NATURAL BURIAL CEMETERIES: DESIGNING FOR ECOSYSTEM SERVICES

by

MARY MATHIS

(Under the Direction of Brian Orland)

ABSTRACT

In the past, cemeteries functioned as sacred burial spaces but also as frequently visited park spaces used for recreation. Contemporary cemeteries contain expanses of lawn littered with headstones and primarily serve as mournful destinations for those grieving. With the rise in popularity of natural burials and environmental concern, this thesis aims to return cemeteries to the multifunctional use by incorporating ecosystem services into the initial design. The goal of this research is to determine design standards to maximize ecosystem services in future natural burial cemeteries. To determine the design standards, case studies will be conducted on existing natural burial cemeteries in the southeast region: Honey Creek Woodland, Milton Fields, and Greenhaven Preserve. Additionally, interviews with the cemetery managers at these locations will provide further insight on the management and design intent of the site. Once the design standards are created, they will be tested on a new natural burial cemetery.

INDEX WORDS: Bereavement, Cemetery Design, Ecosystem Services, Land Use, Landscape Architecture, Natural Burial

NATURAL BURIAL CEMETERIES: DESIGNING FOR ECOSYSTEM SERVICES

by

MARY MATHIS

B.S., Auburn University, 2016

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF LANDSCAPE ARCHITECTURE

ATHENS, GEORGIA

2019

NATURAL BURIAL CEMETERIES: DESIGNING FOR ECOSYSTEM SERVICES

by

MARY MATHIS

Major Professor:	Brian Orland
Committee:	Shelley Cannady
	Stephen Berry
	Don Smith

Electronic Version Approved:

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
May 2019

DEDICATION

To my parents, Lee and Frances Mathis, thank you for providing me with so many opportunities to pursue an education and my career goals. I could not have done this without your support and love.

ACKNOWLEDGEMENTS

Many people have supported me throughout this entire process. First, I would like to express my sincerest gratitude to Brian Orland. Without his macabre enthusiasm, invaluable guidance, and constant encouragement, this thesis would not have been possible. I also would like to thank my thesis committee members Shelley Cannady, Stephen Berry, and Don Smith who have donated their time and knowledgeable expertise.

Of course, I must thank the members of my cohort who have relentlessly supported me these last three years. In addition to their support within the studio, they have provided me with countless hours of laughter and unforgettable memories. I am truly thankful to have gained lifelong friends through this experience.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Purpose of Research and Significance

Due to the expansion of urban areas in the United States, land scarcity for non-development purposes is becoming a critical issue. Cemeteries comprise a land use that requires vast amounts of area and typically serves the sole purpose of burying and memorializing the dead. As the aging 76 million people in the Baby Boomer generation approach their life expectancy in the coming 20 years, the demand for already limited burial space will rapidly increase. Additionally, the generations following the Baby Boomers, Generation-X, Millennials, and Generation-Z, are predicted to surpass the Baby Boomer population in size, meaning those members will ultimately compete for the limited burial space (Basmajian and Coutts 2010). Natural burial cemeteries, due to their unique burial requirements, are able to place more graves in areas that are considered inaccessible to traditional lawn cemeteries (Clayden et al. 2018). The interest in natural burial is currently growing as more people seek alternatives to the traditional lawn cemetery. Natural burial appeals to a diverse range of people including environmentalists and religious individuals.

Cemeteries do, however, provide important services to society beyond simply disposal of remains. The ecosystem services provided by naturalistic sites could offer a variety of benefits that are vital to humankind's wellbeing. These benefits include cultural services, provisional services, regulating services, and supporting

services(Clayden et al. 2018). By proposing natural burial cemetery design standards which maximize ecosystem services, this thesis proposes that future natural burial cemeteries could be able to provide ecosystem services within regional green infrastructure while appealing to the diverse interests of the aging populations (Clayden et al. 2010, Basmajian and Coutts 2010, Bennett and Davies 2015, Pattison 1955, Kowarik et al. 2016)

Research Question

This thesis explores the potential complementarity of honoring the deceased, comforting the survivors and provision of ecosystem services within the context of natural burial cemeteries. With the expansion of urban areas in the United States, land use is becoming a critical issue. Cemeteries are an underutilized resource requiring large expanses of land which could potentially serve multifunctional roles of providing vital ecosystem services to urban centers as well as be a desirable place to bury and memorialize the dead. This thesis seeks to answer the research question:

> Can natural burial cemeteries provide sufficient levels of ecosystem services, while achieving the goals of honoring deceased loved ones, to justify the re-purposing of land for natural burial cemeteries?

Limitations

This study is hypothetical. The locations identified to test the proposed design standards were located using suitability analysis approaches based on aerial imagery and data retrieved from the USGS National Land Cover Database 2011 (NLCD). The

proposed designs are analyzed by i-Tree Canopy. The accuracy of the analysis depends on the author's ability to assign the correct land cover to the randomly generated sample point. For each analysis, the author generated 500 sample points, which is the minimum recommended number of points i-Tree suggests. Since these are sample points, this does not portray an exact count, only an approximate representation, of the land cover on site.

Delimitations

Since there is a large diversity of interment types and religious burial customs, the history and background of cemetery design discussed here will be limited to cemetery design movements which had a clear influence on the natural burial movement. Furthermore, for this thesis, the religious burial customs considered were confined to the major world religions, Christianity, Hinduism, Judaism, Buddhism, and Islam, most likely to be relevant to the urban and suburban United States.

This thesis acknowledges that economics play an important role in the long term success and operation of any cemetery. The solutions proposed in this thesis aim to minimize maintenance costs, but the emphasis was placed on solving design issues rather than economics.

Methodology and Thesis Framework

This thesis utilizes multiple strategies to explore the multifunctional role ecosystem services potentially has in creating design standards for natural burial cemeteries. The investigation will begin in Chapter 2 with an analysis of the aspects of ecosystem services support that can potentially be addressed by natural burial cemetery design. Following this section, Chapter 2 will describe the burial practices and grieving processes of Hinduism, Judaism, Christianity, and Islam; any proposed natural burial

design standards must recognize and support these important values. Next, this chapter will use historical interpretive research methods and analyze research from secondary sources detailing the evolution of cemetery design. This section will culminate with a matrix which extracts major themes and design elements necessary for ecosystem services within the context of natural burial cemeteries. The end of this chapter will conclude with a detailed description of natural burial.

Chapter 3 utilizes case studies and interviews as research methods to further gain a greater understanding of current practices in natural burial. Three local natural burial cemeteries were identified, and the general manager at each cemetery was interviewed to further understand in greater detail the cemetery's design intent and operation. At the end of each case study, a matrix will clearly identify major themes and design elements that each cemetery utilized that support ecosystem services within the context of natural burial.

