location, and weather. The team suggests that the County assess cellular reception at the site before investing in QR codes.
1.2-mile round trip hike, guided by both educational brochures and signage about the history of the area. ncparks.gov/falls-lake-state-recreation-area/trail/beaverdam-kids-track-trail-%E2%80%93-duck-cove-trail.

- **Monarch Waystation at the NC Zoo.** This installation serves as a ‘rest and refueling’ stop for Monarch Butterflies during their annual migration. Zoo staff and volunteers propagated pollinator plants from seed and planted them in the garden, providing a food source for the butterflies as well as an educational experience for volunteers and Zoo visitors. Besides regular weeding and mulching, the garden requires minimal maintenance, as the plants included in the garden are drought-resistant. wakenature.files.wordpress.com/2020/12/wake-county-pros-habitat-guidelines.pdf (p.33).

- **Veteran’s Memorial Park, Springfield, Ohio.** QR codes at this veterans’ memorial provide visitors with pictures, historical context, and the names of the veterans to whom the memorial pays tribute. This allows the park to share much more information than can be placed in the physical environment and provides a more personal memorial of the veterans. springfieldnewssun.com/news/local-military/codes-help-preserve-detailed-memories-veterans-fallen-soldiers/BgaHPEP41WIYSb7clQQ0DM/

**Key Resources**

Infrastructure is vital to the active and passive amenities of any park. All four parks that Cabarrus County currently operates are classified as District Parks. Camp T.N. Spencer, Frank Liske, Rob Wallace, and Vietnam Veterans Parks contain similar infrastructure and facilities like restrooms with running water and flushing toilets, multiple parking lots, and paved access roads. Cabarrus District Parks also feature facilities such as concessions stands, bathhouses, a pool house, and park offices.

In terms of park facilities, three important topics surfaced during interviews with parks experts and community stakeholders: adequate parking, clean and comfortable restrooms, and safety within the Park.

Parking

Parking facilities are often the first area of visitor contact. In addition to functionality, parking can serve aesthetic and conservation purposes. Developing an effective parking facility enhances both the visitor experience and the protection of natural spaces (Weitowitz et al., 2019). Some of the parking characteristics that most influence recreational use include parking type, capacity, access to ancillary facilities, and parking fees (Weitowitz et al., 2019). These terms are defined as the following:

- **Parking types** are identified as roadside parking, designated car parking, and informal parking areas like fields.
- **Capacity** is defined by the number of vehicles that can be accommodated given the size of the property and configuration of spaces.
- **Ancillary facilities** include things like water fountains, signage kiosks, and bathrooms.
- **Fees** are payments for using parking facilities. They generally do not reduce usage in popular parks with attractive features and amenities (Weitowitz et al., 2019, p. 7).

Due to the Park’s rural location, most visitors will arrive by car, so parking capacity should be designed according to the expected level of visitor traffic. Another consideration for parking capacity is the function of the Park. For example, if equestrian or bicycle trails are present, specialized or larger parking areas may be needed to accommodate transportation trailers and vehicles with extended length (McCusker, 2006). The U.S. Bureau of Land Management (BLM) completed an environmental assessment for the Meadowood Special Recreation Management Area in Lorton, VA, which included an evaluation of parking needs and trail impacts. Their plan suggests that trail function should determine the types of parking facilities that are built at each trailhead. They also recommend the use of gravel aggregate for the surface material at most of the locations (McCusker, 2006).

Determining the environmental impacts of a parking lot is another concern. Kuruppu et al. (2018) estimate that “a 4047 m² paved parking lot may generate 16 times more runoff compared with a similar sized meadow” (p. 1). When developing a park focused on natural preservation, the harmful effects of vehicle pollution around parking areas can be minimized by using permeable pavement systems. Permeable pavement systems (PPS) or aggregates (e.g., gravel) can reduce runoff of harmful pollutants by allowing water to travel through them. In some cases, permeable pavement can treat the water as it filters through. However, the more comprehensive a PPS becomes, the more expensive it will be.
Table 6.1: Permeable Pavement Types

<table>
<thead>
<tr>
<th>PAVEMENT TYPES</th>
<th>DESCRIPTION</th>
<th>USAGE &amp; MAINTENANCE</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porous Asphalt</td>
<td>Asphalt that allows stormwater and runoff to penetrate the surface layer and drain into an open grade base layer</td>
<td>Best for use where heavy equipment is not expected. Moderate maintenance.</td>
<td>Medium</td>
</tr>
<tr>
<td>Pervious Concrete</td>
<td>Uses hydraulic cementitious binding of open grade aggregates to form a rigid but penetrable surface</td>
<td>Although not an ideal choice for heavy loads, pervious concrete can be designed for a variety of uses. Moderate maintenance.</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Permeable Interlocking Concrete Pavers</td>
<td>Uses manufactured concrete units which facilitates permeability through the joints. Visually attractive and durable.</td>
<td>Has heavy use applicability. Low maintenance.</td>
<td>Medium</td>
</tr>
<tr>
<td>Grid Pavement Systems (Plastic and Concrete)</td>
<td>Concrete or Plastic grid cell pavement systems that are designed match the thickness of aggregates, soil, and/or grass.</td>
<td>Light usage areas. Moderate amounts of maintenance. Ideal for overflow parking, not for primary parking areas. Offers better permeability.</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Park developers should also consider incidences of people parking outside of designated areas. Parking outside of designated areas can negatively impact the natural areas around the parking facility through direct damage and soil erosion. In addition, there are safety concerns for pedestrians if motorized vehicles are able to drive outside of designated parking areas. Park developers can employ various tools to deter and prevent unintended usage around parking facilities. These tools include signage and enforcement to educate the public about impacts on vegetation and soil erosion, and boulders or natural features to block vehicular access (Manning, 2009). Other considerations for parking areas are lighting sources for night access and external fencing. There are a variety of options for parking lot fencing, from landscaping and hardscaping to traditional fencing like split rails, or an integration of resources already on site. External fencing serves as a
deterrent for visitors attempting to take motorized vehicles into unauthorized areas of the Park and designates clear, specific parking areas.

Cabarrus County has development ordinances in place which apply to these parking lots. Chapter Nine: Landscaping and Buffer Requirements of the Cabarrus County Ordinances includes a strategy to install vegetation near impervious surfaces to mitigate water pollution and stream bed damage. There are also specific requirements for the density and location of vegetation based on the number of parking spaces and size of the parking lot. Additionally, the ordinance includes an extensive list of approved shrubs and trees. This could be a good opportunity to integrate conservation by using species native to the area.

Restrooms

Having a sufficient number of restrooms at a park offers convenience to park users and enhances health and safety. In order to maximize their effectiveness, restrooms should be provided where people will enter, exit, or congregate within a park: near parking lots, trail heads, and other popular amenities (Earlywine, 2019). Different types of restrooms are available for these purposes.

Chemical Toilets

Chemical toilets are often plastic-molded outdoor restroom facilities that collect waste in a holding tank and use chemicals to control bacteria and odor (New England Restrooms, 2021). Chemical toilets are self-contained and can be transported easily, making them prime candidates for temporary restroom facilities at building sites, festivals, and other events that place a heavy use on existing restroom facilities. This form of restroom is not ideal for permanent use in parks because many chemical toilets are not wheelchair-accessible and need frequent maintenance (New England Restrooms, 2021). Chemical toilets are also vulnerable to general misuse, vandalism, tipping, and arson (Earlywine, 2019; Gaddo, n.d.).

Pit Toilets

Pit toilets are another type of restroom facility commonly seen in parks. Pit toilets are small, semi-mobile wooden structures that cover a hole in the ground that collects waste. Also known as outhouses, these facilities are inexpensive and require less frequent maintenance than chemical toilets since they only require a simple wooden shelter and a 1.5-meter-deep hole in the ground (USDA-Forest Service, 1995). However, pit toilets are viewed as an environmentally unfriendly choice for restroom facilities, as waste and cleaning materials could take decades to fully decompose into the ground and possibly seep into groundwater (Tilley et al., 2014; USDA-Forest Service, 1995). In Olympic National Park, staff are unable to keep up with pit toilet maintenance requirements due to high visitation, forcing staff to replace pit toilets in popular spots every three years (Stinchcombe, 2020). But to many hikers, campers, and park goers, the biggest drawbacks to this form of restroom facility are the smell and the insects that accompany pit toilets. The stagnant wastewater below pit toilets provides an ideal breeding ground for insects and odor-causing bacteria (Leonard, 2016; Tilley et al., 2014).

Conventional Restrooms

Conventional restroom facilities are commonly included in parks as a more comfortable and sanitary alternative to chemical toilets and pit toilets. Conventional restrooms often comply with Americans with Disabilities Act (ADA) requirements, and provide park users with a more pleasant experience than pit toilets or chemical toilets. However, brick and mortar restroom facilities are not without drawbacks.
They can incur much of the same vandalism as chemical toilets; they are much more expensive to construct and maintain than chemical toilets; they can be closed for long periods of time to replace broken fixtures, and the operating hours do not always match the hours of the park (Durham Parks and Recreation, 2014; Gaddo, n.d.).

Another consideration for conventional restroom facilities is the acquisition of water and the disposal of wastewater. With most park restroom facilities, a connection to a municipal water and sewer system is sufficient, if available. If a water tap is not readily available or financially feasible, drilling a well for water and installing a large-capacity septic system is the next best alternative (U.S. EPA, 2015). Wells and septic systems can become rather expensive or difficult to implement if the area has unfavorable soil conditions or if the septic system could be deemed a possible contaminant to the local aquifer (U.S. EPA, 2017). For information on soil conditions at the site, please see *Appendix I: Soil Data*.

When conventional restroom facilities are not feasible due to high initial investment costs or logistical difficulties, vault toilets may be an acceptable alternative. Vault toilets combine the relative simplicity of a pit toilet with the comfort of a conventional toilet, while safely containing waste underground and eliminating unpleasant odors through a clever vent system (Sunrise Specialty Staff, 2019). Vault toilets can be periodically pumped out by a standard septic truck. In extremely remote locations where septic pump trucks cannot gain access, vaults can be loaded into trucks and small 4x4 ATVs, or flown out by helicopter, like in Olympic National Park (Stinchcombe, 2020; USDA-Forest Service, 1995).

*Modern Developments*

A few companies are working to revolutionize the vault toilet with new and innovative practices. Green Flush Restrooms has designed a pre-fabricated, free-standing, flushable vault toilet that is almost completely self-sufficient. Water can be pumped into an underground tank for use in this vault toilet system, but rainwater can also be collected to use as flush water. Water is conserved using one-quart toilets, waterless urinals, low-flow sinks. Greywater generated by hand washing can also be filtered and recycled into flushable water (Green Flush Restrooms, n.d.). Like other vault toilets, wastewater is stored underground and can be pumped out by a conventional septic pump truck. Another manufacturer of vault toilets, Toilet Tech Solutions, has pioneered a waterless vault toilet that uses insects and decomposition to separate urine from fecal matter, providing easier management of the waste that has to be removed (Toilet Tech, 2019). Toilet Tech’s decomposition vault toilet system has an advertised 10-20 year lifespan and has been installed in many remote locations where traditional vault toilets are not feasible. These locations include Olympic National Park, Rocky Mountain National Park, Zion National Park, Mount Rainier National Park, Oregon’s Smith Rock State Park, and several provincial parks in British Columbia, Canada (Stinchcombe, 2020; Toilet Tech, 2019).

*Safety and Security*

Parks improve the physical, mental, and social health of park users, but they can quickly become a liability when they are perceived as unsafe. In such cases, parks lose their value for the community (National Recreation and Park Association, n.d.; No Fault, LLC., n.d.). A study of parks in Kansas City, Missouri found that violence, concerning behavior, lack of maintenance, lack of lighting, and busy roads were primary factors affecting the perceived safety of a park (Groshong et al., 2020). Another study conducted of 3,815 American adults living in Albuquerque, New Mexico, Chapel Hill, North Carolina, Columbus, Ohio, and Philadelphia, Pennsylvania revealed that residents had 4.6 times greater odds of visiting a park that was perceived as safe. The same study found that older individuals and those who
reported being in fair or poor health were less likely to attend parks that were perceived as unsafe (Lapham et al., 2016). Marquet (2020) conducted a study of 230 Greensboro, North Carolina residents and found similar results—increased crime in parks and was associated with fewer park visits.

Intentional park design can help facilitate a feeling of safety. Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach to reducing crime and the fear of crime by reducing victimization, deterring offender decisions that precede criminal acts, and building a sense of community among inhabitants to reduce crime opportunities (The International Crime Prevention Through Environmental Design Association, n.d.). CPTED is divided into four main overlapping principles: (1) Territoriality, (2) Natural Surveillance, (3) Image and Milieu, and (4) Access Control.

- **Territoriality** creates a sense of ownership among park users. Owners have a vested interest and are more likely to report intruders to the police. Owners orchestrate natural territorial reinforcement by using physical and symbolic barriers to express ownership and to define what is public, semi-public, and private space (Cozens & Love, 2015). Examples of infrastructure that facilitate a sense of territoriality include landscaping, lighting, sidewalks, fences, and signage (Hayward Police Department, n.d.).

- **Natural Surveillance** results when parks are designed with opportunities for surveillance, such as windows and building entrances with clear lines of sight (Cozens & Love, 2015). Natural surveillance discourages those planning to do harm or commit crimes because park visitors are able to clearly see who and what is around them (Geason & Wilson, 1989).

- **Image and Milieu** are important parts of CPTED, as well-maintained, neat, and orderly facilities can offset the image of a troubled neighborhood (Geason & Wilson, 1989). Unaddressed graffiti, dirty or inoperable restrooms, damaged or unused amenities, broken windows, and unkempt landscaping all project a lack of concern for the property, which York and MacAlister (2015) show may attract criminal activity.

- **Access Control** was not originally included in CPTED, but has been incorporated to address the design of an area that uses real and psychological barriers to guide or obstruct people and vehicles while also providing for safe movement and connections. Real barriers can include a gate across an access road, a cinderblock wall, or a chain link fence. Psychological barriers can include a small, wooden fence, a row of hedges, a flower garden, or simply a “No Trespassing” sign (Geason & Wilson, 1989).

The principles of CPTED provide a well-rounded approach to building a safe and secure park that will help the surrounding community grow and prosper while minimizing crime.
Recommendations

The following recommendations for park facilities and infrastructure are drawn from research on parking, restrooms, and park safety, while also taking into careful consideration the advice of parks experts and community stakeholders.

Recommendation 12: Develop Parking Areas that Protect Natural Elements

Description

Increased stormwater volume from parking surface runoff can lead to localized flooding and erosion, transport of pollutants and debris from impervious surfaces to natural resources, and disturbed groundwater recharge (Eisenberg et al., 2015). Best practices for stormwater runoff, e.g., permeable pavement systems and landscape mitigation, can reduce erosion and pollution of natural resources around parking areas.

Strategies

- Build a rain garden, a natural depression of native perennials and shrubs that collects excess water runoff until it can be absorbed.
- Plant native vegetation within and along the perimeter to “sponge” excess water.
- Install a permeable pavement system that is adequate for vehicular and pedestrian use (See also: Recommendation 2: Preserve the Site’s Natural Drainage).

Example

- **The Meadowood Special Recreation Management Area, Lorton, VA.** This 800-acre passive park managed by the Bureau of Land Management has multiple parking lots and trail functions—pedestrian, equestrian, and biking. The primary parking material is gravel aggregate. The Meadowood Special Recreation Management Area has some high run-off areas, and so employs a landscaped rain-garden stormwater retention basin to slow infiltration of runoff pollutants and trap sediments (McCusker, 2006).

Key Resources

- American Society of Civil Engineers. (2015). *Permeable Pavements.* [doi.org/10.1061/9780784413784](https://doi.org/10.1061/9780784413784)
Recommendation 13: Provide Adequate and Appropriate Parking

Description
One of the biggest concerns emerging from interviews was the need for adequate parking. Understanding the Park’s parking needs will be a function of the Park’s expected usage rates, use types, and number of access points.

Strategies
- Construct multiple parking facilities based on usage and accessibility.
- Conduct anticipated use studies to determine an adequate level of parking.
- Use parking counts to assess usage after development to see if parking capacity is meeting needs.
- Provide accessible parking to meet ADA guidelines and accommodate school bus parking.

Examples
- **Rob Wallace Park.** The best reflection of local conditions and usage will come from Cabarrus County’s other parks. The park most similar to St. Stephens Park in Cabarrus County is Rob Wallace Park. Using Rob Wallace Park as a guide and assessing its capacity-to-usage ratio will be a good starting point to determine if the Park’s parking capacity is meeting visitor needs.