Chapter 4 details a site selection process for identifying potential natural burial cemetery locations within the state of Georgia using the findings from Chapters 2 and 3. The site selection process utilizes GeoPlanner for ArcGIS to create appropriate proximity analyses and weighted overlay analyses. Using these analyses, potential sites are identified in major Georgia cities. This thesis chose three sites located within 20 miles of Athens, GA to test the proposed design standards.

Chapter 5 uses the findings from Chapters 2 and 3 to propose design standards for incorporating ecosystem services into natural burial cemeteries. Within this chapter, the design standards are grouped according to theme. Each theme is followed by a description explaining to the reader what it would be like to experience the cemetery.

Chapter 6 tests the proposed design standards described in Chapter 5 on the three sites identified in Chapter 4. The three sites are unique in land cover, parcel size, and existing land use; the design standards are tested for their utility and flexibility in implementation. On the three sites, the existing conditions and the proposed designs are compared by an i-Tree Canopy analysis of the regulatory ecosystem services. Finally, Chapter 7 concludes the thesis with an evaluation of the three designs for their support of cultural as well as physical ecosystem services and discusses implications for further research.

CHAPTER 2

FOUNDATIONS OF ECOSYSTEM SERVICES, BURIAL PRACTICES, AND CEMETERY DESIGN

This chapter lays the necessary foundations for this thesis. It begins with a description of the four ecosystem services – cultural, provisioning, regulatory, and servicing – and their importance to humankind and the environment. Following this section, Chapter 2 identifies the grieving process and the burial practices of major world religions – Hinduism, Judaism, Christianity, Buddhism, and Islam – to ensure the proposed natural burial design standards, described in Chapter 5, adhere to these important values. The next section includes an analysis of the cemetery design movements which inspired the natural burial movement. The evolution of cemetery design covers the rural cemetery movement, the lawn park movement, the memorial park movement, and woodland cemeteries. Although there are several other cemetery styles, these were identified as major influences to the rise and popularity of the natural burial movement. The history of cemetery design evolution culminates in a detailed description of the existing knowledge of natural burial. The end of this chapter will conclude with a matrix which extracts major themes and design elements necessary for ecosystem service support within the context of a cemetery.

Ecosystem Services

Ecosystem services is a concept which directly links biodiversity with the well-being of humankind. It describes the range of benefits people receive from the natural

environment and attempts to value the ecosystems functions, processes, and structures which provide the benefits (Weidner et al. 2016, Jacobs, Dendoncker, and Keune 2014). It is internationally recognized as a useful way to measure the sustainable performance of environments by researchers, policy makers, and practicing professionals from a variety of disciplines. Ecosystem services are classified into four categories – cultural, provisioning, regulating, and supporting. Research has shown that favoring one particular ecosystem service could have detrimental effects on the other services' ability to provide their benefits (Weidner et al. 2016). Focusing on improving biodiversity within an environment has been shown to improve each of the benefits provided by the four ecosystem services (Millennium Ecosystem Assessment 2005, Weidner et al. 2016). The Millennium Ecosystem Assessment defines biodiversity as "the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (2005).

Cultural Ecosystem Services

Cultural services are among the more challenging areas of ecosystem services to classify and quantify since they include non-material benefits (Millennium Ecosystem Assessment 2005). Described in the Millennium Ecosystem Assessment, cultural services provide benefits including cultural diversity, spiritual and religious values, educational values, aesthetic values, social relations, sense of place, cultural heritage values, and recreation and ecotourism (2005). These benefits from cultural services align with the 17 Sustainable Development Goals proposed by the United Nations in the 2030 Agenda for Sustainable Development Goals (2015). Cultural diversity relies on the biodiversity

within an ecosystem and spiritual and religious values are often attached to and associate to values and symbology found in the ecosystem. Educational values provide both formal and informal educational opportunities to learn from the ecosystem processes. Aesthetic values within a culture are often derived from the surrounding ecosystems. Social relations within cultures are often dictated by the environmental stimuli and recreation. Sense of place is an important concept in cultural services because humans have an innate desire to associate with recognized features within their environment. Cultural heritage places a high importance on historically relevant landscapes and significant species. Recreation and ecotourism are provided by the both natural and cultivated landscapes of the environment (Millennium Ecosystem Assessment 2005). Cultural services are difficult to quantify and to assign a monetary value. In an attempt to assign a monetary value, the amenity and recreational costs are often quantified through preferences revealed by surveying users (Millennium Ecosystem Assessment 2005, Weidner et al. 2016).

Provisioning Ecosystem Services

Provisioning services offer physical goods produced by the environment and are used for the human benefit. These goods include fuel production, fiber, food, fresh water, genetic resources, ornamental resources, and pharmaceuticals. Fuel can be obtained from sources such as wood, animal dung, and other biological material. Sources for food and fiber products may come from plants, animals, microbes, wood, hemp, and silk. Fresh water is obtained from many sources and is directly linked to both the provisioning and regulating services. Genetic resources are considered genetic information which could be used for plant and crop breeding. Ornamental resources, such as animal skins, shells, and

flowers, are considered important through the values identified in cultural ecosystem services. Lastly, pharmaceuticals can be obtained from a number of resources including plant material (Millennium Ecosystem Assessment 2005). Provisioning ecosystem services are more readily quantified than others since each of these goods are bought and sold and consequently have a market value (Jacobs, Dendoncker, and Keune 2014, Weidner et al. 2016).

Regulatory Ecosystem Services

Regulatory services encompass the ways that the environment makes life possible for humans. These services include regulation of air and water quality, climate regulation at the global, regional, and local scales, pest and disease regulation, erosion control, and pollination (Millennium Ecosystem Assessment 2005, Weidner et al. 2016). Air and water quality is managed by extracting chemicals from the atmosphere and moderating the rate of water filtration through different types of land cover, guided by legally- or customarily-derived regulations. Climate regulation in ecosystem services can be witnessed at a local scale, such as altering land cover to regulate temperature and precipitation, and at global scale, such as sequestering or emitting greenhouse gases. Pest and disease control is vital for crop and livestock production. Erosion control is managed by the amount and type of vegetative cover on a site. Pollination is managed by the distribution, abundance and effectiveness of pollinators within a habitat (Millennium Ecosystem Assessment 2005). Together, regulating services benefit humans by creating an ecosystem that is clean, sustainable, functional, and more resilient to change. Ultimately, regulating services attempt to limit the occurrence of extreme natural phenomenon. To value regulating services, the cost is assessed as the damages that would

have been incurred if the service was absent or poorly functioning (Millennium Ecosystem Assessment 2005, Weidner et al. 2016).

Supporting Ecosystem Services

Supporting services include longer-term tangible but indirect benefits provided to humans by nature. In contrast to cultural, provisioning, and regulating services which provide direct short-term impacts, supporting ecosystem services provide indirect benefits that often occur over an extended period of time (Millennium Ecosystem Assessment 2005). These include soil formation, photosynthesis, and nutrient and water cycling. It is essential that supporting ecosystem services function appropriately in order for the previous three ecosystem services to provide their benefits. Supporting services are difficult to quantify and thus to assess as monetary values (Millennium Ecosystem Assessment 2005, Weidner et al. 2016).

Cultural Burial Practices

Burial and funerary customs differ between religions and cultures, which must be considered when creating a set of cemetery design standards. This section describes common emotions people experience after the death of a loved one and describes popular theories of the grieving process. Following this, burial practices of the four major world religions will be described. Any proposed natural burial design standards must recognize and support these important values.

Grieving Process

Cemeteries are unique spaces that welcome visitors expressing a wide range of emotions in response to the loss of a loved one. By conducting a bereavement study, emotional theorists have identified eight primary emotions frequently expressed by

cemetery visitors including sorrow (including grief and sadness), solace (including relief and peace), guilt, respect, loss, loneliness, fear, and anger. These emotions can be experienced by visitors at different times or concurrently during a cemetery visitation. Additionally, it is recognized that bereavement responses are unique to an individual, even if two people are concurrently mourning the loss of the same individual. The cemetery possesses the unique role of hosting the funeral, considered to be a private event, within the realms of a public space intended for bereavement. It is one of the few public spaces in which individual expression of the identified eight primary emotions is acceptable. Acknowledging this position, cemeteries must embrace their significant role in aiding visitors during their emotional grieving process by providing the appropriate spaces and design aesthetic.

Expressions of bereavement and grief are found in cultures around the globe. Numerous grief processes have been identified through history with variations in number of phases and definitions of phases. However, there appears to be a consensus that a person typically experiences three or more recognizable phases. The first person to propose identifiable stages of grief is accredited to Erich Lindemann in 1944. He identified shock and disbelief, acute mourning, and resolution. The most well-known stages of grief, proposed in 1969, is the Kubler-Ross's five stage process including denial and isolation, anger, bargaining, depression, and acceptance. Other psychiatrists believe grief does not follow a linear path and instead is a more fluid process with overlapping phases that varies in order and in duration between individuals (Bachelor 2004). Different cultures create the physical spaces of cemeteries to support their particular manifestations of the grieving process.

Judaism Burial

Beginning with Abraham's covenant with God over 4000 years ago, Judaism is currently practiced worldwide by about 14 million people. The Hebrew Bible, also known as the Tanakh, provides the foundations of the death rituals and burial practices for Jews. In general, the Jewish faith emphasizes "simplicity and modesty" in all aspects of funeral arrangements (Johnson and McGee 1998, 153). The burial must take place as quickly as possible after the death of the individual. Cremation, embalming, and any cosmetic bodily treatments go against Jewish beliefs. After being dressed in simple burial garments made of white linen or a cotton shroud, the body is placed in an unlined casket made of wood not embellished with lavish decorations. The funeral ceremony typically takes place in a funeral home and not in the synagogue (Johnson and McGee 1998, Parry and Ryan 1995). The grave is often dug by family members and close friends, and after lowering the body into the grave, mourners may shovel dirt into the grave as an expression of "fulfillment of the returning of the body to the earth whence it came (dust returning to dust)" (Johnson and McGee 1998, 154). Flowers, elaborate music, and expensive decoration are strongly discouraged at Jewish burials and funeral services. A year after the funeral, a tombstone dedication ceremony is held by close family and friends (Johnson and McGee 1998, Parry and Ryan 1995).

Christian Burial

Representing about one third of the world's population, Christianity encompasses a large number of denominations which exhibit different funeral practices. This section will briefly describe the burial practices of commonly followed denominations of Christianity: Roman Catholicism, Lutheranism, Presbyterianism, and Methodism.

Roman Catholicism is the denomination of Christianity with the most practicing followers. With a strong emphasis on the traditions found in the funeral Mass held inside a Catholic Church, Catholics may dispose of a body in any way which maintains reverence. A Catholic body is not required to be buried in a church cemetery, but a priest can consecrate the grave by blessing the site at the time of burial. Both embalming and cremation, more recently, are permitted in the Catholic burials. Cremated remains must be kept in a sacred place such as in a cemetery and must not be scattered (Johnson and McGee 1998).

Lutheranism, the founding of which started the Protestant Reformation, is practiced by millions worldwide. The Lutheran Book of Worship includes a service for the burial of the dead which is structured to be easily modified for different service locations such as in a church or funeral home. Cremation is permitted in the Lutheran church, but it is not widely practiced.

Presbyterianism, also founded during the Protestant Reformation, gives very few instructions on funeral and burial practices. The Presbyterian doctrinal standards do not propose rules, rituals, or prayers for Presbyterians to follow during a funeral service or burial. Typically, funerals take place in a church two to four days after the death; however, services in a funeral home are also permitted. Presbyterians are instructed to use their best judgment when burying the body. Although not required, embalming is used in most burials, and cremation is permitted (Johnson and McGee 1998).

The Methodist Church began in the 18th century in England. Methodists believe the funeral service should be held within a church, but exceptions are made for the

service to take place in a home or funeral home. Cremation and embalming is permitted in Methodist funerals (Johnson and McGee 1998).

Islamic Burial

Islam, begun in 622 C.E. by the Prophet Muhammad, is practiced by over two billion followers. Since Muslims are in a wide range of cultures around the world, burial customs vary slightly; however, despite these variations, there are some commonalities in Islamic burial practices. Embalming and cremation are not permitted in Islamic burials. The body should be buried within one day of the death. Believing the body should quickly be returned to the earth, Muslims often remove the body from the coffin and loosen the burial shroud to increase the rate of decomposition. The grave should face towards the direction of Mecca; in the United States graves are dug on a southeast-northwest line. Funeral attendees are encouraged to place handfuls of soil on the grave. Instead of cut flowers, plants are placed on the grave which is marked by a flat or rounded piece of wood or stone (Johnson and McGee 1998, Parry and Ryan 1995).

Buddhism

With over 400 million followers, Buddhism is most popular in China and is not as widely practiced in America. This religion embraces death as an unavoidable part of an endless life cycle of reincarnation. After a simple and solemn funeral ceremony, most Buddhists customarily choose to be cremated which is the same way as the Buddha chose. The ashes are often stored in an urn to be kept by the family, enshrined in a columbarium, or scattered (Johnson and McGee 1998).

Hinduism Burial

As one of the oldest religions, Hinduism is practiced by over 900 million followers worldwide, most living in India, while some reside in North America. Hindu funeral rites have evolved over a 2000-year period, incorporating funeral rites from the Vedas, the most sacred Hindu text, influenced by varying world views in the places Hindus live. Most Hindus believe the body must be cremated after being wrapped in a white, unbleached cotton cloth. After cremation, the ashes are collected in a container that dissolves in water a few hours after immersion and are placed in moving water. The sacred Ganges River is a popular place to dispose of Hindu ashes (Johnson and McGee 1998). Hindus living in the United States are lawfully allowed by the Environmental Protection Agency (EPA) to scatter ashes in the ocean at least three miles away from the shore as an acceptable alternative to immersing the ashes in the sacred waters of the Ganges River (Antyeshti Samskar Committee 2009). Scattering ashes in inland waters, including streams and tributaries, is regulated by state laws, although many states, including Georgia, have prohibited scattering cremated remains in these waterbodies (O.C.G.A § 31-21-4 2017).