Resources

Recommendation 14: Consider the Most Appropriate Restrooms for the Site

Description
Conventional restrooms were frequently requested in interviews with both parks experts and community stakeholders. Restrooms are a necessity for everyone and have the potential to draw people to the Park or to push them away (Carman, n.d.). Many people, especially women, prefer conventional toilets over chemical or pit toilets, for reasons relating to cleanliness, privacy, and personal preference (Earlywine, 2014). Despite the higher initial investment of building a restroom facility, connecting to a municipal water system or drilling a well, and either sending wastewater to a sewer line or building a large-capacity septic system, this is the preferred option. Since many other parks in Cabarrus County have conventional restrooms, extending these facilities to the new park would maintain the level of service visitors expect when exploring Cabarrus County Parks.\(^1\)

\(^{11}\) According to Cabarrus County staff, there is currently no sewer service to the park property. Due to the high costs associated with the design and construction of a public sewer system connection, Cabarrus County might consult with stakeholder groups, planners, and civil engineers to determine if this is a worthy investment.
If getting running water to the Park from a municipal water line would be too expensive, a well cannot be drilled, or a septic system cannot be installed on the Property, then a vault toilet is the preferred alternative. Vault toilets combine the cleanliness and odor-free environment of a conventional restroom, the simple construction of a pit toilet, and the ease of maintenance of a chemical toilet. Vault toilets can include running water and flushing toilets or use a waterless approach, while still providing a clean and comfortable environment for Park users.

Due to the large size of the Property, constructing a combination of both conventional and vault restrooms might be an ideal practice. Conventional toilets could be located near parking lots, trailheads, and amenities where people congregate. Vault toilets could be strategically placed in other areas throughout the Park, where connecting to water and sewer service might be challenging or financially impractical, like at trail connections that are some distance from the trailhead or parking lot. The combination of both conventional and vault restrooms would give Park users the optimal array of restroom facilities throughout the Park Property.

**Strategies**

- Build restrooms near places that people congregate.
  - Parking lots
  - Trailheads
  - Trail connections
  - Other amenities where people congregate
- Design with CPTED in mind. Consider:
  - Ease of maintenance
  - Lighting
  - Clear lines of sight
- Keep the restrooms open when the Park is open.

**Examples**

- **Frank Liske Park**
  - Conventional Restrooms
- **James L. Dortor Park**
  - Conventional Restrooms
- **Crowders Mountain State Park**
  - Vault Restrooms are located near campsites throughout the Park.
- **Uwharrie National Forest**
  - Vault Restrooms are located near campsites throughout the forest.

**Key Resources**


**Recommendation 15: Embody the Principles of Crime Prevention Through Environmental Design (CPTED)**

*Description*

The principles of Crime Prevention Through Environmental Design (CPTED) lay the groundwork for a park that will be safe, fun, and valuable to northeastern Cabarrus County. Since the Park is in a rural area and includes wooded areas not easily seen from other areas of the Park, it is crucial that the Park feel safe. CPTED principles assert that if a park is populated, well-maintained by staff and visitors, designed to limit areas of potential crime, and instills a sense of ownership to park visitors, it will minimize problems for Cabarrus County and the local community.

*Strategies*

- Keep amenities and facilities close to the parking lots or access roads so they can be easily patrolled by law enforcement.
- Install a park gate.
- Install lights in the parking lot and around facilities.
- Keep maintenance in mind when deciding what plants to include with landscaping.
- Promptly address and correct broken, vandalized, and worn-out facilities and amenities.

*Examples*

- **The Carolina Thread Trail.** The Carolina Thread Trail Master Plan for Cabarrus County stresses the importance of utilizing CPTED in the design and development of a trail system. zotero.org/google-docs/?s37wAd.

*Key Resources*

Park amenities are “improvements that contribute to the traditional use of park land” and include benches, playgrounds, picnic tables, shelters, and more (Mississauga, 2021, p. 4). Passive park amenities should attract visitors, complement the area’s natural features, and be designed to protect attractive and distinctive natural resources. Additionally, a park’s protected features may be damaged by intensive development, so park planners should consider the impact of different amenities proposed for a site (Nagid, 2018; S. Nagid, April 5, 2021).

According to the MPA team’s research, passive parks require various amenities, including shelters, sitting places, and shade. This section includes recommendations for the design and implementation of these amenities. In addition, Cabarrus County staff and various interviewees proposed several other amenities. This section includes important considerations for inclusion of these amenities at the Park property, although many of these options will require additional community input and funding decisions.

Shelters

Shelters can attract users to St. Stephens Park. For the purposes of this document, shelters are defined as open-air, roofed structures that can accommodate the needs of park visitors. They should be designed with consideration for the sensitivity of the habitat and other park amenities (State of Minnesota, 2019; S. Nagid, April 5, 2021). Shelters are primarily used for overhead protection from sun and rain, seating, and social and family gatherings (National Park Service, 2011), encouraging visitors to stay at the park for extended periods of time. Not only do shelters protect visitors but they also help protect amenities, regulate temperature, and extend the life of the equipment (MRC Recreation, 2021). Additionally, the flooring material of any shelter is an important consideration. Options include varieties of wood, brick, stone, concrete, gravel, or dirt, which are selected according to soil conditions and weather patterns (National Park Service, 2011). Cabarrus County, for example, primarily uses concrete floors for its park shelters (Active Living and Parks, 2021).

Sitting Places

Other important park additions are places for visitors to sit. Besides providing resting spots, seating can trigger secondary activities such as reading, eating, and socializing. In passive parks, there are excellent opportunities to provide sitting places that promote these secondary activities and encourage patrons to use park amenities more frequently or for longer periods of time (Putriutami et al., 2020). Three primary park seating options exist: stools and chairs, benches, and picnic tables. These seating options are designed according to their purpose and location as well as the type of park in which they are used. One example of seating customization occurs in outdoor classrooms. Single-person seating made of logs and stumps can be measured and cut to accommodate varying student heights, offering children effective and unique learning environments (Khan et al., 2019).

In addition to the types of seating provided, park designers should also consider materials. Natural materials, like wood, are ideal for a passive park due to their natural aesthetic. However, there may be
tradeoffs to aesthetics, such as durability and mobility. The Park and Facilities Catalog (2019) outlines these tradeoffs according to material type:

- **Wood.** Wood is among the most traditional materials for park amenities and will contribute to the natural aesthetic of a passive park. A considerable downside to wood, however, is its limited durability. Wooden amenities may need to be replaced more often than those made of metal or concrete.

- **Repurposed Logs:** Repurposing fallen trees is an eco-friendly and affordable option for materials. However, wooden amenities can be heavier, more cumbersome, and thus, more difficult to move. They may also be less comfortable and cause splinters if not sanded properly.

- **Metal.** Metal, most often steel, is among the most durable materials available. When coated in thermoplastic or powder coating, metal amenities are easy to clean, protected from rust, and have smoother edges than other materials. However, metal does not fit the natural aesthetic of a passive park and may be more expensive than wood.

- **Recycled Plastic.** Recycled plastic is a durable, eco-friendly option. It is important to make sure the materials are 100% plastic, with no fillers that can weaken amenities’ integrity over time and cause unexpected early replacements.

- **Concrete.** Concrete is typically the most durable but least comfortable material for park amenities. It is also heavier, so installing concrete amenities deep into forested areas will require more intensive labor.

- **Aluminum.** Aluminum is one of the lightest materials available, making it a good option for amenities that need to be moved regularly. This mobility may also lead to theft, however, so securing or locking aluminum amenities is a must.

**Shade**

Cabarrus County boasts around 214 days of sunshine per year and an average June temperature of 87 degrees (Cabarrus County Convention & Visitors Bureau, 2021), so UV protection is an important consideration. At outdoor recreation areas with limited protection from the sun, shade can reduce prolonged sun exposure and keep patrons cool. Additionally, the introduction of shade in areas with minimal sun protection has been shown to increase park attendance numbers (Buller et. al, 2017). Park shade structures are relatively inexpensive and require minimal infrastructure investment. They also deliver a large return on park patron use and satisfaction (Buller et al., 2017; City of Phoenix, 2010).

Where feasible, natural sources of shade (e.g., trees) are ideal and have many benefits, such as improved air quality and minimal maintenance requirements. Trees can also enhance the natural aesthetic of a nature-based passive park. In some cases, natural shade from trees is unavailable due to permanent ground development like asphalt or concrete (Host, 2021). One solution is the use of artificial shade sails, or large pieces of fabric suspended over recreation areas. They can either be porous or water-proof. To be effective, shade sails should meet or exceed safety requirements for strength and resistance to light degradation and provide ultraviolet protection to reduce UV exposure. The choice of size, shape, and material is contingent upon the purpose of the space it will cover. In addition to providing UV protection, shade sails can protect visitors from heavy rain (Bueller et. al, 2017).
Recommendations

The following section offers recommendations for amenities the Park could offer. Each recommendation includes a description of the need, strategies for implementation, examples of similar efforts and initiatives, and resources available to the County as future how-to guides.

**Recommendation 16: Build Accessible Shelters on the Property**

*Description*

The County should provide park shelters as an amenity at the Property. At least one shelter must comply with Americans with Disabilities Act (ADA) standards, which requires certain reasonable accommodations to afford disabled individuals similar opportunities as non-disabled individuals (Department of Justice, 2010, 402.2). Additionally, if the shelters are added to the County’s online rental portal, citizens can reserve the shelters throughout the year for larger outdoor events. Moreover, the County will be aware of the frequency of their usage and be able to monitor those shelters for security and cleaning expectations.

*Strategies*

- Evaluate the best locations and number of shelters necessary for the Park.
- Review all building material options for park shelters with regards to expected capacity, structural expectations, sustainability, and ease of maintenance.
- Build shelters near parking lots and bathroom facilities so they can be easily accessible to all park patrons.
- Provide the minimum number of shelters to meet ADA Standards for Accessible Design.

*Example*

- **Wildlife Shelter, Frank Liske Park.** This 20 X 23 foot, 25-person capacity shelter is on the edge of the parking lot, close to the bathroom facilities. It contains a smooth concrete floor and is handicap accessible, with a sidewalk leading directly to the shelter from the parking lot (Active Living and Parks, 2021). This shelter meets the strictest ADA building requirements, and is a permanent structure with minimal maintenance requirements.

**Recommendation 17: Provide Sufficient Sitting Places Across the Park**

*Description*

The County should provide sitting areas according to anticipated social, educational, or health needs of park visitors. Additionally, park developers should choose the correct materials for amenities according to the objectives at the Park, whether they are providing natural aesthetics, facilitating secondary activities, or encouraging full use of the Park.
Strategies

- Evaluate the number of sitting places needed. The outdoor classroom, for example, should attempt to provide enough seats for the largest class sizes in Cabarrus County.
- Select the most appropriate materials for each activity’s seating purpose and location.
- Ensure amenities meet the requirements of the Americans with Disabilities Act (ADA).

Example

- **Bintaro Xchange Park, Banten, Indonesia.** Bintaro Xchange Park utilizes seating in strategic locations to inspire visitors to participate in various activities. It also provides ‘stepped’ seating so that those seated in the rear have a similar view to those closer to the front. See resource from IOP Publishing, below.

Key Resources

- Children’s Geographies. (2019). *There is no better way to study science than to collect and analyse data in your own yard: Outdoor classrooms and primary school children in Bangladesh.* [https://doi.org/10.1080/14733285.2018.1490007](https://doi.org/10.1080/14733285.2018.1490007)

**Recommendation 18: Provide Shade in High-Traffic Areas of the Park**

*Description*

To enhance the visitor experience, the County should seek to provide shade that meets the needs of visitors in the Park’s open areas. This effort underpins the mission of Active Living and Parks—to improve the quality of life for its residents with fitness, wellness, and education (Cabarrus County Active Living and Parks, 2021, n.p.).

*Strategies*

- Provide shade in open, communal areas.
- Utilize large, light-colored shade structures to protect visitors during the hottest periods, such as summer afternoons.
- Provide enough shade to accommodate a large number of users at once.
- Host tree-planting events in areas where additional shade is needed. Doing so can provide affordable development strategies and nurture community involvement within local parks.
Examples

- **Myrtle Beach Boardwalk, Myrtle Beach, South Carolina.** The installation of shade sails at the Myrtle Beach Boardwalk boosted tourism in the area and enhanced public infrastructure in an aesthetically pleasing way. Although it required a large investment, it was the best solution since natural canopy either could not grow, or would take several years to provide tourists any UV relief. [shadesystemsinc.com/wpcontent/themes/ShadeSystems/documents/articles/LASN_myrtlebeach.pdf](shadesystemsinc.com/wpcontent/themes/ShadeSystems/documents/articles/LASN_myrtlebeach.pdf)
- **Tree and Shade Master Plan, Phoenix, Arizona.** The goal of this 2010 citywide initiative was to provide shade in the city’s most heavily trafficked urban neighborhoods. While trees can take longer to provide robust UV protection than artificial structures, they can offer a higher return on investment than other shade options and slow the deterioration of street pavement and sidewalks. [phoenix.gov/parks/parks/urban-forest](phoenix.gov/parks/parks/urban-forest).

Amenities Requiring Further Study

Over the course of this project, several additional options for park amenities emerged. These ideas came from County officials, community stakeholders, and parks experts. After further research, the MPA team found that these options likely require significant financial investment and may not serve the entire community. As a result, the MPA team recommends that they not be implemented in the short term. Instead, this section discusses certain advantages and disadvantages of each amenity, along with best practices for design and installation. Additionally, Section IX: Stakeholder Involvement provides strategies for collecting community opinions, which may be an important step towards finalizing the development plan for St. Stephens Park.

**Fishing**

Fishing as a park activity was suggested by both County officials and numerous community stakeholders. According to the NC State Extension and the North Carolina Wildlife Resources Commission (2018), ponds should have a surface area of at least 1 acre to support fish. This is because smaller ponds cannot support a large number of fish, and because ponds with smaller surface areas are more vulnerable to drought. The ideal depth of a fishing pond is between 6 feet and 12 feet to limit the growth of aquatic vegetation (Virginia Department of Wildlife Resources, 2021). Some aquatic plant presence is preferred, as leaves and grass are great nutrient sources for fish. However, other vegetation, such as duckweed and watermeal, grow quickly and end up depriving other aquatic organisms of sunlight and oxygen (Dunn’s Fish Farm, 2014).
Another important feature to consider when constructing a fishing pond is drainage. Drainage areas are imperative for ponds because they maintain water levels and allow water to be drained for pond maintenance. The ideal size of the drainage area is dependent on the natural features of the area, such as slopes, soil quality, and surrounding vegetation (USDA, 1997). Dams are typically good watershed sources for ponds. However, the County may need to apply for a permit from the North Carolina Department of Environmental Division of Water Resources to install a dam (NC State Extension & NCWRC, 2018).

Based on a visit to the Site and the Park map, a pond with a sufficient surface area for fishing is not currently located on the Property. A small pond is located on the Site, but park developers would need to build a larger pond with appropriate drainage features to accommodate fishing and facilitate water regulation as needed. The County should consider the cost of installing a fishing pond as well as community demand for the activity to decide if fishing is the best choice for the Park.

Disc Golf

Disc golf is a popular feature in many parks across the country. Participants attempt to throw small frisbee-like discs into metal baskets. In wooded areas, these discs are thrown along narrow corridors cut through dense tree cover (Nelson et al., 2015). In similar fashion to traditional golf, disc golf centers on individual skill and creativity in overcoming natural hazards along the course. The sport’s relatively low cost of entry and play allows it to be enjoyed by individuals from all social and financial levels (Infinite Discs, 2021).

In the context of a passive park, a disc golf course constitutes a serious undertaking that requires careful planning and consideration of the natural characteristics of the area. However, in comparison to other more invasive installations such as pools or athletic fields, disc golf courses require a much smaller financial investment. An average municipal baseball field, for example, can cost $15,000 or more (River Sharks, 2021), while a disc golf course can cost as little as $3,000 since a basic course requires only tee pads and target baskets (Infinite Discs, 2021).
While disc golf courses typically have a low impact on the surrounding land, it is important to remember that any amenity increases foot traffic and can disrupt natural habitats. In the case of St. Stephens Park, these include both farmland and a fragile wetland biome. The limited amount of acreage available for development is also a concern as each additional amenity reduces the feasibility of another. As a result, planners should seek out additional input from the community about demand for a disc golf course in place of other amenities, as well as the relative disruption of the surrounding natural environment.

**Nature Center**

A nature center is a facility that serves to educate park guests on conservation and the natural world around them (Ashbaugh, 1971). Often, these facilities are located on public property and in parks. Because of this, they are best situated in areas with diverse terrain and interesting geological features (Ashbaugh, 1971).

Nature centers provide leisure opportunities, connect people to the environment, enhance civic engagement, and build community resilience through community pride in local natural beauty (Browning et al., 2016). Successful nature centers utilize volunteers, community support, and diverse and high-quality programming, funding sources, and staff (Browning et al., 2016).

The idea of a nature center came up in interviews with both community stakeholders and parks experts from Mecklenburg County Parks and Recreation. Interviewees identified the following best practices for building and developing a nature center:

- Hire planners who are familiar with environmental preservation and education to help guide the process and provide valuable input.
- “Practice what you preach,” and construct the nature center in an energy efficient manner, even if it costs more (A. Reynolds, March 4, 2021).
- Opt for smaller windows, which will discourage birds from flying into them.
- Choose landscaping and plants that are native to the area.
- Include nature center staff in the planning and design process. While the whole team may not be necessary, having some staff who can provide input would be a valuable asset (A. Reynolds, March 4, 2021).
- Keep larger facilities like a nature center near the Park entrance. This will reduce the impacts of construction and traffic on the more secluded and fragile areas of the Park (C. Matthews, March 8, 2021).