Natural burial appears to be within acceptable practice for Christian burial and even desirable for Judaism and Islam, but not appropriate for Hinduism. Natural burial can include Buddhist customs only if the family scatters the cremated remains or buries the ashes in a biodegradable container.

Cemetery Design Evolution

The evolution of cemetery design in this thesis covers the rural cemetery movement, the lawn park movement, the memorial park movement, and woodland cemeteries. These cemetery design movements influenced the reintroduction of the

natural burial movement as an accepted form of burial. This section concludes with a matrix extracting major themes and design elements identified in the cemetery design evolution which provide ecosystem service support within the context of a cemetery.

Rural Cemetery Movement

A multifunctional cemetery is not a new concept and originated in the movement to relocate cemeteries to the outskirts of cities. Pere Lachaise in Paris, France was created in 1804 as the first example of a rural cemetery, ultimately inspiring similar cemeteries to be built across the globe (Woodthorpe 2011, Francis, Kellaher, and Neophytou 2000, Jernigan 2015, Lee 2015, Rugg 2000, Sloane 1991). A rural cemetery originated for the function of solving sanitation issues associated with the poor burial practices of the time (Rugg 2000). 18th century English aesthetic theories of the sublime, picturesque, and pastoral were applied to the design of Pere Lachaise. The architect Etienne-Hippolyte Godde (1781-1869) designed the gateway and the chapel in a Neoclassical style, as well as advised patrons on the suitability of monuments. Neoclassical art was particularly fashionable during this time period (Curl 1980). This cemetery contained wooded, naturalistic scenery with paths meandering through elaborate burial monuments leading to vistas of Paris (Sloane 1991). Since green space was limited within the urban environment, the French people, in addition to European and American tourists, would travel to visit these cemeteries for leisure and recreation, not solely visiting the dead (Jernigan 2015, Sloane 1991). Jernigan identified historical examples of people using cemeteries for alternative uses such as meetings, fairs, lectures, and markets (2015). The opening of Pere Lachaise represented a major shift in the European attitude toward death.

By placing the grave within a manicured garden, this cemetery symbolically transformed death from "something grotesque into something beautiful" (Sloane 1991).

As the popularity of Pere Lachaise and the rural cemetery movement grew, the design style spread throughout Europe and America. Ultimately Pere Lachaise inspired the creation of Mount Auburn Cemetery located outside of Boston in Cambridge, MA in 1831 (Sloane 1991, Jernigan 2015). Similar to Paris's cemeteries, cemeteries in Boston were suffering from vandalism, abandonment, and sanitation issues (Sloane 1991). These cemeteries in Boston before the creation of Mount Auburn possessed endless rows of graves, little to no ornamentation, and were considered "unattractive necessities" (Jernigan 2015, 2). The site of Mount Auburn was considered the ideal location because of the tranquility it offered outside the busy, gridlocked city (Jernigan 2015, Sloane 1991). The design of Mount Auburn was greatly praised because of its "beautiful meadows, shady groves, and cool recesses" (Sloane 1991, 54). In addition to an abundance of space to bury the dead, Mount Auburn offered its visitors botanical tours, a local and national historical museum, and an arboretum. Supporters of the rural cemetery movement viewed the cemetery as an extension of their horticultural and gardening efforts. To evoke a more contemplative atmosphere, the roads and pathways in the cemetery deliberately twisted and wound through the landscape, which is in a dramatic contrast to the efficient grid systems of urban roads (Sloane 1991).

Like Pere Lachaise, Mount Auburn Cemetery sparked the spread of the rural cemetery movement, and by 1861, approximately sixty-six rural cemeteries were established in the United States in locations such as Charleston, Louisville, Macon, and Richmond (Jernigan 2015). Rose Hill Cemetery, located in Macon, GA, was established

in 1840 as the first municipal rural cemetery in the United States. Rose Hill Cemetery embraced the rural cemetery movement by incorporating "serpentine paths, bordered with shrubbery, that wind around the skirts of the hills, dividing and branching off and diverging into other avenues, sometimes terminating in a secluded dell" (Jernigan 2015, 5). Additionally, Rose Hill Cemetery was well known for its diversity of landscapes including mature forest and a variety of wild flowers.

Lawn Park Cemetery Movement

As the rural cemetery movement grew in the United States, many of these popular burial spaces ultimately became overcrowded with burials and visitors. The rural cemeteries were highly criticized because they were established to alleviate the stress caused by the commotion of the urban city. In response to this criticism, the board of directors of Spring Grove Cemetery in 1855 asked the German-born horticulturalist Adolph Strauch to redesign the cemetery into a simpler, more open, pastoral landscape (Sloane 1991, Worpole 2003). Strauch believed the overall effect of the landscape was more important than individual expression at the grave site. His knowledge in English landscaping guided him in creating large expanses of green lawn interspersed with trees, shrubs, flower plantings, and lakes. Through his plans for Spring Grove Cemetery, Strauch proposed strict rules for the scale, design, and individualism of gravesites. To Strauch, Spring Grove had become so chaotic as a result of the excess of family and individual monuments, plot fences, and dense plantings that the beautiful, natural appearance of the site had been lost. He highly criticized the eccentric grave markers found in Spring Grove and other cemeteries, and instead, he placed selectively chosen decorative statues and ornamental fountains in the landscape. Individual grave markers

were restricted to less than six inches high, and larger family monuments were strategically placed on the edges of the property so that they would not interfere with the vistas. Spring Grove Cemetery was the prototype of future lawn-park cemeteries. The style embraced the English pastoral aesthetic of expanses of lawn with thin groupings of trees. The picturesque style of the rural cemetery movement was rejected, and cemeteries quickly became more parklike. Although the lawn cemetery was significantly simplified, visitors still came to these cemeteries to experience passive recreation like walking, admiring vistas, and picnicking.

Towards the end of the 19th century, the United States was experiencing a change in the attitude towards death and a movement away from sentimentality. The Civil War introduced the practice of embalming bodies before burial which grew in popularity after the conclusion of the war. Without refrigeration, embalming was the method to preserve the bodies of soldiers while they were transported to their families (Sloane 1991). After the conclusion of the war, embalming grew in popularity as a common burial practice. There is misbelief that embalming is required by law and protects the public from contaminants released during the decomposition process, which is not the case (Webster 2016, Watts 2018, Whittaker 2018, Bell 2018). The medical community believes that embalming is strictly a preservation method to delay the burial process and is a cosmetic procedure to improve the appearance of the body at the time of funeral. The body is not preserved indefinitely because the preservative properties become ineffective after about two weeks (Webster 2016). With the introduction of more turf, intensive maintenance of lawn-park cemeteries became a growing issue. The invention of the lawn mower made maintenance more efficient, but these vast cemeteries demanded large maintenance crews

to upkeep the parklike grounds. By the 1870s, all cemeteries were using perpetual care to fund maintaining the grounds, monuments, roads, and facilities. Perpetual care prices eventually because so expensive that lower class individuals were forced to select individual plots on the periphery of the burial grounds, often separating families from being buried near one another. The commercialization of the cemetery business and the distancing from people's association with death laid the framework for additional cemetery design movement reform (Sloane 1991).

Memorial Park Cemetery Movement

Embracing the commercialization of the burial business, Hubert Eaton in 1913 opened Forest Lawn in Glendale, California. This cemetery, both well-known and controversial, is the first cemetery in the memorial park movement. Eaton recognized the changing views about death in America, the growing problem of funeral affordability, and the individual desire to be memorialized (Sloane 1991). He expanded upon Strauch's ideas by erasing most evidence of death within the landscape, dramatically improving business operations, introduced the practice of selling plots before death known as "pre-need services", and creating a familiar suburban environment (Worpole 2003). Forest Lawn's landscape was strictly controlled to maintain a uniform appearance. Nature played a passive role in Forest Lawn and was only used as a backdrop against the heavily managed burial lawn (Sloane 1991, Worpole 2003). Most notably, Eaton introduced bronze memorial plaques that were installed on grade. These flush bronze memorials are intended to be invisible from a distance against the turf, so that the visitor was only able to see a specific memorial plaque when standing in front of it, creating a private experience. Additionally, keeping the memorials flush to the ground created more

efficient turf management since lawn mowers can easily cut over the memorials. Eaton's own views of Christian immortality in a joyful afterlife caused him to erase all associations of solemn death within Forest Lawn. He sought sculptures which reflected joyful religious scenes, named gardens sections after words suggesting light and celebration, and planted evergreen trees since deciduous plants could invoke images of death (Sloane 1991). Its gardenlike atmosphere has inspired over 70,000 people to marry in the Forest Lawn chapels since its first wedding ceremony in 1923 (Forest Lawn n.d.). Although Forest Lawn was initially viewed to be successful, Eaton wanted to balance the respect for the dead with use by the living. He did this by limiting visiting hours and prohibiting picnics, smoking, and bicycling. On the other hand, Eaton did promote visitation by establishing an art museum and tourist destinations. Eaton's solution to the growing funeral affordability problem and to increase funding for Forest Lawn was to sell "pre-need" funeral packages, which included embalming, casket, memorial plaque, and other cemetery services. By offering these packages through aggressive advertising campaigns, Eaton was able to dramatically increase sales by 250% in one year (Sloane 1991, Worpole 2003).

Forest Lawn set the model for future memorial parks to be built across the country. Many of these were established in suburban locations due to land availability and restrictions set in place by cities. Memorial park cemeteries seem to embrace many aspects of American values including business and marketing expertise, withdrawal from the close association with death, the overwhelming simplistic Christian motifs, and the suburban aesthetic of organization and expansive lawn (Worpole 2003, Sloane 1991).

Woodland Cemetery Style

While America was embracing the aesthetic of memorial parks during the twentieth century, Europe was starting to accept a uniquely different cemetery design style. The woodland style was first introduced by Hans Grassel in Munich Germany (Clayden and Woudstra 2003). Beginning in 1916 and completed in the 1940s, Erik Gunnar Asplund and Sigurd Lewerentz, both well-known Swedish architects and landscape architects, completed the most famous example of the woodland cemetery style, the Stockholm Woodland Cemetery (Skogskyrkogården) in Stockholm, Sweden (Clayden et al. 2015, Worpole 2003, Sloane 1991). Now a UNESCO World Heritage Site and popular tourist destination, this cemetery brought this unique design style to international attention. The Stockholm Woodland Cemetery is built on the location of a former quarry, over 200 acres in scale. Most of the rolling landscape is heavily planted with pine trees and graves are found on the forest floor in regularly spaced intervals. Within the burial grounds, long inviting paths bring the visitors through the site and offer glimpses of the cemetery's five chapels through the pine trees. Asplund and Lewerentz did not permit sculptural monuments in the cemetery and restricted the headstones to a limited size and local material (Worpole 2003). Since there is no clutter of gravestones, the visitor is greeted by a powerful, contemplative scene in the woodland (Clayden and Woudstra 2003). The Stockholm Woodland Cemetery has been referred to as an "immersive aesthetic" because the representation of nature entices the visitors into the natural setting while encouraging inner reflection among the pine forest (Worpole 2003).

The success of the Stockholm Woodland Cemetery caused the woodland cemetery design style to spread through Europe. In Doorn, The Netherlands, Wim Boer created the General Cemetery in 1952 as another example of the woodland cemetery.

Boer submitted his design for the open competition to create the General Cemetery. The competition called for entries which retained the existing woodland on site. Boer's design responded with creating rectilinear clearings in the existing pine woodland. In contrast to the burials beneath the pine canopy in the Stockholm woodland cemetery, the burials in the General Cemetery took place within these rectilinear openings with the edges reinforced with plantings of evergreen hedges These clearings were designated as rooms organized in a style reminiscent of the De Stijl movement (Clayden and Woudstra 2003).

Natural Burial

As the idea of incorporating the burial space within nature spread across Europe, natural burial, also known as green burial, began to develop as a new cemetery movement. Of course, natural burial is not a new concept since it has been around since the origin of man. Natural burial was reintroduced in 1993 to the public as a burial option at Carlisle Cemetery in the United Kingdom by Ken West. He developed the natural burial concept as an attempt to reduce annual maintenance costs, increase conservation area, and to offer an alternative to the formality of other cemetery design styles. When West realized the potential popularity and positive environmental impact this new cemetery design style could have, he attempted to develop a framework of environmental standards that would help classify a site as natural burial. However, there was criticism it would be too exclusive on potential site locations. Since there were no design standards to follow, many European natural burial sites interpreted the concept of natural burial differently (Clayden et al. 2015).

In 1998, natural burial was introduced in the United States as a legitimate burial option at the Ramsey Creek Preserve in South Carolina by Dr. Billy Campbell. He

proposed minimum standards for a cemetery to qualify as a natural burial cemetery. His burial requirements must exclude embalming fluids and concrete vaults and require a shroud or biodegradable casket (no exotic woods). Campbell's goals for these standards were to not introduce toxic elements into the environment. Additionally, Campbell strives to not degrade the existing wild areas with conservation value, to avoid introducing invasive plant species, and to create habitat and food sources for animals (Campbell).