**Signature Amenity**

The County directed the MPA team to utilize stakeholder input to develop ideas for a signature amenity at the Park. The County stated that it would like to build a structure that would be an identifying feature of the Park to attract residents and visitors alike. While conducting interviews, MPA team members transcribed notes and analyzed major themes to discern if an agreed-upon signature amenity would emerge. However, there was no consensus. Instead, various options were mentioned, including:

- Nature/education center
- Suspended tree-top walkway
- Amphitheater
- A large shelter for special occasions
- Ropes courses
- Rock climbing
- Swimming pool
- Ball fields
- Dog parks

Due to the lack of consensus, the County should continue to seek the input and involvement of community stakeholders before committing to a signature amenity for the Site. All of the aforementioned options would entail a considerable amount of funding and development. As such, feedback from the community is paramount. Moreover, gathering more information and engaging in conversations with community stakeholders will enable the County to discover what feature of the region they should highlight. Finally, several of these options may have a greater impact on the environment than others. Considering the County’s desire to create a passive park, other less intensive developments, such as a nature center, could serve as the signature amenity given community support.
The St. Stephens Church Road Property includes a 138-acre farm that runs along its western boundary. In January 2021, Cabarrus County released a Request for Proposals (RFP) seeking a farmer to take control of the farm. The County’s goal was to identify a lessee with experience in crop cultivation, sustainable methods, and soil and water conservation best practices. The County finalized a contract with Barrier Farms, LLC in March 2021. The Cabarrus County Soil and Water Conservation District Board plans to implement controls, such as regular monitoring and required soil testing of the agricultural farm, at least every three years. These plans will help to ensure the lessee adheres to evidence based practices over the life of the lease. The active farm provides the County with a unique opportunity, as few passive parks that the MPA team researched include a working farm.

Barrier Farms appears well qualified to uphold Cabarrus County’s vision given their history in the community and farming experience. Barrier Farms has been owned and operated by the Barrier family for four generations. The farm was established in 1880, and in the 1970s became one of the biggest dairy farms in Cabarrus County. In 1986, a large barn fire led to hard times for the small family farm, and they transitioned to growing row crops. This purpose, as a grain farm, has suited them well ever since. Currently, they specialize in GMO free grains. On their other property, they grow, mill, and package grain, and even raise their own animals with the feed they produce. In an interview with Mr. Landon Barrier, he stated that the St. Stephens Church Road Property will be dedicated solely to growing and harvesting row crops such as corn, soybeans, wheat, barley, oats, and rye. From there, the grains will be transported to their mill and packaging facilities.

The active farm represents an important opportunity for the County to promote land conservation and recreation for visitors, which are the primary objectives for the Site as a whole. Conservation and recreation, as well as education, community engagement, and economic development, can be promoted through targeted initiatives on the active farm. The following section includes a rationale for advancing these objectives in an agricultural setting, followed by recommendations for current and future management of the farm.

Conservation

The farmland on the parcel offers a valuable asset to Cabarrus County and the immediate community. At 138 acres, it exceeds the average farm size for the County and contributes to North Carolina’s $92.7 billion agriculture and agribusiness industry, the largest industry in the state (NC Department of Agriculture & Consumer Services, 2020). Despite the strength of this industry, urban development remains a threat. Eleven million acres of farmland were converted between 2001 and 2016, with North Carolina ranking second in the nation for highest risks to conversion (American Farmland Trust, 2020). Fortunately, North Carolina policymakers understand the threats to the state’s
flagship industry and have committed significant funding to ensure farmland is preserved for a new generation of farmers and ranchers. These efforts include Farm Link programs through the NC State Extension, which the American Farmland Trust (2020) places among the most robust in the country. Cabarrus County has demonstrated its commitment to these efforts by preserving farmland at the St. Stephens Property and welcoming land use proposals that will contribute to the local and state economy.

Approaches for conserving the quality of farmland have been established as well. One example, suggested by Scott Pohlman of the NC Natural Heritage Program, is *regenerative agriculture*, an approach to farming and land management that emphasizes rehabilitation of existing land to help maintain the health of soil and produce diverse crops (The Climate Reality Project, 2021; Schreefel et al., 2020). Farmers can learn these practices through the Regenerative Organic Certification program. Farmers with this background will be best prepared to meet high standards of soil health, animal welfare, and social fairness (Regenerative Organic Alliance, 2021).

**Education**

Experts frequently point to agricultural education as a valuable context for traditional subjects (FFA, 2021; Knobloch et al., 2007; NAAE, 2021), such as environmental science, nutrition, mathematics, technology, and more. In other words, agricultural education helps children “understand the relevance of the material they learn in classes” (Kirby & Olinger, 2019, n.p.). The history of agricultural education in the U.S. is illustrated by the evolution of 4-H, a U.S. Department of Agriculture (USDA) program that promotes development and equal opportunity for youth. 4-H was founded to bring rural agricultural developments into the mainstream through ‘hands-on’ approaches. This inspired the formation of agricultural clubs in the early 20th Century and formalization as a federal program under the USDA in 1924. Today, 4-H engages youth to address issues like food security, climate change, sustainable energy, and childhood obesity (4-H, 2021). Through these efforts, 4-H demonstrates the salience of modern agricultural education for a wide range of modern problems.

**Community Engagement and Economic Development**

Several agricultural programs and initiatives provide an opportunity for community engagement and economic development. These include agritourism, Community Supported Agriculture (CSA), and farmers’ markets.
**Agritourism**

Agritourism links active agriculture with tourism to provide education and entertainment to patrons (National Agricultural Law Center, n.d.). One of the most impactful benefits of agritourism is enhanced economic growth for agricultural communities. In fact, according to Whitt et al. (2019), agritourism revenue more than tripled in the U.S. between 2002 and 2017. Agritourism operations can offer farmers supplemental income and diversify farmers’ income streams, which can protect them from fluctuations in the agricultural market and natural disasters, minimizing their need for government subsidies. Agritourism also provides a more complete use of household assets and more employment opportunities. Agritourism is appropriate for a wide range of farms and land types, as activities can include everything from wildlife study and horseback riding to guided tours and special event venues, to name a few (Brown & Reeder, 2007). Furthermore, agritourism benefits the local community by providing increased economic activity and a broader tax base, as well as producing labor opportunities for local residents and revitalizing rural economies (Brown & Reeder, 2007; Whitt et al., 2019). Bagett (2018) offers advice to farmers considering agritourism:

- **“Use what you have and what you know.”** Farms should focus on their specific area of expertise. Navigating unfamiliar programs may prove difficult and costly.
- **“It is not about where you are but what you have to offer.”** A quality agritourism experience will attract visitors, regardless of the distance they must travel.
- **“Use a unique and compelling farm story to set yourself apart from others.”** Take advantage of what makes a given farm or its product different from others.
- **“Build neighborhood relationships.”** By tapping into community strengths, agritourism initiatives can market themselves and gain support from the surrounding area.

**Community Supported Agriculture**

Community Supported Agriculture (CSA) promotes interaction between farms and the local community. Generally, CSAs involve individuals purchasing shares of the farm in advance of the growing season so that the farmer can focus on “good land stewardship and growing high quality food” (Roos, 2021, n.p.). During the season, members receive a certain amount of produce according to their level of contribution. In some CSA models, members work on the farm instead of paying with cash. According to the USDA, farmers engaging in CSA programs “receive advance working capital, gain financial security, earn better crop prices, and benefit from the direct marketing plan” (USDA, n.d.).
Farmers’ Markets

Farmers’ markets are spaces where farmers can come together to sell their products directly to consumers (CDC, n.d.). According to the National Recreation and Park Association, farmers’ markets connect people with their food and help to bridge the urban-rural divide (Young, 2014). Moreover, these markets can help low-income individuals and families buy healthy foods through the Supplemental Nutrition Assistance Program (SNAP) (CDC, n.d. p. 3). Farmers’ markets can also serve as collection points for food pantries (Welch, 2010). Based on publications from the CDC, farmers’ markets are a proven way to promote public health by providing access to fresh produce and other foods (CDC, n.d.). Moreover, farmers’ markets provide economic and social benefits (CDC, n.d.; NRPA, n.d.).

Recommendations

According to Young (2014, n.d.), the relationship between parks and agriculture is “a natural fit,” helping to “preserve agricultural heritage, promote conservation and provide education programming that reconnects urbanites with rural America.” “The connection with the agricultural community is relevant and important,” he writes, and occurs through “community engagement and education, conservation of natural resources and the agritourism economy.” The following recommendations capture these elements with specific programs and initiatives, some of which may be implemented with Barrier Farms and others with a future tenant.

Recommendation 19: Set Agricultural Standards

Description

As a GMO-free grain farm, Barrier Farms is experienced in evidence-based conservation practices. Mr. Barrier also practices no-till farming, a component of regenerative agriculture which prevents soil erosion, limits carbon emissions, and promotes sustainable soil (The Climate Reality Project, 2021; Regeneration Agriculture Initiative, 2017). Additional components of regenerative agriculture include:

- **Encouraging a diversity of crop species.** Different plants produce a variety of carbohydrates, which feed microorganisms that release beneficial nutrients into the soil (The Climate Reality Project, 2021).

- **Limiting the use of artificial and synthetic fertilizers.** Excessive use can cause an imbalance in the pH level of the soil and damage the atmosphere. Using natural fertilizers for cover crops, crop rotations, compost, and animal manures provides beneficial nutrients to soil and plants (Regeneration Agriculture Initiative, 2017; Schreefel et al., 2020).
Furthermore, according to Section 5 of the Lease Agreement, Barrier Farms will use the USDA Natural Resources Conservation Service’s Field Office Technical Guide to draft their conservation plan. The Cabarrus Soil and Water Conservation District Board will ensure Barrier Farms meets the standards outlined in this guide to promote continued conservation of the farmland on the Site.

**Strategies**

- Work with Barrier Farms to document their current approaches to conservation and use them in future RFPs.
- Include regenerative agriculture certification as a desired or required qualification of future farm lessees. For certificate application instructions, see [regenorganic.org/apply/](https://regenorganic.org/apply/).
- Apply for a North Carolina Agricultural Development and Farmland Preservation (ADFP) Trust Fund grant. (See Appendix J: ADFP Trust Fund).

**Examples**

- **Recent NC Agricultural Development and Farmland Protection Trust Fund Grantees:**
  - 2016: The Franklin County Cooperative Extension Service received $20,000 for a feasibility study to determine the need and location for a multipurpose facility and farmers’ market in Franklin County.
  - 2015: Davie County received $12,000 to develop a farmland protection plan.
  - 2009: Polk County received $34,000 to help connect many small and beginning farmers with community and business opportunities. Marketing and training resources will also be made available to these farmers to reconnect the community with agriculture. [ncadfp.org/documents/CycleIIGrantRecipientSpreadsheet.pdf](https://ncadfp.org/documents/CycleIIGrantRecipientSpreadsheet.pdf)

- **Cargill.** The global food corporation has committed to regenerative agriculture in the production of row crops such as corn, wheat, canola, soybeans, and other staple crops. These efforts are expected to reduce greenhouse gas emissions in its global supply chain by 30% by 2030, as well as preserve water and enhance soil health. They have partnered with The Ohio State University, The Nature Conservancy, The Soil Health Institute, and others to help promote these initiatives. [world-grain.com/articles/14234-cargill-commits-to-regenerative-ag-practices](https://world-grain.com/articles/14234-cargill-commits-to-regenerative-ag-practices).

**Key Resources**

Recommendation 20: Coordinate Educational Opportunities at the Farm

Description

The Cabarrus Soil and Water Conservation District (SWCD) has encouraged agricultural education and stewardship for its constituents since 1973 (Testerman, 2017). The SWCD hosts events and provides volunteering opportunities, educational workshops, and resources for educators (Cabarrus County, 2017). These efforts aim to protect the County’s land and water, which remain vital components of North Carolina’s booming agribusiness industry. In fact, 28% of the County’s land is active farmland, valued at over half a billion dollars (NC Department of Agriculture & Consumer Services, 2021). The active farm could provide a new venue for agricultural education specific to the activities conducted by Barrier Farms. Mr. Barrier stated that he would not be opposed to leading agriculture based educational programs on the Site and has relevant experience with the Cabarrus County Cooperative Extension. In the future, the County could consider selecting lessees with farming activities conducive to education.

Strategies

- Bring ongoing Cabarrus SWCD programs to the St. Stephens Park and Active Farm.
- Consider new programs which may further agricultural education for Cabarrus County citizens.
- Coordinate between Barrier Farms and Cabarrus County Active Living and Parks to develop school field trip programs for the active farm.

Examples

- **National Garden Clubs.** Youth programs with the National Garden Clubs promote self-expression, dignity, integrity, respect, and knowledge around youths’ environment. Outreach programs include a wide range of activities, scholarships, and contests designed to promote interest in horticulture, gardening, conservation, sustainability, and environmental stewardship. gardenclub.org/youth-programs.

- **Lost Creek Reserve and Knoop Agricultural Heritage Center.** Part of the Miami County, Ohio Parks Department, these attractions include a working dairy farm, miles of trails, historic barns, a Victorian-era farmhouse, and an Agricultural Heritage Center. The heritage center documents the history of the 200-year-old Knoop Homestead. These programs help educate visitors about the importance of agriculture as well as the history of the region. miamicountyparks.com/park/lostcreek.

Key Resources

- NC State Extension. (2019). *Agricultural education curriculum.* growforit.ces.ncsu.edu/curriculum
Description

Cabarrus County and its citizens could benefit from opportunities for community engagement at the farm, such as agritourism, farmers’ markets, and Community Supported Agriculture (CSA). Together, these programs provide exponential economic and social benefits to the community. Agritourism, for example, can bring people to the farm, encouraging them to buy produce from the farmer directly, which could lead to a formal farmer’s market. Agritourism may also help retain and engage with the farm’s potential CSA customers, providing additional financial support and community trust (Adams, 2013). These programs could also fill a local need. For example, the closest farmers’ markets to the St. Stephens Property are miles away in Concord and Harrisburg. Additionally, Cabarrus County Active Living and Parks showed support for the idea of agritourism in the County as a means of economic development and marketing. Furthermore, including produce from the St. Stephens farm would diversify an already robust CSA program within Cabarrus County.

The MPA team acknowledges that many of the following strategies may not be possible under the current lease. If Barrier Farms is uninterested or unable to pursue these programs at this time, the County could express its desire to pursue these initiatives in a future RFP.

Strategies

- Consider an agritourism attraction at the St. Stephens farm.
- Sell St. Stephens Park produce at area farmers’ markets and consider hosting a farmers’ market at the Site.
- Offer produce to the public through a Community Supported Agriculture (CSA) program.
Consider partnering with other farms, local groups, and nonprofit organizations to enhance community outreach and product diversification.

Work with Barrier Farms to identify the needs and interests of its existing client base.

Market the initiatives at the farm using modern technology. Phone applications and websites for NC include Got To Be NC (gottobenc.com) and Visit NC Farms (visitncfarms.today.com).

Apply for the USDA’s Farmers’ Market Nutrition Program grant to fund equipment needed to implement SNAP at farmers’ markets. fns-rod.azureedge.net/sites/default/files/fmnp/WICFMNPFactSheet.pdf

Examples

Delvin Farms. Delvin Farms in Tennessee offers an interesting case study in best practices and pitfalls to avoid for CSAs. extension.tennessee.edu/publications/documents/pb1797.pdf (p. 10).

Dane County Farmers’ Market. Located in Wisconsin, Dane County Farmers’ Market focuses on offering local growers and producers an alternative marketing option as well as connecting the community with their food. dcfm.org/

Hope Street Farmers’ Market. Hope Street Farmers’ Market is a farm-run cooperative located in Rhode Island. They offer creative services like a bicycle valet and live music. hopestreetmarket.com

Peterson Farm in Assarria, Kansas. This farm has also been around since the 1800s and is most closely aligned with Barrier Farms in that they also raise animals and grow row crops. They offer tours and educational opportunities about farm life today. petersonfarmbrothers.com

Tate Farms in Meridianville, Alabama. This farm property is as large as the entire St. Stephens Church Rd. site, and while they might not be the perfect comparison, they do offer many agritourism activities that could potentially be implemented on the property. tatefarmsal.com

Lewis Farms in New Era, Michigan. On another large property, Lewis Farms offers creative agritourism ideas like sunflower fields and rubber duck races. visitlewisfarms.com

Cold Water Creek Farms CSA Program. This family farm serves Cabarrus, Stanley, and Rowan Counties. They are a certified organic farm serving 60 families between May and November. localharvest.org/cold-water-creek-farms-M28230.

Key Resources


Due to the numerous possibilities for and implications of certain amenities and land uses at St. Stephens Park, the MPA team recognizes the need for stakeholder input and involvement to enhance the decision-making process.