Following the success of Ramsey Creek Preserve, the concept of natural burial began to grow in the United States. Presently, there are over 300 natural burial cemeteries located in the country. In an effort to legitimize natural burial, the Green Burial Council was established in 2005 as an organization which advocates for natural burial and provides environmental certificates for natural burial standards. As shown in Appendix A, the categories in the Green Burial Council certification standards include customer relations, burial practices, site planning, care of grounds, operations and management, and preservation and stewardship (Council 2015). These certification standards marginally expand upon what was proposed by Campbell at Ramsey Creek Preserve; however, implementation of these standards is vaguely described. Natural burial cemetery managers have criticized the Green Burial Council saying the Council does not have any name recognition for people desiring a natural burial. Without this recognition, the certification offered by the Green Burial Council may not appeal to a natural burial cemetery. Additionally, some cemetery managers do not embrace the landscape management practices of the Green Burial Council (Whittaker 2018).

Ecosystem Services and Their Presence within the Cemetery Context

Table 2.1 extracts the relevant information discovered from this chapter. This table identifies elements of the cemetery design movements described in this chapter which either positively (+) or negatively (-) impact ecosystem services. Only cultural, provisioning, and regulating ecosystem services are included on this table since supporting services, such as photosynthesis, water cycling, and soil formation, provide intangible benefits to humans over a long period of time and are not affected by imposed land uses. Elements which directly contribute or hinder these three ecosystem services are able to be easily identified. Through the evolution of burial practices and the development of cemetery design styles, it is evident that the designs' styles primarily included elements which provide cultural ecosystem services. Cultural benefits relating to education, art appreciation, popular aesthetics, religious and spiritual nourishment, and recreation were common themes found in each of the cemetery design movements. This is not surprising since these elements are ones which directly benefit the living. Regulating services are occasionally provided by the described cemetery design movements. Neither the lawn park nor memorial park cemeteries contribute regulating services, which is expected because these styles were heavily influenced by the English lawn style and resulted in designs with less biodiversity. Both the rural and woodland cemetery design movements contributed some regulating ecosystem services because these styles employed aesthetics which emphasized heavily planted landscapes. Lastly, provisioning ecosystem services did not appear in any of these cemetery design movements. This was not a shocking discovery because cemeteries are rarely seen as productive sites which provide physical goods such as food, fiber, fuel, and other resources. Rather, they are typically viewed as a disposal site for the dead and a place to

mourn. As a result, the cemetery design movements addressed in this chapter did not incorporate elements which deliberately provided provisioning services.

Table 2.1 Cemetery Design Movement Findings

Cemetery Design Movement	Cultural	Provisioning	Regulating
Rural	+ Recreational space + Vistas + Tourist destination + Valued for Neoclassical architecture + Meeting place + Contemplative atmosphere + Botanical tours + Public Park		+ Mature trees + Created to reduce diseases in city + Presence of nature + Minimal lawn area + Some plant diversity
	- Diminished sense of place from extensive use of monuments		- Non-biodegradable elements
Lawn Park	+ Recreational space + Vistas + Reduction of distracting monuments		
			- Large amount of lawn area - Sparse plantings of trees and shrubs - Requires intensive management -Non-biodegradable elements
Memorial Park	+ No distracting		

	monuments + Christian icons found throughout + Wedding location + Museum for education + Passive recreation + Themed burial locations		
	- No sense of place - Not inclusive to other religions - Limited user behavior		- Large amount of lawn area - Nature played a passive role - Requires intensive management - Limited plant diversity - Non-biodegradable elements
Woodland	+ Inclusive to all religions + Heightened sense of place + Incorporated Nordic icons + Use of local materials + Recreational public space + Vistas + Immersive experience in nature + Limited distracting monuments + Tourist destination		+ Dense forest
Natural Burial	+ Inclusive to all religions + Heightened sense of place		+ Promotes biodiversity + Provides pollinator habitat

	+ Recreational space + Immersive experience in nature + Contemplative atmosphere		+ Minimal lawn area + Biodegradable elements

CHAPTER 3

CASE STUDIES

To further understand the design intent and operation of natural burial cemeteries, this chapter explores three natural burial cemeteries as case studies. Through these case studies, this thesis will identify design elements which will help provide ecosystem services to the area. At each cemetery location, interviews were conducted with the cemetery manager and personal observations were recorded. The three cemeteries were selected based on location within the southeastern United States, range in scale, and differences in land cover. The first cemetery is Honey Creek Woodlands at the Monastery of the Holy Spirit located in Conyers, Georgia. Greenhaven Preserve, located in Eastover, South Carolina, is the second natural burial cemetery. The third cemetery is Milton Fields located in Milton, Georgia.

Honey Creek Woodlands

This natural burial cemetery, located in Conyers, Georgia, is owned by the Monastery of the Holy Spirit, a Trappist monastery. Although the cemetery is located at a monastery, people of all faiths are welcomed to be buried here. Honey Creek Woodlands is 25 miles away from Atlanta, Georgia which contributes to its success as a popular location for natural burial. The monastery owns 2,300 acres of land which is nestled within 8,000 acres of a larger conservation effort known as the Arabia Mountain Heritage Corridor along the South River. About 1,000 acres of the monastery's land is under permanent protection, and the Honey Creek Woodlands cemetery is approximately 120

acres of this protected land. The site is protected in perpetuity by a conservation easement held by the Georgia Piedmont Land Trust. Before opening Honey Creek Woodlands, the Monastery was experiencing a serious financial situation due to a lack of revenue stream. The land, on which the burial grounds are now located, was previously used for agricultural purposes; however, the aging monks were physically unable to work in the field. The media attention of Dr. Billy Campbell from Ramsey Creek Preserve inspired the monks to use the land as an opportunity to earn more revenue through offering natural burial as well as protect the land for wildlife habitat (Whittaker 2018).

Since natural burial was a new concept in the United States, there were not many people who were able to assist with starting a new natural burial cemetery. Campbell advised the Monastery with planning and operating Honey Creek Woodlands in the first few years after opening. Once the Green Burial Council was established, Honey Creek Woodlands was certified under their natural burial cemetery standards. However, Honey Creek Woodlands decided to stop renewing the natural burial cemetery certification with the Green Burial Council. They identified that the Green Burial Council does not have name recognition in the country, imposed different environmental goals than Honey Creek Woodlands, and did not emphasize the human experience enough. By no longer following the Green Burial Council's restrictions, Honey Creek Woodlands is better able to prioritize the human experience which maximizes the number of burials to provide funding for the Holy Spirit Monastery (Whittaker 2018).