This section explains some of the benefits of stakeholder participation, defines who should likely be involved in planning and decision-making discussions, and identifies issues for which the County might request stakeholder input based on conservation and recreation literature. Recommendations and strategies for facilitating stakeholder input and involvement are provided to orchestrate community-oriented development of the Park.

Benefits of Stakeholder Involvement

According to the Environmental Protection Agency (2001), stakeholder involvement means allowing groups and individuals to participate in decision-making processes otherwise exclusive to public administrators and elected officials. Over the last thirty to forty years, private and nonprofit groups as well as individual citizens have become increasingly involved in government decisions, especially those regarding environmental protection and public recreation areas. In fact, nongovernmental input has become a lynchpin for successful public policy and administration due to the unique perspectives and solutions stakeholders provide. Furthermore, when stakeholders are involved at the local level, they feel more ownership of end results which leads to higher participation in co-produced services. Overall, engaging stakeholders in planning and execution often leads to better outcomes (Bingham et al., 2005; Everett Community College, n.d.).

Requirements for Stakeholder Participation

An important first step to consider is the method by which administrators collect citizens’ opinions. Surveys are a popular and useful tool for collecting citizen input regarding land usage and the (dis)interest the public has in a given amenity or service (Beaufort County Rural and Critical Land Preservation Program, 2018; City of Greer, South Carolina, n.d.). Despite their widespread use, however, surveys alone may not lead to true stakeholder involvement if administrators do not work to build long-term, collaborative relationships with the public (Lacaze, 2000).

In order to maximize the value of a public project, administrators must seek out the wishes and concerns of the public. Interactions between government and its constituents can enhance the appropriateness of decisions made. The goal is to create shared trust between stakeholders with competing interests. This may take time, and public managers should be prepared to moderate conversations. Fostering stakeholder engagement and implementing any of the aforementioned methods could require initial training for administrators and citizens alike. However, Pomeranz et al. (2013) suggest the effort will be well worth the rewards of open communication, reciprocal understanding, and positive results. It is essential to set realistic goals as well as plan for monitoring and evaluation of both the process and the end results (Wondelleck & Yaffee, 2000). Finally, administrators and managers should judge the success of stakeholder involvement by whether those involved were able to come to an agreement, not by the extent of the efforts required to do so.
Recommendations

The following recommendation is intended to provide Cabarrus County with strategies, examples, and resources for engaging the community in decisions about development at St. Stephens Park. These strategies will allow the County to define the needs of citizens and set priorities for the Park according to community feedback.

Recommendation 22: Explore Various Strategies for Stakeholder Involvement

Description

Actors with agendas tied closely to government activities have a strong incentive to form stakeholder groups. Public managers sometimes focus mainly on these types of actors because they show the strongest interest in particular proposals and policies. More equitable involvement requires governments to reach out to a broader array of stakeholders whose lack of awareness or empowerment may have excluded them from the decision-making process. This type of comprehensive stakeholder engagement can strengthen organizational legitimacy (Yang & Callahan, 2007). Outlined below are pertinent stakeholder groups to consult and potential topics to consider throughout the St. Stephens Park development process:

Groups to Include

● Property owners
● Residents
● Conservation organizations
● Elected officials
● Business owners
● Special interest groups

(Agbenyega et al., 2009)

Topics to Consider

● Recreation / amenities
● Aesthetics
● Conservation
● Long-term sustainability
● Community unity
● Economic development
● Funding
● Land use
● Maintenance requirements
● Safety

(Carlson et al., 1989)

Strategies

Bingham et al. (2005, p. 547-51) offer the following “new governance” strategies to promote stakeholder engagement. The MPA team has built on these strategies with supplemental examples and resources to provide the County with several options for consideration when engaging the above groups and interests.

Strategy 1: E-Democracy

E-democracy, also known as digital democracy, is a method of community involvement that utilizes modern technology to “extend community engagement, expand suffrage and citizen agency, create real time decision making, rapidly aggregate opinion data, and pave the way for a shift from representative
to more direct forms of democracy” (Richardson & Emerson, 2018, n.p.). Methods include virtual town meetings, feedback polls, public surveys, and community forums (IGI Global, 2021).

**Examples**

- **Mecklenburg County, NC Park Surveys.** Mecklenburg County Parks and Recreation Department offers an annual survey to its citizens. Participants are able to rate their enjoyment of various park facilities and programs, as well as provide input on their favorite amenities. This helps Parks and Recreation staff make decisions about funding priorities and communicates community opinion about their public spaces (C. Matthews, March 8, 2021).

- **City of Portland, Maine Needs Assessment.** In 2007, the Portland, Maine Parks and Recreation Department distributed a survey to citizens to establish development priorities for future services, facilities, and programs. Findings included the quality of current facilities, the most popular park activities, the extent of park use in the city, and what facilities and amenities would be most beneficial. portlandmaine.gov/DocumentCenter/View/1593/Community-Needs-Assessment?bidId=.

**Key Resources**


- The Urban Institute. (2004). *Understanding Park Usership.* urban.org/sites/default/files/publication/57656/311012-Understanding-Park-Usership.PDF.

**Strategy 2: Focus Groups**

Focus groups are small group discussions led by a trained facilitator. Focus groups are designed to gauge opinions on a specific topic or issue and rely on group interaction and discussion. Focus groups are beneficial for discussing sensitive topics and can help researchers explore more rich, nuanced information than other methods, such as surveys. Ideally, the same focus group questions will be repeated with multiple different groups in order to obtain a diversity of perspectives (University of Idaho Park Studies Unit, n.d.; University of Kansas, 2021).

**Examples**

- **Listening Outside the Park.** The University of Idaho Park Studies Unit conducted focus groups in four areas of the U.S.: Columbia, SC; Tucson, AZ; Seattle, WA; and Southwest Missouri. The objective of the focus groups was to identify “who is not visiting National Parks, and why?” (University of Idaho Park Studies Unit, n.d.). Focus groups, which consisted of minorities and youth, were asked about participants’ preferred recreational activities, to what extent parks meet those preferences, and barriers to park access. Researchers were able to provide recommendations to address issues they identified. Topics included activities, amenities, lack of

Key Resources


Strategy 3: Participatory Budgeting

Participatory Budgeting (PB) allows citizens to decide how to spend part of a public budget, giving them “real power over real money” (Participatory Budgeting Project, 2021, n.p.). Many public entities have adopted PB as a regular part of the annual budget process. The Participatory Budgeting Project (2021) outlines five steps to the PB process:

- **Design the process.** A steering committee creates rules and engagement plans.
- **Brainstorm ideas.** Residents share and discuss ideas through online tools.
- **Develop proposals.** Volunteers develop rough ideas into feasible proposals.
- **Vote.** Residents choose proposals that best meet community needs.
- **Fund winning projects.** Governments fund and implement winning ideas.

Benefits of PB include increased civic engagement, stronger relationships among stakeholders, broader political participation, empowerment of marginalized groups, new community leaders, and more equitable and efficient spending (Participatory Budgeting Project, 2021).

Examples

- **Park Development Projects, Greensboro, NC.** The city of Greensboro, NC has adopted PB as an important method for community input for facilities and amenities in its public parks. In 2019, the community allocated over $300,000 for safety, education, planning, and recreation at city parks. greensboro-nc.gov/departments/budget-evaluation/participatory-budgeting.
- **Participatory Budgeting Initiative, Oakland, CA.** Over 1,200 Oakland residents decided how to spend a quarter million dollars over a two-year period. Approved projects were largely focused around helping low- to moderate-income residents. pboakland.org/page/about.

Key Resources


Strategy 4: Collaborative Policy-Making

Collaborative policy-making (CPM) is grounded in the idea of bottom-up, community-driven policy implementation, as opposed to top-down decision-making (Ansell, Sorensen, & Torfing, 2017; Pomeranz et al., 2013; Vernon et al., 2007). CPM bridges the gaps between policymakers, constituents, and other actors, helping to “blur the sharp lines of demarcation between design and execution, top and bottom and public and private” (Ansell, Sorensen, & Torfing, 2017, n.p.).
Examples

- **Tracy Arm-Fords Terror Wilderness, Alaska.** Conflict emerged between stakeholders over the use of a protected wilderness and recreation area in southeast Alaska. The major cruise industry, smaller tour guides, and conservation advocates were brought together to discuss strategies for implementing established best practices. The U.S. Forest Service, by serving as a neutral party to implement collaborative discussions among stakeholders, was able to improve communication between parties and promote a spirit of compromise (Pomeranz et al., 2013). Pomeranz et al. (2013) found that members appreciated being “equal participants in voluntary rulemaking, as opposed to passive recipients of mandatory regulations” (p. 23).

- **Collaborative partnerships in Cornwall, UK.** The Caradon District Council in Cornwall, United Kingdom formed community partnerships to identify barriers to a sustainable tourism strategy compiled by public leaders. The strategy initially recognized the need to balance local business priorities, environmental concerns, and the booming tourism industry in the area. The collaboration involved government agencies and a local university. Together, these entities formulated objectives designed to minimize conflict between various stakeholders. Takeaways relevant to this project include: (1) the importance of government leaders who set and maintain priorities; (2) sustained public relations campaigns temper stakeholder apathy and encourage community input; and (3) roles of participants are dynamic, and certain groups may not have valuable contributions throughout all stages of the planning process (Vernon et al., 2007).

**Key Resources**

CONCLUSION

In late 2020, Cabarrus County, North Carolina purchased a 616-acre parcel from The Conservation Fund through a three-year purchase agreement. This parcel possesses significant natural features such as an Upland Depression Swamp Forest, a Dry Oak-Hickory Forest, and an active farm to be managed by a private operator. By commissioning the St. Stephens Park project and this report, Cabarrus County has demonstrated its dedication to conserving public lands and providing unique recreation and educational opportunities to Cabarrus County residents and visitors. The County has also committed to local economic development by encouraging the continued use of active farmland on the Property. These efforts will benefit the community for years to come. The MPA team is pleased to present these findings and recommendations in promotion of Cabarrus County’s vision for the passive park.

The recommendations provided in this report stem from academic and non-academic literature, 14 stakeholder interviews, 14 expert interviews, and visits to the Site itself. From this research come 22 recommendations based on seven general themes:

- Conservation
- Nature-Based Recreation
- Education
- Facilities
- Amenities
- The Active Farm
- Stakeholder Involvement

The MPA team recommends further that the County continue to involve the community as it moves forward with its plans to develop the Park. By engaging the public in the Park’s development, the County can design features that are grounded in conservation and recreation, and meet the ongoing needs of the community. This report will benefit the County by providing research, recommendations, and themes which maximize what the Park can offer to the Cabarrus County community.
ACKNOWLEDGMENTS

The MPA team would like to extend a special thanks to the following individuals and project sponsors for their time and assistance. Their insights and expertise were incredibly valuable to the team’s efforts to establish recommendations for St. Stephens Park.

- Mike Downs, County Manager, Cabarrus County
- Jonathan Marshall, Deputy Manager, Cabarrus County
- Kelly Siford, Planning and Development Director, Cabarrus County
- Londa Strong, Director, Cabarrus County Active Living and Parks Department
- Byron Haigler, Assistant Director, Cabarrus County Active Living and Parks Department
- Daniel McClellan, Senior Resource Conservation Specialist, Cabarrus County Soil and Water Conservation District
- Cabarrus County Active Living and Parks Commission
- Shannon Unger, Park Program Supervisor, Cabarrus County Active Living and Parks
- Anjoli (Joli) Reynolds, Environmental Recreation and Outdoor Recreation Manager, Mecklenburg County Parks and Recreation
- Ben Callahan, Historian, Eastern Cabarrus Historical Society
- Bob Dowles, Director, Parks and Recreation, Concord, NC
- Chris Matthews, Director, Division of Nature Preserves and Natural Resources, Mecklenburg County Parks & Recreation
- Christa Rogers, Natural Resources Manager, Mecklenburg County
- Corey King, Director, Parks and Recreation, Matthews, NC
- David Bennett, Executive Director, Parks & Recreation Commission, Charleston County, SC
- Deena Bost, Tri-County Cowboy Church
- Doug Paris, Town Manager, Midland, NC
- Gary Mills, Director, Parks and Recreation, Kannapolis, NC
- Haynes Brigman, Town Manager, Harrisburg, NC
- Jim Sells, Town Council Commissioner, Mt. Pleasant, NC
- Katie Lloyd, Senior Planner, Mecklenburg County
- Landon Barrier, Barrier Farms
- Lori Furr, Mayor Pro Tem, Mt. Pleasant, NC
- Matt Hartman, President, Central Carolina Cycling Club
- Peter Cook, Deputy Director, Mecklenburg County Parks and Recreation
- Randy Holloway, Town Manager, Mt. Pleasant, NC
- Rick Money, Principal, Mt. Pleasant Elementary School
- Rob Gilson, Senior Maintenance & Operations Specialist, Mecklenburg County
- Russ Snyder, Principal, Mt. Pleasant High School
- Scott Pohlman, Nature Preserve Property Manager, North Carolina Natural Heritage Program
- Shawn Marble, Assistant Director, Parks and Recreation, Harrisburg, NC
- Stefanie M. Nagid, Passive Parks Manager, Beaufort County, SC
- Tim Farrar, Principal, Mt. Pleasant Middle School
- W. Del Eudy, Mayor, Mt. Pleasant, NC
- Wesley Knapp, Western Regional Ecologist/Botanist, North Carolina Natural Heritage Program
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APPENDIX

A. Interviewees
B. Interview Instrument
C. Lower Butcher Branch Inventory
D. Forest Priority Species
E. National Heritage Program (NHP) Chapter 13H Rules
F. Tarheel Trailblazers Memorandum of Understanding (MoU)
G. Cabarrus County Active Living & Parks (ALP) School Field Trip Information
H. Pollinator Gardens
I. Soil Data
J. Agricultural Development and Farmland Preservation (ADFP) Trust Fund
K. Scope of Work
# Appendix A: Interviewees

## Stakeholders

<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
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<td>Historical Researcher</td>
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<td>February 20, 2021</td>
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<td>Bob Dowles</td>
<td>Parks and Recreation Director</td>
<td>City of Concord</td>
<td>March 3, 2021</td>
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<tr>
<td>Deena Bost</td>
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<td>Doug Paris</td>
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<td>Haynes Brigman</td>
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<tr>
<td>Jim Sells</td>
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<td>Landon Barrier</td>
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<td>Londa Strong</td>
<td>Director</td>
<td>Active Living and Parks Commission - Cabarrus County</td>
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<tr>
<td>Lori Furr</td>
<td>Commissioner, Mayor Pro Tem</td>
<td>Mt. Pleasant Town Council (Board of Commissioners)</td>
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<tr>
<td>Matt Hartman</td>
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<td>Central Carolina Cycling Club</td>
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<td>Randy Holloway</td>
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<td>Rick Money</td>
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<td>March 8, 2021</td>
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<td>Russ Snyder</td>
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<td>Mt. Pleasant High School</td>
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<td>Tim Farrar</td>
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<td>W. Del Eudy</td>
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## Parks and Recreation Experts

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<td>Anjoli Reynolds</td>
<td>Manager, Quest Nature Center</td>
<td>Mecklenburg County, Parks and Recreation</td>
<td>March 3, 2021</td>
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<td>Chris Matthews</td>
<td>Division Director, Nature Preserves and Natural Resources</td>
<td>Mecklenburg County, Parks and Recreation</td>
<td>March 8, 2021</td>
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<td>Christa Rogers</td>
<td>Natural Resources Manager</td>
<td>Mecklenburg County, Parks and Recreation</td>
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<tr>
<td>Corey King</td>
<td>Parks and Recreation Director</td>
<td>Town of Matthews</td>
<td>March 3, 2021</td>
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<tr>
<td>Daniel McClellan</td>
<td>Senior Resource Conservation Specialist</td>
<td>Soil and Water Conservation District Board</td>
<td>March 18, 2021</td>
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<tr>
<td>David Bennett</td>
<td>Executive Director</td>
<td>Charleston County Park and Recreation Commission</td>
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<tr>
<td>Gary Mills</td>
<td>Director</td>
<td>City of Kannapolis, Parks and Recreation</td>
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### Appendix A: Interviewees

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<tr>
<td>Katie Lloyd</td>
<td>Senior Planner</td>
<td>Mecklenburg County, Planning</td>
<td>March 9, 2021</td>
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<td>Peter Cook</td>
<td>Deputy Director</td>
<td>Mecklenburg County, Parks and Recreation</td>
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<tr>
<td>Robert Gilson</td>
<td>Senior Maintenance and Operations</td>
<td>Mecklenburg County, Parks and Recreation</td>
<td>March 11, 2021</td>
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<tr>
<td>Scott Pohlman</td>
<td>Director of Conservation Incentives</td>
<td>North Carolina Natural Heritage Program</td>
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<tr>
<td>Shawn Marble</td>
<td>Assistant Director, Parks and Recreation</td>
<td>Town of Harrisburg</td>
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<tr>
<td>Stefanie Nagid</td>
<td>Passive Parks Manager</td>
<td>Beaufort Passive Parks Program</td>
<td>March 4, 2021</td>
</tr>
<tr>
<td>Wesley Knapp</td>
<td>Mountains Field Ecologist/Botanist</td>
<td>North Carolina Natural Heritage Program</td>
<td>March 10, 2021</td>
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</table>
Appendix B: Interview Instrument

Interview Questions for Park Professionals
MPAD 6187 Spring 2021

1. Explain the project
   1. Cabarrus County has made arrangements to purchase ~616 acres of land in Northeast Cabarrus County near NC 49 North, St. Stephens Church Road, and North Lentz-Harness Shop Road. This parcel includes many natural features including ~200 feet of elevation change, an Upland Depression Swamp, farmland, and many old-growth trees. Cabarrus County would like to turn this parcel into a passive park. A passive park usually includes less structured recreational activities that require little or no specialized parkland development and management and therefore can be provided at a low cost to communities. It involves casual activities and the pursuit of hobbies, with no adverse impact to the natural habitat. Generally, no motorized activity is allowed and trails are typically dirt or gravel.

2. Tell me about your background? How long have you been working with parks?

3. What do you personally like about the parks in your area (or that you manage)? Specifically, passive parks.

4. What do you dislike about those parks?

5. What does your staff/coworkers like about passive parks (ease of maintenance, type of maintenance)?

6. What does your staff/coworkers dislike about passive parks?

7. What do your residents like about passive parks?

8. What do your residents dislike about passive parks?

9. What features are “must haves” for your residents to visit a passive park?

10. Have you ever been to a park you didn’t like? Can you tell me what you didn’t like about it?

11. If you were building a passive park from scratch, what would you do?

12. If you have built a passive park in the past, what would you do differently?

13. Do you have any other comments about passive parks? Things we should consider?

Topic-Specific

- Do you have any advice for marketing a new park, addition to a park, or other recreation opportunity to the public? How do you get the word out?
- Are there any volunteer groups/organizations that help maintain [the park/site] that aren’t hosted by [the county/city/organization that runs the park]? Any local partnerships who play a role in upkeep?
- Do you have any special plant and wildlife considerations at your park? If so how do you ensure their safety while also maximizing visitors?
- During the development stages of a park (or whatever the expert’s specialty is) which activities should be prioritized and why?
- How long does it take to develop a standard “XYZ” (i.e. bike trail, equestrian trail, etc.)?
- What’s the average price range to develop XYZ?
- Why are passive parks valuable assets to communities?
Appendix B: Interview Instrument

- What type of performance metrics do you utilize to analyze the overall quality of the park and/or activities?
  How do you balance conservation and recreation at your park? What is key to establishing this balance?
- Do you have any educational opportunities or partnerships with schools? If so, please tell me about them and what has worked well and maybe not so well.
- Do you have any experience with conservation easements?
- How do you integrate educational experiences into park usage?
  - Follow-up if applicable: Any specific thoughts on historical/conservation/wildlife?
Appendix B: Interview Instrument

Interview Questions for Community Stakeholders
MPAD 6187 Spring 2021

1. Explain the project
   - Cabarrus County has made arrangements to purchase ~616 acres of land in Northeast Cabarrus County near NC 49 North, St. Stephens Church Road, and North Lentz-Harness Shop Road. This parcel includes many natural features including ~200 feet of elevation change, a wetland bog, farmland, and many old-growth trees. Cabarrus County would like to turn this parcel into a passive park. A passive park usually includes less structured recreational activities that require little or no specialized parkland development and management and therefore can be provided at a low cost to communities. It involves casual activities and the pursuit of hobbies, with no adverse impact to the natural habitat. Generally, no motorized activity is allowed and trails are typically dirt or gravel.

2. Tell me about your organization. What do you do? Who are you?

3. Where do you like to do your activities (i.e., ride your horses, ride your bike, etc.)?

4. What features do you like about that park/area?

5. What makes you return to that site?

6. What features are “must haves” for you to visit a park?

7. What features would you like to include in a park for your group (i.e., special parking for horse trailers, bike repair station, elevation and natural features, what would make their experience better)?

8. Have you ever been to a park you didn’t like?

9. Which features would you like to see available immediately and which features would you not mind waiting for?

Topic-Specific Questions

- Are you aware of any other community organizations which may be interested in/willing to support the development, maintenance, or marketing of this site?
- How do you balance the prioritization of conservation and recreation in your community?
- What sort of educational opportunities would you like to see at a passive park? Can you think of any partnerships we should look into?
- How do you integrate educational experiences into park usage?
  - Follow-up if applicable: Any specific thoughts on historical/conservation/wildlife/geological information?
Appendix C: Lower Butcher Branch Inventory

Appendix C: Lower Butcher Branch Inventory
Appendix C: Lower Butcher Branch Inventory

Cabarrus County Natural Area Inventory

LOWER BUTCHER BRANCH DEPRESSION SWAMPS
Significant Natural Heritage Area

Site Significance: county
Size: ca. 90 acres
Quadrangles: Mt. Pleasant

SIGNIFICANT FEATURES
Significance: Site is considered significant because of the occurrence of two upland depression swamps and the relatively good quality of the surrounding forest.

Biological Description:
A: The site is an example of a DRY-OAK HICKORY FOREST which also contains an UPLAND DEPRESSION SWAMP FOREST in two areas. (see map)
B&C: The dry ridge canopy consists of a mix of Quercus alba, Q. falcata, Q. prinus, Carya ovata, C. glabra and Pinus echinata. Subcanopy species include Acer leucoderme, A. rubrum, Cornus florida, Nyssa sylvatica, Asimina triloba, and Oxydendrum arboreum. The shrub layer includes Nestronia umbellula, Ilex opaca, and Vaccinium corymbosum. Herb layer contains Tipularia discolor, Houstonia sp., Chimaphila maculata, Erythronium americanum and Thalictrum thalictroides. The two depressions contained standing water and had a canopy of mostly Acer rubrum and Liquidambar styraciflua. Also present was Quercus phellos. Sphagnum moss occurs in both depressions as well as the aquatic Proserpinaca palustris.
D: The ridge is bordered by agricultural fields on the western side and DRY-MESIC OAKHICKORY FOREST on the eastern side.
E: The quality of this site is good although its condition is fair due to selective cutting of canopy species.
F: ca. 90 acres total

The following is a description of the two upland depressions that are found on the site. They are identified as cnhsA and cnhsB. The cnhsA depression is approximately 100 x 60 feet in size, has a fair overstory cover, and a maximum depth of 11.5 inches. Water chemistry characterizations reveal no significant pollution problems, though the pH measures slightly acidic. cnhsA is located atop a ridge adding to its unique character. Inundated/ponded conditions are expected to be present throughout the year given its basin and water levels during the time of the assessment. Several species of amphibians were observed utilizing the wetland. Spotted salamander, Ambystoma maculatum, egg masses were found in abundance. The cnhsB depression is approximately 5.5 x 3 feet in size, has good overstory cover and a maximum depth of 5.5 inches. Water chemistry characterizations reveal no significant pollution problems though the pH measures slightly acidic.

SITE DESCRIPTION
Province: PIEDMONT
Watershed: Yadkin - Pee Dee
Aspect: W, flat
Moisture: inundated swamp, mesic,dry mesic
Hydrology: terrestrial, palustrine
Slope: 0-35+
Topographic Position: crest, upper-mid-lower slope
Appendix C: Lower Butcher Branch Inventory

Geology: mvm - Mafic and intermediate Metavolcanic rocks within Gold Hill Shear Zone of Carolina Slate belt. Zp-Phyllite
Elevation: 640-760
Soils: Swamp: MsA-Misenheimer channery silt loam, 0 to 4% slopes, Ridge: GoF-Goldston very channery silt loam, 15 to 45% slopes, GoC-Goldston very channery silt loam, 4 to 15% slopes, TaB-Tatum silt loam
Comments: Wide spacing of trees due to dry soil on ridge. Area has also been selectively cut. Site contains two upland depression swamps both of which contained egg masses and sphagnum moss.

LANDSPE RELATIONSHIPS
Adjacent Land Use: Agriculture, residential
Landscape: Swamp on top of hill, water 10" to 16" in depth, Sweetgum, Red maple, some Willow oak, Campsis sp., Ilex sp.
Ridge running NE to SW, very rocky soil.
Fire Regime: unknown, probably suppressed
Comment: Area was selectively cut, although not recently, as evidenced by the presence of stumps.
Management and Protection: This site is recommended for protection as a natural area. The two depressions are breeding habitat for amphibians, and the surrounding forest is good habitat for other wildlife.

Noteworthy Species:

PLANT SPECIES LIST
CANOPY: Quercus alba, Q. marilandica, Q. falcata, Q. phellos, Q.stellata, Q. prinus, Q. velutina, Q. rubra, Q. coccinea, Oxydendrum arboreum, Pinus echinata, P. virginiana, Carya ovata, C. glabra, Acer rubrum, Fraxinus americana, Liquidambar styraciflua, Nyssa sylvatica SUBCANOPY: Juniperus virginiana, Cornus florida, Nyssa sylvatica, Prunus serotina,
Oxydendrum arboreum, Ulmus alata, Acer rubrum, A. leucoderme, Sassafras albidum
SHRUBS: Asimina triloba, Ilex decidua, I. opaca, Viburnum rafinesquianum, V. dentatum, Neotrition umbellula, Vaccinium corymbosum
HERBS: Claytonia virginica, Tipularia discolor, Houstonia sp., Chimaphila maculata, Erythronium americanum, Thalictrum thalictroides, Carex glaucescens, Rhynchospora corniculata, Scirpus cyperinus, Proserpinaca palustris (aquatic)
VINES: Campsis radicans, Smilax sp., Vitis sp., Trachelospermum difforme
FERNS: Pteridium aquilinum

ANIMAL SPECIES LIST
Benthic Macroinvertebrates observed:
ORDER / COMMON NAME
Amphipoda / scuds
Decapoda / crayfish and shrimp
Diptera / midges, mosquitoes, aquatic gnats and flies
Megaloptera / fishflies, dobsonflies, alderflies
Oligochaeta / aquatic worms
Odonata / dragonflies and damselflies Plecoptera / stoneflies Other wildlife:
Carolina Anole, White Tail Deer, Salamander egg masses in both depressions

REFERENCES:
26-Mar-98, 14-Sep-98, 24-Jun-97 (D. Seriff, D. Testerman)
### Appendix D: Forest Priority Species

Priority species associated with piedmont oak forests and mixed hardwood/pine stands.

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<td><em>Accipiter cooperii</em></td>
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<td><em>Caprimulgus vociferus</em></td>
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<td>Worm-eating Warbee</td>
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<td>Amphibians</td>
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<td><em>Ambystoma opacum</em></td>
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<td><em>Hyla versicolor</em></td>
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<td><em>Elaphe guttata</em></td>
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<td><em>Lampropeltis triangulum elapoids</em></td>
<td>Scarlet Kingsnake</td>
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<td>Eastern Slender Glass Lizard</td>
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<td><em>Sistrurus miliarius</em></td>
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<td><em>Terrapene carolina</em></td>
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<td><em>Virginia valeriae valeriae</em></td>
<td>Eastern Smooth Earthsnake</td>
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**Source:** NCRWC (2021a, p. 2)
SUBCHAPTER 13H - NATURAL HERITAGE PROGRAM

SECTION .0100 - GENERAL PROVISIONS

07 NCAC 13H .0101 STATEMENT OF POLICY

07 NCAC 13H .0102 STATEMENT OF PURPOSE

History Note: Authority G.S. 113-3; 113-8; 113A-164.2; 113A-164.4;
Eff. April 4, 1979;
Amended Eff. January 1, 1986; October 1, 1984;
Expired Eff. February 1, 2016 pursuant to G.S. 150B-21.3A;

07 NCAC 13H .0103 DEFINITIONS AS USED IN THIS SUBCHAPTER

In addition to the definitions in G.S. 143B-135.254, the following terms shall apply to this Subchapter:

1. "Natural diversity" means the native plant and animal species, geological features, plant communities, ecosystem types, and other natural features.

2. "Natural Heritage Areas List" means a list of those natural areas recommended by the Natural Heritage Program, pursuant to G.S. 143B-135.256(7), that are of special importance to the maintenance of the state's natural diversity and that may warrant protection by registration or dedication.

3. A "natural community" means any area with a recognizable and reoccurring assemblage of plants, animals, bacteria, and fungal species naturally associated with each other and their physical environment.

History Note: Authority G.S. 143B-135.254; 143B-135.256;
Eff. April 4, 1979;
Amended Eff. August 1, 1988; January 1, 1986; October 1, 1984; August 30, 1980;
Readopted Eff. March 1, 2017;

07 NCAC 13H .0104 RESPONSIBILITIES AND DUTIES OF NATURAL HERITAGE PROGRAM

History Note: Authority G.S. 113-3; 113-8; 113A-164.4;
Eff. April 4, 1979;
Amended Eff. January 1, 1986; October 1, 1984; August 30, 1980;
Repealed Eff. March 1, 2017;

07 NCAC 13H .0105 NATURAL HERITAGE ADVISORY COMMITTEE

(a) The Natural Heritage Advisory Committee shall be composed of nine members appointed by the Secretary, in accordance with G.S. 143B-135.256(6).

(b) The Natural Heritage Advisory Committee shall:
(1) advise and make recommendations to the Department on inventory and evaluation of natural areas;
(2) review and make recommendations for registration, acquisition, and dedication of natural areas and nature preserves by the Department;
(3) review and make recommendations on Department priorities and plans for the selection of particular natural areas for State acquisition and for designation of nature preserves;
(4) review and make recommendations on master plans, management plans, and other plans and proposals for development and use of lands administered by the Department;
(5) advise the Secretary on policies and rules governing management, protection, and use of registered natural areas and dedicated nature preserves by the Department;
(6) advise and consult with the Secretary and Department staff on policies and programs relating to preservation of natural diversity and outstanding natural areas in the state; and
(7) consult and coordinate with other public agencies, conservation organizations, and scientific bodies on matters concerning natural diversity inventory and natural areas identification, acquisition, management, and dedication.

History Note: Authority G.S. 143B-10; 143B-135.256;
Eff. April 4, 1979;
Amended Eff. January 1, 1986; October 1, 1984; March 1, 1983; August 30, 1980;
Readopted Eff. March 1, 2017;

07 NCAC 13H .0106 INFORMATION SERVICES 07 NCAC 13H .0107 LOCATION

History Note: Authority G.S. 113-3; 113-8;
Eff. April 4, 1979;
Repealed Eff. October 1, 1984;

SECTION .0200 – REGISTRY OF NATURAL HERITAGE AREAS

07 NCAC 13H .0201 OBJECTIVES OF REGISTRY

History Note: Authority G.S. 143B-135.254; 143B-135.256; 143-135.258;
Eff. April 4, 1979;
Repealed Eff. March 1, 2017;

07 NCAC 13H .0202 CRITERIA FOR ELIGIBILITY

(a) For an area to qualify as a Natural Heritage Area and be eligible for registration or dedication, the Natural Heritage Program staff shall determine that the area possesses one or more of the following natural values:

(1) a habitat for individual species of plants or animals that are in danger of or threatened by extirpation;
(2) a rare terrestrial natural community;
Appendix E: NHP 13H Rules

(3) a rare aquatic community;
(4) features that illustrate geologic processes or the history of the earth;
(5) unique or unusual ecological types; or
(6) biological or ecological phenomena of significance.

(b) Upon meeting one of the criteria in Paragraph (a) of this Rule, the Natural Heritage Program staff shall evaluate an area with respect to the following factors:

(1) the presence of ecological values represented in previously registered Natural Heritage Areas;
(2) the natural diversity of the area;
(3) the quality and viability of the environmental features including self-sufficiency of the ecosystem when managed and degree of vulnerability to disturbances and intrusions;
(4) the extent to which past disturbances or land uses have altered natural communities. An area may be considered even if it shows evidence of past disturbance or land use;
(5) the ability to be managed to protect and maintain ecological features in a natural condition, and a buffer area, as set forth in Rule .0304 of this Subchapter, to ensure protection. A buffer zone, where possible, shall follow defensible boundaries and help protect the site against adverse effects from use and development of adjacent land. The buffer zone may be included in the designated area but need not itself possess any eligibility criteria as set forth in this Rule;
(6) compatibility of protective management practices with current use practices on adjacent lands; and
(7) scientific and educational value.


07 NCAC 13H .0203 REGISTRATION PROCESS

(a) Nomination.

(1) Nominations for the Registry of Natural Heritage Areas may be made by the Natural Heritage Program staff, by other public agencies, by members of the Natural Heritage Advisory Committee, or by any other resident or property owner of the State. Nominations shall be submitted, in writing, to the North Carolina Natural Heritage Program, 1651 Mail Service Center, Raleigh, North Carolina 27699. Nominations shall include the name, address and phone number for both the nominator and the owner of the nominated area and the location where the area is located.

(2) The Natural Heritage Program staff shall conduct an on-site evaluation of a nominated area in order to gather information to determine that the area meets eligibility criteria.