One of the main goals in prioritizing the human experience is making the cemetery a user-friendly site, which is difficult for a natural burial cemetery on a wooded site. Since a majority of funeral attendees are elderly people, the cemetery must make the

wooded site accessible. This issue was alleviated by providing parking along the cemetery road within 100-200 yards from the grave site and utilizing electric golf carts to shuttle people closer to the grave. Particular care is given to removing hazards along walking trails by cutting low hanging limbs, removing fallen branches, and flagging protruding roots. Figure 3.1 shows the unpaved cemetery road where people are permitted to park to access the burial meadow and the pine forest. Prayer and meditation are strongly encouraged by visitors, especially at the Martin Gatins Chapel, Figure 3.2, which is allowed to be used for funeral services (Whittaker 2018).

The wilderness and the natural aesthetic are dominant within Honey Creek Woodlands. Deliberately, there is an absence of design within the cemetery with the intention of invoking the feeling of natural and beneficial decay within the Georgian wilderness. People may choose from a variety of environments to be buried including a meadow, pine forest, mixed woodland, and hill top. Cremated remains may be buried in a meadow, pine forest, mixed woodland, hill top, and with a creek view. Figure 3.3 shows the meadow in which people are allowed to bury both bodies and cremated remains. Native grasses and perennials, such as the yellow-blooming Goldenrod, make this burial environment a popular choice. Succession is controlled in the meadow by prescribed burns. Figure 3.4 shows the mixed woodland burial option. This preference is popular for people who desire canopy cover that is common in the Piedmont region. According to the Honey Creek Woodlands Rules and Regulations, Appendix B, only un-embalmed bodies in biodegradable shroud or casket (wood, wicker, and cardboard are common) are allowed. Figure 3.5 shows a pine casket and wicker casket, which are both popular biodegradable options. All ornamentation on the casket must be biodegradable. Grave

decoration is prohibited to only natural cut flowers; however, leniency for other mementos, such as teddy bears and figurines, is granted during holidays, birthdays, and anniversaries. A native, flat fieldstone engraved with the deceased's name and date may be purchased from Honey Creek Woodlands to use as the headstone. Bird houses are allowed to be placed near a grave with permission from the cemetery. Plantings on the grave are permitted although not strongly encouraged, but most families choose to let the grave merge with the surrounding environment over time. Figure 3.6 shows the grave of a recent funeral (Whittaker 2018).

Figure 3.1: Cemetery Road, Honey Creek Woodlands. *Photo Provided by Joe Whittaker*

Figure 3.2: Martin Gatins Chapel, Honey Creek Woodlands. *Photo Provided by Joe Whittaker*

Figure 3.3: Meadow Burial, Honey Creek Woodlands. *Photo Provided by Joe Whittaker*

Figure 3.4: Mixed Woodland Burial, Honey Creek Woodlands. *Photo Provided by Joe Whittaker*

Figure 3.5: Biodegradable Caskets, Honey Creek Woodlands. *Photo Provided by Joe Whittaker*

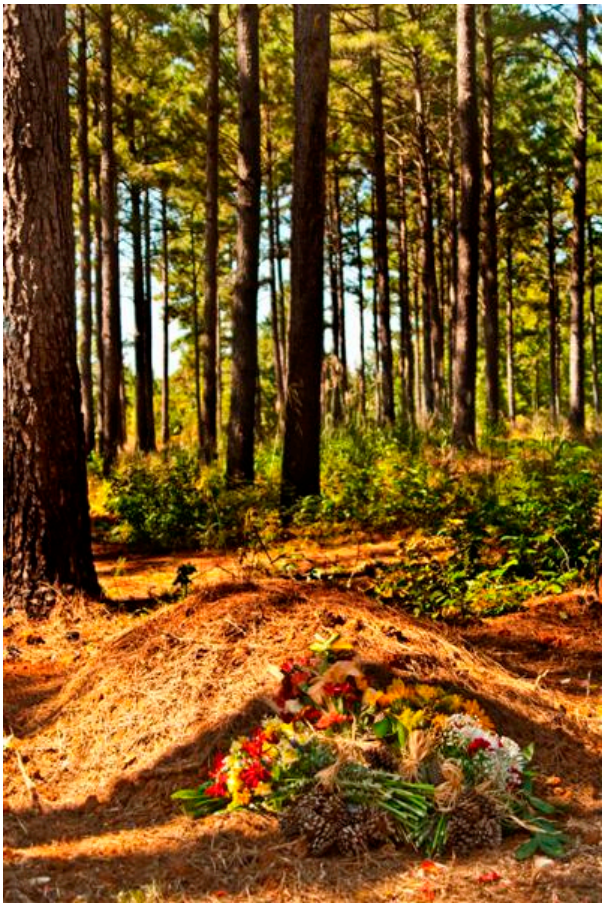


Figure 3.6: Natural Burial Grave, Honey Creek Woodlands. Photo Provided by Joe Whittaker

The mounded dirt will eventually settle and be indistinguishable from the rest of the forest floor. Until then, the mound will blend in with the rest of the environment as it is covered with pine needles and other woodland debris. Eventually, plants will begin to grow on top of the grave. Memorial plants are strictly limited to native plants, and Honey Creek Woodlands is not responsible for the survival of the plant. They suggest planting in the fall or winter and have seen great success with Black-eyed Susan, mountain mint, beautyberry, and red bud trees. Wooden benches used to be available to purchase, but that practice has been discontinued because the natural landscape was becoming littered with rarely used benches. Instead, people are encouraged to bring a temporary camp chair if they desire to sit by the grave (Whittaker 2018).

Within Honey Creek Woodlands, the plot layout within the burial grounds also takes on a natural feeling. While lawn cemeteries typically have plots arranged on an orderly grid system, Honey Creek Woodlands allows burial wherever the land allows, taking into account extreme slopes, suitable soils, and vegetation density. In general, they aim to bury about 125 people per acre, which is in sharp contrast to lawn cemeteries who bury about 1000 people per acre. Lawn cemeteries can support this high density by using the structure of concrete vaults to improve support of the land. Although the density is significantly less at Honey Creek Woodlands, protecting the land is of high importance, so using a large amount of land to bury people is justified. Related family members are allowed to be buried within three to five feet of each other while unrelated people have about 10 to 12 feet of space between. These distances allow Honey Creek Woodlands to reach its target burial density. If the target density cannot be met because of a natural feature, such as seasonally wet landscape depression, Honey Creek Woodlands staff

simply buries elsewhere and allows nature to thrive in the site unsuitable for burial. Each grave is dug by hand since the machine equipment is detrimental to these environments including pollution they emit, potential to disrupt the ground and vegetation, and noise. Additionally, it is not feasible to maneuver the equipment between densely planted trees. Friends and family members are allowed to assist in digging the grave and closing the grave after the funeral. Many people who choose this option have claimed it has helped them grieve their loss (Whittaker 2018).

Visitation to Honey Creek Woodlands is strictly limited to people who know someone who is buried at this cemetery. The monks at the Holy Spirit Monastery want to be aware of who is coming onto their expansive private property, and they believe visitors who have a loved one buried at Honey Creek Woodlands would more likely respect the grounds. Visitors simply need to call the main office ahead of time to announce themselves. Although visitation is limited, people are encouraged to hike, walk, meditate, bird watch, explore nature, and bring their dogs. The extensive hiking trails within the burial grounds and conservation land are clearly marked with trail blazes (Whittaker 2018).