(3) After reviewing information on a nominated area, the Natural Heritage Program staff shall determine if an area qualifies for the registry and shall document its findings in an evaluation report with recommendations for action.

(4) Nominations initiated by the public or other agencies shall be accepted or rejected by the Department within one year of receipt. Rejections shall include an explanation. The nominator may request consideration again by submitting information that was not previously considered to the Natural Heritage Program.
Appendix E: NHP 13H Rules

(b) Notification of Landowner or Administrator. Once an area is nominated and is recommended for registration, the Natural Heritage Program staff shall notify the owner or administering agency. The owner may request that the property be or not be considered further for registration.

(c) All nominations and recommendation reports shall be submitted by the Natural Heritage Program to the Natural Heritage Advisory Committee (“Committee”). Upon approval of the nomination by the Committee, the chairman or acting chairman shall sign the statement of recommendation and submit it for review by the Division Director. If the Division Director approves the statement of recommendation, it shall be submitted to the Natural Heritage Program staff. The Natural Heritage Program staff shall solicit comments about the nomination from the landowner or managing agency. Recommendation statements, comments, and a report of the owner’s willingness to accept registration shall then be submitted to the Secretary by the Natural Heritage Program staff.

(d) Designation. Upon review of the information submitted in Paragraph (c) of this Rule, the Secretary shall decide whether the nominated area is eligible for listing in the Registry of Natural Heritage Areas. The registration of a site shall be the voluntary decision of the landowner or administering agency, pursuant to G.S. 143B-135.258.

(e) The owner or a volunteer shall annually report to the Natural Heritage Program Director once a year on the condition of the registered area.

History Note: Authority G.S. 143B-135.256; 143B-135.258;
   Eff. April 4, 1979;
   Amended Eff. January 1, 1986; October 1, 1984; August 30, 1980;
   Readopted Eff. March 1, 2017;

07 NCAC 13H .0204 REGISTRATION

History Note: Authority G.S. 113-3; 113-8; 113A-164.4; 113A-164.5;
   Eff. April 4, 1979;
   Amended Eff. January 1, 1986;
   Repealed Eff. March 1, 2017;

07 NCAC 13H .0205 RESCISSION

(a) The registration agreement may be terminated at any time upon notification by either party. Such termination shall remove the area from the Registry.

(b) Any person may submit a written request to the Department to remove an area from the Registry if he or she believes the site no longer meets the criteria for registration as set forth in Rule .0202 of this Section. The request for removal shall explain the changes that have occurred to the area since the area was registered and why the area no longer meets the criteria in Rule .0202 of this Section. All requests made under this Rule shall be submitted to the North Carolina Natural Heritage Program, 1651 Mail Service Center, Raleigh, North Carolina 27699. After considering the request, the Secretary, upon recommendation of the Natural Heritage Program staff and Natural Heritage Advisory Committee, may order removal from the Registry as set forth in G.S. 143B-135.258.

(c) Rescission shall remove the area from the Registry of Natural Heritage Areas, and the owner or administering agency shall be requested to return the certificate to the agency signifying the area’s inclusion on the Registry, as set forth in G.S. 143B-135.256.
Appendix E: NHP 13H Rules

(d) Any person aggrieved by any of the steps in the process described in this Rule may seek an administrative hearing as set forth in G.S. 150B-23.

History Note: Authority G.S. 143B-135.256; 143B-135.258;
   Eff. April 4, 1979;
   Amended Eff. August 1, 1988; January 1, 1986; October 1, 1984;
   Readopted Eff. March 1, 2017;

07 NCAC 13H .0206 PUBLIC ACCESS
Registration of a natural area shall not create a right of public access to the registered area. Any person visiting a registered area shall first obtain the permission of the owner or managing agency before entering the property. The landowner or managing agency retains the option to restrict publicity and access to the property.

History Note: Authority G.S. 143B-135.256;
   Eff. April 4, 1979;
   Readopted Eff. March 1, 2017;

07 NCAC 13H .0207 MANAGEMENT OF REGISTERED NATURAL AREAS

History Note: Authority G.S. 143B-135.256; 143B-135.258;
   Eff. April 4, 1979;
   Repealed Eff. March 1, 2017;

07 NCAC 13H .0208 DESIGNATION OF NATURAL AREAS ON STATE LANDS

History Note: Authority G.S. 143B-135.258; 143B-135.264;
   Eff. March 1, 1983;
   Amended Eff. October 1, 1984;
   Repealed Eff. March 1, 2017;

SECTION .0300 – DEDICATION OF NATURE PRESERVES

07 NCAC 13H .0301 OBJECTIVES OF DEDICATION
The State may accept the dedication of nature preserves on lands deemed by the Secretary to qualify as "outstanding natural areas," based on the criteria of eligibility as set forth in Rule .0202 of this Subchapter. The Secretary shall recommend to the Governor and Council of State, through the Director of the State Property Office in the Department of Administration, that an area be dedicated as a nature preserve. Dedication of a preserve becomes effective only upon acceptance of Articles of Dedication by the Governor and Council of State. Articles of Dedication shall be recorded in the county or counties where the nature preserve is located, in the State Property Office and in the office of the Natural Heritage Program.
07 NCAC 13H .0302 DEDICATION PROCESS
(a) Upon receipt of the recommendation reports from the Natural Heritage Program and statements of recommendation from the Natural Heritage Advisory Committee, the Secretary shall determine whether the proposed area qualifies under criteria set forth in Rule .0202 of this Subchapter and constitutes an "outstanding natural area" through dedication as a nature preserve.

(b) Nature preserves are created when natural areas are dedicated by:

1. the owner who transfers to the State the title or other interest in the land with Articles of Dedication agreed to by the owner and the State;

2. any local unit of government that transfers fee simple title or other interest in land to the State through Articles of Dedication agreed to by the local government agency and the State; or

3. the State itself for State-owned lands through Articles of Dedication, and declaring the State as trustee for the dedication, subject to allocation pursuant to the provisions of G.S. 143-341(4). The Secretary and Director of the State Property Office shall make recommendations to the Governor and Council of State for dedicating State-owned lands as nature preserves.

History Note: Authority G.S. 143B-135.252; 143B-135.256; 143B-135.260; 146-26;
Eff. August 30, 1980;
Amended Eff. January 1, 1986; October 1, 1984;
Readopted Eff. March 1, 2017;

07 NCAC 13H .0303 ARTICLES OF DEDICATION
(a) Articles of Dedication shall include:

1. a statement of the public purposes served by the dedication and a declaration that the State shall hold such title or interest to the area in trust for the public as a dedicated nature preserve under the terms and authority set forth in G.S. 143B-135.262, and describe the rights and restrictions as will protect the dedicated area consistent with the criteria set forth in Rule .0202 of this Subchapter.

2. the primary custodian who will be responsible for managing the nature preserve in accordance with the Articles of Dedication and these Rules;

3. the right of the State or its agents to enter dedicated lands to inspect its condition and to enforce the Articles of Dedication. This right of inspection shall not in and of itself create an automatic right of public access; and

4. any other provision necessary to carry out the purpose of this Subchapter.

(b) Articles of Dedication on land remaining in private ownership shall contain a provision notifying the State before any sale or transfer by deed or lease of the land or other interests therein. The State shall not regulate or prohibit such sale or transfer, but shall ensure that the grantee or lessee is familiar with the Articles of Dedication. The Articles of Dedication shall contain a provision indicating that any
Appendix E: NHP 13H Rules

transfer of any interest in the dedicated nature preserve shall be subject to the conditions set forth in the Articles of Dedication.

History Note: Authority G.S. 143B-135.260; 143B-135.262; 143B-135.264; 143B-135.266; 143B-135.268;
   Eff. January 1, 1986;
   Amended Eff. August 1, 1988;
   Readopted Eff. March 1, 2017;

07 NCAC 13H .0304 BUFFER AREAS
(a) For the purpose of protecting a nature preserve, adjoining land that is not otherwise suitable for dedication as a nature preserve may be dedicated as a buffer area in the same manner as a nature preserve under this Section. A buffer area, where possible, shall help protect the site against adverse effects from use and development of adjacent land. The buffer area may be included in the designated area but need not itself possess eligibility criteria.
(b) Provisions in the Articles of Dedication for the management, use, development, and public access of the buffer area may differ from those used for the adjacent nature preserve.

History Note: Authority G.S. 143B-135.256; 143B-135.260;
   Eff. January 1, 1986;
   Readopted Eff. March 1, 2017;

07 NCAC 13H .0305 PUBLIC TRUST
(a) Members of the public may bring notice to the Secretary or his or her agents of suspected violations of terms of dedications. Notice shall be made by U.S. Mail to 4601 Mail Service Center, Raleigh, North Carolina 27699. The Natural Heritage Program shall investigate notices of violations and shall maintain monitoring of all dedicated preserves. After investigation of a notice of violation, the Natural Heritage Program shall respond, via U.S. Mail, to the notifying party and recommend action to the Secretary.
(b) The Natural Heritage Program shall maintain administrative records for dedicated areas. These shall be available for public review online at www.ncnhp.org or at 121 West Jones Street, Raleigh, North Carolina 27603, and copies shall be available at actual cost.
(c) The State may enter into contracts and agreements with other agencies and persons to manage and monitor dedicated preserves, but the State shall not abdicate its trusteeship for dedicated lands through such contracts or agreements.

History Note: Authority G.S. 143B-135.256; 143B-135.262;
   Eff. January 1, 1986;
   Readopted Eff. March 1, 2017;

07 NCAC 13H .0306 AMENDMENTS
(a) Amendments that remove some portion of the existing Articles of Dedication shall not be approved until after a public hearing in the county or counties where the dedicated preserve lies. The State shall provide not less than 30 days notice of the hearing in the newspaper of largest circulation in
the county or counties where the land lies. The State shall provide not less than 30 days notice to the chief county and municipal administrative officials in the jurisdiction where the land lies.

(b) Notwithstanding the provisions of Paragraph (a) of this Rule, Articles of Dedication may be amended as they affect use or disposition of land, even if the purposes of G.S. 143B-135.262 or the original dedication will be violated under the following circumstances:

(1) the Governor and Council of State find that an amendment serves the best interest of the State and no prudent alternative exists;

(2) after a public hearing with notice provided in Paragraph (a) of this Rule; and

(3) with the concurrence of the Governor and Council of State.

(c) After the public hearing and finding by the Governor and Council of State, the State shall publish a statement of its findings in the newspaper of largest circulation in the county or counties where the land lies at least 30 days before the amended Articles of Dedication is final.

History Note: Authority G.S. 143B-135.256; 143B-135.260; 143B-135.262; 143B-135.268;
Eff. January 1, 1986;
Amended Eff. August 1, 1988;
Readopted Eff. March 1, 2017;

07 NCAC 13H .0307 EXTINGUISHMENT BY THE STATE
(a) Articles of Dedication may be extinguished by amendment and the dedication abandoned if:

(1) the Secretary finds that qualifying features of the land have been destroyed or damaged;

(2) the Secretary finds that the public purposes of the dedication have been frustrated; (3) after a public hearing with notice provided as described in Rule .0306(a) of this Section; and

(4) with the approval of the Governor and Council of State.

(b) Articles of Dedication may be extinguished by amendment and the dedication abandoned if:

(1) the Secretary finds that the extinguishment and abandonment serves a public necessity and no alternative exists;

(2) after a public hearing with notice provided as described in Rule .0306(a) of this Section; and

(3) with the approval of the Governor and Council of State.

(c) After the public hearing, the State shall publish a statement of its findings in the newspaper of largest circulation in the county or counties where the land lies at least 30 days before the extinguishment is final.

History Note: Authority G.S. 143B-135.256; 143B-135.260(c);
Eff. January 1, 1986;
Readopted Eff. March 1, 2017;

07 NCAC 13H .0308 MUTUAL TERMINATION
Articles of Dedication shall terminate only under the following circumstances:

(1) in accordance with the terms of the Articles of Dedication itself;

(2) in accordance with the nature and duration of the underlying legal interest in the property being placed under the Articles of Dedication; or
Appendix E: NHP 13H Rules

(3) upon mutual written consent executed by and between the owner, its successors or assigns, the State, and approved by the Governor and Council of State.

History Note: Authority G.S. 143B-135.256; 143B-135.260(c);
Eff. January 1, 1986;
Readopted Eff. March 1, 2017;

SECTION .0400 – MANAGEMENT; USE; AND PROTECTION OF DEDICATED NATURE PRESERVES

07 NCAC 13H .0401 MANAGEMENT PLAN
(a) A management plan shall be prepared for each dedicated nature preserve. The Articles of Dedication shall assign responsibility for the preparation of the management plan.
(b) The Secretary of the Department of Natural and Cultural Resources or his or her designee shall review all management plans and their revisions, and shall approve those plans that implement the principles set forth in Rule .0402 of this Section.
(c) The Secretary or his or her designee shall monitor all dedicated preserves as set forth in Rule .0305 of this Subchapter and report violations of the approved plan, situations that violate the Articles of Dedication, or actions harmful to the natural resources of the preserve.
(d) In the event that the owner or the State agency managing the dedicated preserve does not adopt an approved management plan or does not adhere to the provisions of the plan, the Secretary shall request the Department of Administration to take an action such as mediation, reallocation of the land to another agency, or referral to the Office of the Attorney General.

History Note: Authority G.S. 143B-135.256; 143B-135.262;
Eff. January 1, 1986;
Readopted Eff. March 1, 2017;

07 NCAC 13H .0402 MANAGEMENT PRINCIPLES
The following management principles shall apply to all dedicated preserves, unless exceptions are expressly provided in the Articles of Dedication:

1. the natural character of the property shall be maintained;
2. improvements, including building of all types, trails, parking areas, vehicular roadways, signs, fences, steps, and bridges, shall only be constructed when approved by the Secretary or his or her designee as necessary for the security, safety, access of the public or for the maintenance and management of the preserve;
3. destruction of flora and fauna shall not be permitted except for the purpose of preserving species and natural communities of concern, or for the purpose of establishing and maintaining public access facilities. In case of either exception, and upon approval of the exception by the Secretary or his or her designee, manipulation of the flora and fauna shall be consistent and compatible with the ecological character of the area and shall not be damaging or detrimental to the preserve;
4. no motorized vehicles shall be permitted on the dedicated property other than those utilized by the owner or the owner's agents in management and protection of the
property or used by the general public for ingress and egress to the property in compliance with the management plan for the preserve;
(5) no signs, billboards, or other advertising of any kind shall be erected, with the exception of informational and directional signs, designed by the Secretary, owner, or State agency, related to the designation of the area as a preserve or for public access to the preserve;
(6) no change shall be made in the topography of the preserve except as approved by the Secretary or his or her designee for those alterations that may be necessary to provide on-foot access to the public for visitation or observation, if the change is compatible and consistent with the character of the property, and where no detrimental effect will result;
(7) no activity shall be allowed that may pollute any stream or body of water in the preserve;
(8) no stream in the preserve shall be dammed, impounded, or have its course altered as a result of human activity;
(9) visitor activities shall be controlled to prevent disturbance and environmental degradation of the preserve;
(10) prescribed fire and necessary fire lines may be used as management tools to maintain or protect the natural community type;
(11) the cutting or removal of trees, dead or alive, shall be prohibited, except when it is necessary for public safety, as determined by the Secretary, owner, or State agency;
(12) persons wishing to engage in scientific research or collection of natural materials within a preserve shall first secure written permission from the owner or the State agency;
(13) when necessary, as determined by the Secretary, owner, or State agency, boundaries of a preserve shall be made evident by placing markers or boundary signs at corners and other strategic locations;
(14) control of exotic (non-native) species may be undertaken where eradication may be accomplished without disturbance of the area’s natural conditions; and
(15) no other acts or uses that are detrimental to the maintenance of the property in its natural condition shall be allowed, including disturbance of the soil, mining, commercial or industrial uses, timber harvesting, ditching and draining, or depositing waste materials.


07 NCAC 13H .0403 MANAGEMENT RULES FOR PRESERVES
Additional management principles consistent with the general management principles for dedicated preserves, as set forth in Rule .0402 of this Section, may be adopted through an amendment to the Articles of Dedication by the owner or State agency, in accordance with Rule .0306 of this Subchapter.

Appendix F: Tarheel Trailblazers Memorandum of Understanding (MoU)

PARK AND RECREATION DEPARTMENT
AMENDED AND RESTATED AGREEMENT BETWEEN THE COUNTY OF MECKLENBURG, HEREIN COUNTY AND TARHEEL TRAILBLAZERS, INC., HEREIN CONTRACTOR, FOR THE DEVELOPMENT AND MAINTENANCE OF MOUNTAIN BIKING TRAILS AT VARIOUS PARK LOCATIONS AS IDENTIFIED IN SCHEDULE 1 ATTACHED HERETO.

RECITALS

1. Contractor and County entered an agreement in March 2006 and now desire to amend and restate that prior agreement which shall be replaced in its entirety by this agreement
2. Contractor is a North Carolina non-profit corporation and wishes to develop and maintain mountain biking trails in the Mecklenburg County Park and Recreation Park System.
3. Contractor and County have maintained a partnership for several years, in which Contractor has been permitted to construct and maintain mountain bike trails in several selected County parks.
4. County agrees to allow Contractor to continue to build and maintain mountain bike trails (herein Trails) in selected County Parks on a TEMPORARY use basis (until the sites are Master Planned or until areas used by Contractor are needed for other planned development) and Contractor desires to do so.

In consideration of the recitals, the mutual promises and conditions stated herein, and in recognition of the Contractor’s role as an independent contractor and not as an employee of the County, County and Contractor agree as follows:

I. DUTIES OF THE CONTRACTOR:

Prepare plans and specifications for the construction of Trails in approved County Parks. Such plans will be submitted to the County’s Parks and Recreation Department Planning Staff (herein Staff) for review and approval. No Trail will be located closer than 100 feet from any Park boundary. Trail construction standards, design specifications, layout considerations and trail difficulty rating system standards may, to the extent reasonably possible, follow those promulgated by the International Mountain Bike Association (IMBA) but will in all cases follow plans which have been reviewed and approved by Staff.

Contractor agrees to inspect the Trails on a monthly basis once constructed and open to public use, and maintain such trails in a safe condition. In the event that Contractor desires to clear, mark and/or stabilize the trails, Contractor agrees to present such plans to the Staff for review. Upon the successful review of such plans, Staff may give permission to Contractor to proceed with the approved plans.
In consultation with the Staff, develop and provide a signage system approved by the Staff identifying the Trails, their level of difficulty (as applicable), and unusually difficult sections of Trail. The signage plan may include codes of trail conduct and requirements for the use of safety equipment and shall be approved by the Staff before implementation.

The Contractor may hold organized mountain biking programs or events, subject to the prior consent of County, including coordinating, sponsoring or co-sponsoring organized competitive racing events on the Trails. Mecklenburg Parks and Recreation logo shall appear on all publications and signs advertising or promoting these programs and events.

The Contractor will report any problems or difficulties noted relative to safety issues by users of the Trails.

The Contractor will deliver a quarterly report to County which will include a listing of approved events held that quarter, the number of participants for each event, and a list of approved upcoming events along with a summary of volunteer projects and the number of volunteer hours contributed in respect of the Trails. Contractor understands that all projects which it undertakes must have specific prior approval by County.

Contractor agrees to meet with a designated County employee at least quarterly to review upcoming requests related to programs, plans, budgets, and events desired by Contractor and to review previously approved items as needed.

II. DUTIES OF THE COUNTY

A. Meet with the Contractor as reasonably requested, but at least quarterly, to review requests for programs, plans, budgets, and events related to the Trails including approved Trail construction and maintenance and to review issues related to this Agreement.

B. Notify Contractor of:
   (1) Additional opportunities to build approved trails, and;
   (2) Development of, or changes to, Master Plans or other policy or construction issues which may impact existing Trails;

C. Provide Contractor reasonable access to the Parks so that it may fulfill its obligations hereunder.

D. Provide mulch and gravel to assist Contractor with approved projects as may be possible.

E. Provide technical advice and assistance to Contractor as may be possible and consistent with approved projects.

III. HOLD HARMLESS, INDEMNITY AND INSURANCE

A. Indemnification. CONTRACTOR agrees to indemnify, defend and save harmless the COUNTY and its agents, officers and employees from and against any and all liability, expense (including defense costs and legal fees) and claims for damages including, but not limited to, bodily injury, death, personal injury, or property damage arising from or connected with CONTRACTOR’s operations or services hereunder, including any Worker’s Compensation suits, liability or expense, arising from or connected with services performed on behalf of CONTRACTOR by any person pursuant to this Agreement except to the extent that such bodily injury, death, personal injury or property damage arises from or is connected with the COUNTY’s operations or services. CONTRACTOR’s duty to indemnify the COUNTY shall survive the expiration or other termination of this Agreement.
but only with respect to those liabilities, expenses (including defense costs and legal fees) and claims for damages including, but not limited to, bodily injury, death, personal injury, or property damage which arise from any of CONTRACTOR’s operations or services provided prior to the expiration or other termination of this Agreement.

B. CONTRACTOR’s Insurance. CONTRACTOR shall provide and maintain at its own expense during the term of this Agreement the following program(s) of insurance covering its operations. Such insurance shall be provided by insurer(s) satisfactory to the COUNTY as approved by the COUNTY’s Risk Management Division and evidence of such programs satisfactory to the COUNTY shall be delivered to the COUNTY on or before the effective date of this Agreement. Such evidence shall specifically identify this Agreement and shall contain the express condition that the COUNTY is to be given written notice of at least ten (10) days in advance of any modification or termination of any program of insurance. Such insurance shall be primary to, and not contributing with any other insurance maintained by COUNTY, and shall name MECKLENBURG COUNTY as an additional insured:

Commercial General Liability: Insurance endorsed for Independent Contractor, Professional Liability, Premises-Operations, Products/Completed Operations, Contractual, bodily injury and property damage with a combined single limit of not less than ONE MILLION DOLLARS ($1,000,000.00) per occurrence.

IV. LIMITATIONS:

A. The Contractor shall not sell or provide, nor cause nor allow to be sold or provided, alcoholic beverages during any of its functions without prior written permission of County, including obtaining permits as may be required by the County’s Park and Recreation Facilities Ordinance;

B. The Contractor shall not transfer its obligations under this Agreement to other interested parties without prior written permission of County;

C. Opportunities to participate in all activities conducted by the Contractor must be available without regard to race, religion, national origin, sex, or disability.

V. NOTICES

If to Contractor: If to County:

President Director
Tarheel Trailblazers Mecklenburg County Park and
C/o 3611 Woody Grove Lane Recreation Department
Charlotte, NC 28210 5841 Brookshire Blvd.
Fax: 704-662-0898 Charlotte, N.C. 28216

Telephone: 704-336-5476

With a copy to:
Christopher J. Fernandez
Alston & Bird LLP
101 South Tryon Street, Suite 4000
Charlotte, NC 28280-4000
VI. TERM/TERMINATION

This Agreement is entered into and effective this the 15th day of February, 2009. This Agreement shall be effective for one year from the date hereof but will automatically renew unless terminated by notice as described herein. This Agreement may be terminated by either party for cause in the event that the other party remains in non-compliance of this Agreement after thirty (30) days notice of such non-compliance. Either party hereto may terminate this Agreement without cause and for any reason with a minimum of ninety (90) days written notice. This Agreement contains the entire agreement between the parties and may not be altered except by a written amendment executed by both parties.

IN WITNESS WHEREOF, THE PARTIES HAVE DULY EXECUTED THIS CONTRACT TO BE EFFECTIVE AS OF THE DATE ABOVE WRITTEN:

TARHEEL TRAILBLAZERS, a North Carolina non-profit corporation

By: ____________________________
    James Grover, its President

MECKLENBURG COUNTY PARK AND RECREATION DEPARTMENT

By: ____________________________
    Gregory Jackson, Division Director, Park Operations and Athletic Services

____________________________
Contracts Administrator

____________________________
Director, Park and Recreation Dept.
Appendix F: Tarheel Trailblazers MoU

**SCHEDULE 1**

**Current Trails**

Renaissance Park

Historic Tuckaseegee Ford Park

Col. Francis J. Beatty Park

North Mecklenburg Park

Sherman Branch Park

Jetton Park

**Pending/Under-Construction Trails**

Park Road Park

Southwest Park

Dixie River Property

Lakewood Community Park
Cabarrus County Active Living and Parks is a great place to bring your class! And if you can’t come to us, we will come to you! We offer hands-on minds-on nature and science-based programs that will engage and excite young scientists. Our activities inspire curiosity and spark the desire to learn more about the natural world. All programs meet North Carolina Essential Standards.

“The visuals and hands-on activities brought learning to life for our students.”

R. Brown McAllister Elementary School Teacher

“The experiments were highly engaging and memorable.”

Weddington Hills Elementary School Teacher

“The program totally reinforced the curriculum we taught and the kids had so much fun! “ Bethel Elementary School Teacher
Appendix G: Cabarrus County ALP School Field Trip Information

HOW TO REGISTER

Requests are processed in the order they are received. Please fill out a field trip application and return it via email or direct mail a minimum of 4 weeks in advance to:

Cabarrus County Active Living & Parks
Address: 12900 Bethel School Road  Midland, NC 28107   E-mail: seunger@cabarruscounty.us

Please contact Shannon Unger at 704-920-2727 or seunger@cabarruscounty.us with any questions. Programs done at a school location are 30 minute and are $2 per student. Programs done at a park are 1.5 hours for PreK-K and 2.5 hours for 1st-5th grade. These visits will include a science program, team-building session and additional outdoor activities. The fee is $3 per student. Adults are free. We can accommodate up to 30 in a group and can accommodate multiple groups.

Cabarrus County Schools qualify for the Jr. Ranger Program that consists of 3 classroom visits and 1 park field trip for only $3 per student!

Registration Information

Starred programs can only be done at Cabarrus County Parks and are highly recommended for a park field trip. All other programs can be done at either your school site or park location. Unless noted, you may choose the County Park for your visit. Please note above which park you would like to visit. Cabarrus County Parks include Camp T.N. Spencer Park (Concord), Frank Liske Park (Concord), Rob Wallace Park (Midland), and Vietnam Veterans Park (Concord).

Please see program descriptions for location requirements. While grades are recommended for each program, program choice is at the teacher’s discretion.

Requests are processed in the order they are received. Please fill out a field trip application and return it via email or direct mail a minimum of 4 weeks in advance to:
Cabarrus County Active Living & Parks
Address: 12900 Bethel School Road  Midland, NC 28107   E-mail: seunger@cabarruscounty.us

Please contact Shannon Unger at 704-920-2727 or seunger@cabarruscounty.us with any questions.

Programs done at a school location are 30 minute and are $2 per student. Programs done at a park are 1.5 hours for PreK-K and 2.5 hours for 1st-5th grade. These visits will include a science program, team-building session and additional outdoor activities. The fee is $3 per student.

Adults are free. We can accommodate up to 30 in a group and can accommodate multiple groups.

Cabarrus County Schools qualify for the Jr. Ranger Program: 3 classroom visits and 1 park field trip for only $3 per student!

Cabarrus County Active Living and Parks welcomes children and adults that need special accommodations. Please let us know how we can accommodate your group.
Contact: _______________________ Address: ____________________________________________

School/Organization: _______________________ Grade: _____ Children: _____ Adults: _____

Phone Number: _______________________ Email Address: ______________________________

Program Request: _______________________ Location (park/school): __________________

Dates Requested: First Choice: _______________ Second Choice: __________________

For Multiple Programs:

Program 2 Request: _______________________
Location (park or school): __________________

Dates Requested: First Choice: _______________ Second Choice: __________________

Program 3 Request: _______________________
Location (park or school): __________________

Dates Requested: First Choice: _______________ Second Choice: __________________

Program 4 Request: _______________________
Location (park or school): __________________

Dates Requested: First Choice: _______________ Second Choice: __________________
Pre-Kindergarten—Kindergarten

Animal Detectives (APL-1, APL-2, K.L.1) Young detectives will “track” different animals using clues along the trail to identify their presence.*

Backyard Buddies (APL-1, APL-2, K.L.1, K.P.2) Young scientists will investigate living and non-living things and explore the interdependence of all life. Students will be thrilled to observe and investigate some exciting native animals including a corn snake, tree frog and decomposers.*

Its in the Details...(APL-1, APL-2, K.L.1, K.P.2): Come along with Slimy and Shelly on a walk through the woods as they find a mysterious object. Use the clues in the story to figure out what these critters have found. Then meet the real Slimy and Shelly (a frog and turtle)!

Jr. Earth Protectors (APL-1, APL-2, K.L.1): Calling all Earth Protectors! Come join us as we investigate our local animal friends and their homes as we learn how to protect them. Young students will have a ball making "seed balls" to help create habitat for birds and butterflies.

Our Amazing Bodies (APL-1, APL-2, K.L.1): Young students will have a blast learning about their bodies and comparing themselves to other animals! This program is full of stories, movement, touching animal artifacts and meet-and-greets with live animals including a rat, frog, and snake.

Sense-sational (APL-1, APL-2, K.P.2): Young scientists will investigate how their senses help them understand the world around them. They will test their own senses in a series of challenges...from mystery bags and smelly bottles to a series of sounds and optical illusions.

Wacky Weather (APL-1, APL-2, K.E.1): Students will have a blast investigating weather...from the everyday to the wacky! We will wrap up the program making something we see too little of - snow, that each student gets to take home!

1st–2nd Grade

Creek Stompers (1.L.1, 1.L.2, 2.L.1) There is nothing better than a good ole’ creeks stomp to discover nature at its finest...from catching crayfish to salamanders, this trip will be unforgettable.* Location: Frank Liske Park
**FBI (Fungi, Bacteria, and Insects) (1.L.1, 1.L.2, 2.L.1)** Going on a bug hunt has never been so much fun! Students will go hiking, digging, and log rolling to look for some of our unsung heroes, decomposers!*

**It’s Not Easy Being Green! (1.L.1, 2.L.1):** Through stories, games and crafts, students will learn that it is not always easy to be green. The program will start with the classifying of real plant specimens into their distinct parts followed by a game of true survival and finally, make and take our own seed balls.

**May the Force Be With You (1.P.1, 2.G.1):** Students will have a blast as they investigate a variety of forces including air pressure, magnetism, and electricity. Students will go on “road trips” across North Carolina simply using magnets and create basic circuits.

**The Moon is Made of Swiss Cheese! (1.E.1, 1.P.1, 2.E.1):** Students will have fun on a moon expedition! From modeling moon phases with cookies (yum!) to becoming meteorites and crashing into our large model moon to making their own moon complete with craters and an American Flag, students are sure to have an out-of-this-world experience!

**We Dig it! (1.E.2, 1.L.1, 2.G.2):** We will go on an underground adventure as students do simple experiments and make observations of different types of soil. This program has a delicious ending as students create edible soil profiles to learn how the earth changes the deeper you dig. We dig it!

**Whether you Like it or Not! (1.E.1, 2.E.1, 2.P.2):** Young meteorologists will learn that the sun is the “star” of the weather show that drives temperature and precipitation. Students will have a blast making a cloud and watching it rain and making and wearing a daily reminder that the sun runs the show!

**Around We Go (1.L.2, 2.L.1, 2.L.2):** Come join us on a life cycle journey as students compare and contrast different life cycles and compare them to their own. We will get to meet-and-greet a live rat, snake, and frog and explore how their life cycles vary and wrap up by making slimy frog egg masses to take home!

**Help! I’m Sublimating! (1.E.1, 2.P.2):** Come along as we investigate states of matter and phase changes! We may even have some fun with dry ice and bubble hats. You want to know what bubble hats are, don’t you?
Appendix G: Cabarrus County ALP School Field Trip Information

*While accommodations may be made for a school visit, these programs are recommended for Cabarrus County Parks.

Cabarrus County Active Living and Parks Department
Address: 12900 Bethel School Road
Midland, NC 28107
E-mail: seunger@cabarruscounty.us  Phone: 704-920-2727

3rd – 4th Grade

**Healthy Waters** (3.E.2, 3.L.2, 4.L.1): Students will gain a better appreciation for the importance of clean water in the natural community. We will explore the creek and see what we can learn about its inhabitants, stream health, and human disturbance. *Location: Frank Liske Park*

**Healthy Habitats** (3.L.2, 4.L1): Students will explore the importance of healthy, diverse habitats for native wildlife. Using tools, including nets, shake cloths, bug jars, magnifiers, ID guides and more, students will investigative insects, plants, and other life found here.* Location: Frank Liske Park, Camp T.N. Spencer Park, or Rob Wallace Park

**Grossology** (3.L.1, 4.L.2) This is one of my favorites! The body is so gross and so cool all at the same time. Discover the importance of skin, mucus, bile, flatulence, and so much more with these unforgettable hands on experiments.

**Dazzling Diversity** (3.L.1, 4.L.1) Explore our own body systems and those of other creatures to get a better understanding of form and function as major factors for survival. Students will investigate biofacts of different animals, compare skeletal differences and meet some of our resident ambassador animals including a frog, snake, turtle, and rat.

**A Solar System in your Pocket** (3.E.1, 3.E.2.2, 4.E.1 ): How big is our solar system? Students will have a blast using creative models of register tape and clay to get a good grasp on just how amazing, huge and diverse our solar system really is starting from our neighbor, the moon, to our outer planets.

**Cannons, Catapults, and ‘Copters** (3.P.1, 3.P.3, 4.P.1) Investigating energy and force has never been so much fun! Students will build and take home canons and catapults and build a circuit that flies a helicopter through use of electricity and magnets!

**Fantastic Flight** (3.P.1, 4.L.1) Hasn't everyone wanted to fly at some point? Students will be enthralled learning just how birds fly and will experiment with flight designs of their very own in our wind tunnel.

**From Sea to Shining Sea** (3.L.2, 4.E.2): Students will explore a variety of landforms by building them with clay on a map. We will end the creative session with a little volcanic eruption!
Appendix G: Cabarrus County ALP School Field Trip Information

**Fossil Fun (4.E.2, 4.P.2):** Calling all budding anthropologists! Students will investigate and enjoy creating and eating a delicious rock cycle. Then we dive into fossils by classifying a variety of real fossils and matching them with the animals and plants that created them.

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**5th Grade**

**Stream Scientists (5.L.2):** Here we get our hands dirty! Students will investigate how living things depend on each other for survival in the micro-habitat of one of our little creeks.*

Location: Frank Liske Park

**Land-Lovers (5.L.2):** Students will investigate different habitats at our parks for the producers, consumers, and decomposers that keep it running! *

**Turtle Hurdles (5.L.2):** Being a turtle isn’t easy and students will find out the challenges a turtle endures by playing Turtle Hurdles! From predators and fishing to trash and pollution, it isn’t easy being green!* 

**The Sky’s the Limit (5.P.1.)** We will investigate force and motion is a very exciting way with rockets! Students will design an experiment, changing variables, to conclude what is the best formula to increase force and therefore motion of their own balloon rocket!

**The Incredible Journey (5.P.2, 5.E.1):** Everyone has their own journey, but what about a little drop of water? The most incredible! Come experience it for yourself and take home a lovely reminder—a water cycle bracelet.

**The Leg Bone is Connected to the… (5.L.1)** Let’s take a look inside, at our own bones and guts that is! We will compare our own body systems to that of other living creatures. Then we will get to meet some of our non-human neighbors including a snake, turtle, and a frog.

*While accommodations may be made for a school visit, these programs are recommended for Cabarrus County Parks.

**Teachers -** If there a science or nature topic that you would like us to present and you cannot find it here or it is under a different grade, just let us know. We will work with you and your students to accommodate your needs and get the students excited about science and nature!
Appendix H: Pollinator Gardens

Installing a pollinator garden provides an educational opportunity for park visitors as well as an interactive volunteering experience for the community. Pollinator gardens are created to provide nectar and for pollinators like bees and butterflies. These gardens serve as a food source to help fight against the decline of the pollinator population due to the loss of their natural habitat. Installing a pollinator garden or similar interactive feature of the park will enhance aesthetic beauty, habitat resilience, and educational opportunities available to visitors of the park. Table 1 illustrated the best choices for native NC plants that will attract pollinators. Following are a list of best practices, potential community partners, examples, and a list of resources to help guide the design, installation, and maintenance of the garden.

Best Native Plants for Pollinator Gardens in North Carolina

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Bloom Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Spring</td>
</tr>
<tr>
<td>Anise Hyssop</td>
<td>Agastache ‘Blue Fortune’</td>
<td>X</td>
</tr>
<tr>
<td>Asters</td>
<td>Symphyotrichum spp.</td>
<td></td>
</tr>
<tr>
<td>Bee Balm</td>
<td>Monarda spp.</td>
<td>X</td>
</tr>
<tr>
<td>Black-eyed Susan</td>
<td>Rudbeckia spp.</td>
<td>X</td>
</tr>
<tr>
<td>Coneflower</td>
<td>Echinacea spp.</td>
<td>X</td>
</tr>
<tr>
<td>Golden Alexander</td>
<td>Zizia aurea</td>
<td>X</td>
</tr>
<tr>
<td>Joe Pye Weed</td>
<td>Eutrochium spp.</td>
<td>X</td>
</tr>
<tr>
<td>Milkweed</td>
<td>Asclepias spp.</td>
<td></td>
</tr>
<tr>
<td>Mountain Mint</td>
<td>Pycnanthemum spp.</td>
<td>X</td>
</tr>
</tbody>
</table>

Adapted from: Conserving Carolina (n.d.)

Best Practices for Pollinator Gardens (New England Wildflower Society, n.d.)

1. Plant species which flower across the growing season, from spring to late fall.
3. Incorporate a variety of flowers to attract a variety of pollinators.
4. Limit the use of pesticides and herbicides, which can harm pollinator species and cause more damage to their populations.
5. Provide bare ground and grasses for pollinator species which nest and winter below ground.
6. Provide a small source of water, such as a bird bath or trough.
Appendix H: Pollinator Gardens

Potential Community Partners

- NC Native Plant Society. (ncwildflower.org/about-us)
- Cabarrus County Master Gardener Extension Program (cabarrus.ces.ncsu.edu/2017/08/nc-extension-master-gardener-program-information/)
- The Bee Conservancy. (thebeeconservancy.org)

Pollinator Garden Examples

- **Monarch Waystation at the NC Zoo.** This installation serves as a ‘rest and refueling’ stop for Monarch Butterflies during their annual migration. Zoo staff and volunteers propagated pollinator plants from seed and planted them in the garden, providing a year-round food source for the butterflies as well as an educational experience for volunteers and Zoo visitors. Besides regular weeding and mulching, the garden requires minimal maintenance, as the plants included in the garden are drought-resistant. wakenature.files.wordpress.com/2020/12/wake-county-pros-habitat-guidelines.pdf (p.33).
- **Gateway Nature Preserve Pollinator Garden.** This garden in Winston-Salem has over 120 trees, snubs, and plants. There is also signage around the garden with a picture of the plant as well a description of its characteristics. The GNP also seeks out volunteers to help with both the upkeep of the garden as well as research about the plants and pollinators. gatewaynaturepreserve.org/pollinator-garden-1.
- **Smithsonian Gardens.** Located adjacent to the Museum of Natural History in Washington D.C., this garden highlights the dependency between pollinators and plants. The gardens also provide an educational experience focusing on the mutually beneficial relationship between pollinators and the plants and flowers that produce pollen. The gardens have virtual and in person self guided tours. Pollinator Garden - Smithsonian Gardens (si.edu)

References and Additional Resources

Appendix I: Soil Data

The following map and legend describe the soil composition of the St. Stephens Park property. This information can be used to evaluate the feasibility of various projects, including facilities infrastructure and trail construction.

**Soil Conditions at the St. Stephens Park Property**

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12 **Source:** Cabarrus County GIS Database. [https://location.cabarruscounty.us/mapcabarrus/](https://location.cabarruscounty.us/mapcabarrus/). Layer: “Soils by Parcel”

Appendix I: Soil Data

Legend

<table>
<thead>
<tr>
<th>Map symbol</th>
<th>Soil name</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AaB</td>
<td>Altamjvista sandy loam, 2 to 6 percent slopes</td>
<td>1,140</td>
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</tr>
<tr>
<td>ApB</td>
<td>Appling sandy loam, 2 to 8 percent slopes</td>
<td>975</td>
<td>0.4</td>
</tr>
<tr>
<td>Ar</td>
<td>Armenia loam -</td>
<td>955</td>
<td>0.4</td>
</tr>
<tr>
<td>BaB</td>
<td>Badin channery silt loam, 2 to 8 percent slopes</td>
<td>11,495</td>
<td>4.9</td>
</tr>
<tr>
<td>BaD</td>
<td>Badin channery silt loam, 8 to 15 percent slopes</td>
<td>6,860</td>
<td>3</td>
</tr>
<tr>
<td>BaF</td>
<td>Badin channery silt loam, 15 to 45 percent slopes</td>
<td>2,550</td>
<td>1.1</td>
</tr>
<tr>
<td>CcB2</td>
<td>Cecil sandy clay loam, 2 to 8 percent slopes, eroded</td>
<td>18,463</td>
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<tr>
<td>CcD2</td>
<td>Cecil sandy clay loam, 8 to 15 percent slopes, eroded</td>
<td>7,790</td>
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<tr>
<td>CeB</td>
<td>Cecil-Urban land complex, 2 to 10 percent slopes</td>
<td>5,265</td>
<td>2.3</td>
</tr>
<tr>
<td>Ch</td>
<td>Chewacla sandy loam, frequently flooded</td>
<td>19,460</td>
<td>8.3</td>
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<tr>
<td>CoB</td>
<td>Coronaca clay loam, 2 to 8 percent slopes</td>
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<tr>
<td>CoD</td>
<td>Coronaca clay loam, 8 to 15 percent slopes</td>
<td>700</td>
<td>0.3</td>
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<tr>
<td>CuB2</td>
<td>Cullen clay loam, 2 to 8 percent slopes, eroded</td>
<td>12,645</td>
<td>5.4</td>
</tr>
<tr>
<td>CuD2</td>
<td>Cullen clay loam, 8 to 15 percent slopes, eroded</td>
<td>5,365</td>
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<tr>
<td>EnB</td>
<td>Enon sandy loam, 2 to 8 percent slopes</td>
<td>23,045</td>
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<tr>
<td>EnD</td>
<td>Enon sandy loam, 8 to 15 percent slopes</td>
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<tr>
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<td>Goldston very channery silt loam, 4 to 15 percent slopes</td>
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<td>Herndon silt loam, 2 to 8 percent slopes -</td>
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<tr>
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<td>Iredell loam, 0 to 2 percent slopes -</td>
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<td>IdB</td>
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<td>3,065</td>
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<tr>
<td>MsA</td>
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<td>PcE3</td>
<td>Pacolet-Udorthents complex, 12 to 25 percent slopes, gullied</td>
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<td>Ud</td>
<td>Udorthents, loamy</td>
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<td>W</td>
<td>Water</td>
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<td>Total</td>
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Appendix J: North Carolina Agricultural Development and Farmland Preservation (NCADFP) Trust Fund

North Carolina Agricultural Development and Farmland Preservation (ADFP) Trust Fund

The ADFP trust fund is a resource available for county governments and conservation non-profits that are interested in growing agribusiness and preserving farms and forests for future generations.

History
In March 2005, Agriculture Commissioner Steve Troxler delivered his "Agricultural Development and Farmland Preservation Strategy" to the General Assembly as a State priority. During the 2005 legislative session, the General Assembly passed House Bill 607 establishing the Agricultural Development and Farmland Preservation Trust Fund.

The purpose of the fund is to support the farming, forestry, and horticulture communities within the agriculture industry by:

- Supporting the purchase of agricultural conservation easements (on farm, forest, and horticulture lands), including transaction costs.
- Funding public and private enterprise programs that will promote profitable and sustainable family farms through assistance to farmers in developing and implementing plans for the production of food, fiber, and value-added products, agritourism activities, marketing and sales of agricultural products produced on the farm, and other agriculturally related business activities.
- Funding conservation agreements (on farm, forest, and horticulture lands) targeted at the active production of food, fiber and other agricultural products.

The legislation also established a Trust Fund Advisory Committee to advise Commissioner Troxler on the prioritization and allocation of funds, the development of criteria for awarding funds, program planning, and other areas for the growth and development of family farms in North Carolina. In the fall of 2006, the Trust Fund awarded its first grants to support projects aimed at agricultural development and farmland preservation.

Source: https://ncadfp.org/aboutus.htm

Eligible Entities
Per N.C.G.S.106-744, all applicants for conservation easements, agricultural development projects, and agricultural plans must be non-profit conservation organizations or county agencies. Farmers, landowners, and others interested in applying must partner with a non-profit conservation organization or county agency to participate in an ADFP Trust Fund grant proposal.

Application
The application period for 2021 is closed as of February 2021. If available for 2022, applications will be open from October to December of 2021. For application materials for the 2021 cycle, please see https://ncadfp.org/CycleXIV.htm.

Frequently Asked Questions: https://ncadfp.org/faq.htm

Landowner inquiry form: https://fs30.formsite.com/ADFPTrustFund/7iggemvxqq/index.html

Contact Information: https://ncadfp.org/AdvisoryCommittee.htm
SCOPE OF WORK
MPAD 6187 - SPRING 2021
Client: Cabarrus County, NC

I. Introduction

Cabarrus County, North Carolina has recently acquired a parcel of land in the Northeast portion of the County. Lying North of NC 49 between St. Stephens Church and North Lentz Harness Shop Roads, the 615-acre property is considered by the Natural Heritage Inventory as a unique natural area. The Cabarrus County Soil & Water Conservation Board and the Board of Commissioners selected the land as part of an initiative to conserve and protect unique natural areas. The parcel has been purchased from The Conservation Fund through a three-year purchase agreement, which allows Cabarrus County to act as owner for purposes of planning and management of the property.

An inventory of these natural features by the North Carolina Natural Heritage Program (NCNHP) has identified the following as unique or vulnerable features contributing to the culture, natural character, and economy of the local region:

- Upland Depression Swamp Forest
- *Villosa vaughaniana* (Carolina creekshell)
- *Acmispon helleri* (Carolina Birdfoot-trefoil)
- Active farmland
- Dry Oak / Hickory Forest

Cabarrus County’s vision includes the development of a passive park which prioritizes conservation of these unique natural features of the site. Students in the UNC Charlotte MPA program (MPAD 6187) will work with the Cabarrus County, North Carolina government to research and propose broad recommendations to guide the future development of this site. Research will focus on both the theory and practice of conservation and recreation management of public lands to offer best practices for park design according to the objectives of Cabarrus County and other conservation authorities. The following outlines the goals for the UNC Charlotte MPA team, the list of tasks to be completed, as well as limitations, timetable, and project deliverables.
II. Goals

The MPA team will seek to do the following in fulfillment of the partnership with Cabarrus County:

- Develop existing Cabarrus County citizen input data and conduct interviews and research to better understand the needs of the community.
- Offer recommendations based on best practices for both recreation and conservation as it pertains to the vision for this park as well as the existing landscape and natural features.

III. Tasks

The following tasks will be undertaken to meet the goals outlined above.

Research Topics

The MPA team will conduct research on the following topics and compile findings into a literature review:

- Notable examples of public recreation areas within and around conservation areas.
- Notable examples of public recreation areas within and around Upland Depression Swamp Forests, specifically.
- Best practices for conservation of endangered flora and fauna identified on the property.
- Specific mandates or protections in place from government or conservation entities (e.g., The Conservation Fund) given the endangered species, farmland, and other unique natural features of the site.
- Best practices for the development of various recreational amenities typically found at passive parks.
- Local features such as the Carolina Slate Belt, the Reed Gold Mine, and the Uwharrie Mountain Range.
- The history of the property and existing utilities.
- The conservation of cultivated land as a natural and economic resource along with any potential uses for community engagement, recreation, and/or education.

Community Outreach and Data

The MPA team will undertake the following in order to best understand the existing needs of the Cabarrus County community and key stakeholders:

- Create and conduct surveys and interviews of the groups listed in the “St. Stephens Park Summary” document and other potential stakeholders to gather respective visions for the project.
- Collect area maps from Cabarrus County GIS data team in order to render a visual representation of suggested land use.
- Collect, clean, and analyze existing community survey data to guide future site development.
- Identify key experts, draft questionnaires, interview experts, and develop recommendations according to an analysis of the results.

The findings from the research, outreach, and data analysis will be compiled into a report with recommendations based on best practices and the input of various stakeholders and experts for the
Appendix K: Scope of Work

development of the site. The findings and recommendations will be presented to Cabarrus County leadership near the end of the Spring academic semester (see Section V for a more specific timeline).

IV. Limitations

The UNC Charlotte team has identified certain factors which may limit the extent of research, design, and other aspects which must ultimately be conducted by future champions of this project.

1. As this project is being conducted through an MPA class, the timeline is limited to that of the Spring 2021 UNC Charlotte academic calendar.
2. Any cost-benefit analysis, financial projections, or budgetary concerns are outside the scope of this project. Any recommendations for site development will not necessarily include financial considerations.
3. As the scope of this project does not call for detailed mapping nor does the MPA team necessarily possess related skills, the MPA team will be unable to provide documents which show scaled images of any proposed or suggested park amenities.
4. The tentative dates provided in this scope of work are subject to change in accordance with requirements for the UNC Charlotte MPA team.

V. Timeline

<table>
<thead>
<tr>
<th>Task</th>
<th>Date (Tentative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send finalized Scope of Work to Cabarrus County (Jonathan Marshall)</td>
<td>February 15, 2021</td>
</tr>
<tr>
<td>Develop questionnaire and identify interviewees</td>
<td>March 1, 2021</td>
</tr>
<tr>
<td>Begin Stakeholder Interviews</td>
<td>March 15, 2021</td>
</tr>
<tr>
<td>Draft Report to Cabarrus County for Review</td>
<td>April 21, 2021</td>
</tr>
<tr>
<td>Final Report to Cabarrus County</td>
<td>May 3, 2021</td>
</tr>
<tr>
<td>Presentation to Stakeholders - Cabarrus County Staff, Board of Commissioners, Active Living &amp; Parks Advisory Board, and the Soil &amp; Water Conservation District Board</td>
<td>May 3, 2021</td>
</tr>
</tbody>
</table>

VI. Deliverables

- Scope of Work
- Survey Instrument(s) and Associated Data
- Draft Report for Review
- Final Report
- Presentation
Appendix K: Scope of Work

VII. Approval

By signing below, signatories agree that the proposed Scope of Work serves as adequate and appropriate direction for the UNCC MPA team as commissioned by Cabarrus County staff.

UNCC Team Representative (Grant McMillan)

[Signature]  Date 2/23/2021

Cabarrus County Representative

[Signature]  Date 2/19/2021