The design elements of Honey Creek Woodlands which contribute to ecosystem services are summarized in Table 3.1. Since Honey Creek Woodlands focuses on the human experience within the cemetery, it provides many cultural ecosystem services related to the spiritual and religious experiences within nature, contemplation, local identity, and passive recreational opportunities. Honey Creek Woodlands also places a focus on environmental conservation within the burial grounds. Through these efforts, it is able to provide regulating ecosystem services to the area. Similar to the findings in

Chapter 2, Honey Creek Woodlands does not provide any provisioning ecosystem services since it focuses on supporting the human grieving experience and the conservation of the burial lands.

Table 3.1: Honey Creek Woodlands Findings

Cemetery	**Cultural**	**Provisioning**	**Regulating**
Honey Creek Woodlands	+ Sense of place + Use of local materials + Contemplative atmosphere + No distracting monuments + Religious influences + Opened to all religions + Passive recreation + Immersive experience in nature		+ Conservation easement + Emphasis on natural processes + Plant diversity + Invasive management plans + Habitat diversity + Mature trees + Pollinator habitat + No lawn area
	- Limited visitor access		

Greenhaven Preserve

Located in Eastover, South Carolina, Greenhaven Preserve is a natural burial cemetery located about 20 miles outside Columbia, South Carolina, from where many of its clients travel. Within the 24,000 acre Congaree National Park, Greenhaven Preserve protects about 360 acres of old-growth and pine forests. Ten of these acres are currently used for natural burial, and 30 additional acres are set aside for future expansion of the natural burial cemetery. Since Greenhaven Preserve is under a conservation easement with the Congaree Land Trust, the cemetery is permanently protected. As an important corridor for birds, turkey, deer, and other wildlife, this cemetery ensures the natural area will always provide valuable food and refuge to the local wildlife. Similarly to Honey Creek Woodlands, Greenhaven Preserve was inspired by Dr. Billy Campbell's success with operating Ramsey Creek Preserve. Without many resources for creating a natural burial cemetery, the manager relied heavily on the assistance and instruction provided by Campbell. Additionally, Greenhaven Preserve is a certified natural burial cemetery with the Green Burial Council because the manager believes his views on land stewardship and preservation align with the values of the Green Burial Council (Watts 2018).

The natural aesthetic of the existing land was extremely important for the manager to preserve when creating Greenhaven Preserve. Before opening the cemetery, very few modifications to the landscape were made besides removing dense, invasive underbrush, to maintain the aesthetic of a park organized by nature. The ten acre portion of the current cemetery is small enough that parking is not permitted within the burial grounds. Visitors are allowed to park along the tree lined entrance or in the mown lawn near the onsite chapel. This chapel welcomes people of all faiths. Figure 3.7 shows the

Figure 3.7: Visitor Parking, Greenhaven Preserve. *Photo by Author*

Figure 3.8: Cemetery Site Map, Greenhaven Preserve

parking area which can accommodate traffic from large funerals and visitors. Behind the designated parking, the burial grounds are easily accessed by grieving visitors (Watts 2018).

People may choose from a variety of locations to be buried. The ten acres are divided into sections, shown in Figure 3.8, which are named after familiar native plants such as oak, honeysuckle, dogwood, loblolly, and jasmine. These areas are mostly planted with different species of pine trees and not primarily planted with the species the section is named after. It is simply a naming convention. Topography and the differences in vegetation density seem to be the only distinguishing characteristics between burial sections. Figure 3.9 shows a flat portion of the burial grounds, and Figure 3.10 depicts a portion of the burial grounds on a hillside which leads to a small valley. Each section is divided into a grid system consisting of 10'x10' burial plots. Each plot has room to bury a body, cremated remains, and the body of a small pet. The burial plots are not restricted by slope since the graves at Greenhaven Preserve may be dug by hand or by machine. Family and friends are allowed to help close the grave after the funeral, as shown in Figure 3.11. Each section is delineated with an 8'-10' walking path which is bordered on either side by a 5' buffer zone. The walking paths are not made of a different surface material than the surrounding landscape because Greenhaven Preserve is intended to have a seamless park-like aesthetic. Mowing lawn areas and clearing undesirable weeds are the main methods of landscape management at Greenhaven Preserve (Watts 2018).

Similar to Honey Creek Woodlands, Greenhaven Preserve only allows un-embalmed bodies in a biodegradable shroud or casket to be buried. Ornamentation on the casket must be limited to biodegradable materials as well. The manager intended to have

strict rules about grave decoration, but he has allowed more leniency than Honey Creek Woodlands. If a family wishes to plant a memorial plant on the grave of their loved one, A list of native plants is provided to the families; however, many families go against these recommendations and often plant nonnative ornamentals. Some graves do not have memorial plants because the families choose to have the grave slowly merge with the surrounding environment. Decorations of small figurines and natural materials including pinecones, sticks, and rocks, are commonly found on graves within the cemetery. Watts tries to respect the grieving families of the deceased and removes any gaudy ornamentation, but he does notify the family before he does so. Figure 3.12 shows a burial that is decorated with a small angel figurine and planted with Knock-out Roses. Each grave is permitted to have an engraved grave marker that is supplied by Greenhaven Preserve. The markers are flat stones but are not required to be native stones. Figure 3.13 displays some of the grave marker options offered by Greenhaven Preserve. Similar to Honey Creek Woodlands, Greenhaven Preserve mounds the dirt of newly buried graves which slowly erode to be indistinguishable from the surrounding woodlands.

Visitation to and enjoying the natural beauty of Greenhaven Preserve is strongly encouraged. People are permitted to bring their dogs, to picnic, to bird watch, to meditate, and to explore the grounds. They do not have to declare their presence on the site and are allowed to use the chapel and reception facilities whenever they please. Accommodating the needs of visitors is of high importance to Greenhaven Preserve (Watts 2018).

The design elements of Greenhaven Preserve which contribute to ecosystem services are summarized in Table 3.2. This cemetery focuses on providing a park-like

Figure 3.9: Burial Grounds, Greenhaven Preserve. *Photo by Author*

Figure 3.10: Hillside Burial Grounds, Greenhaven Preserve. *Photo by Author*

Figure: 3.11: Grave Closing, Greenhaven Preserve. *Photo Provided by Ronnie Watts*

Figure 3.12: Grave Decoration, Greenhaven Preserve. *Photo by Author*

Figure 3.13: Grave Marker Options, Greenhaven Preserve. *Photo by Author*

experience within the natural environment which is ideal for contemplating the death of a loved one. Cultural and regulating ecosystem services took priority over providing provisioning services. It provides many cultural ecosystem services such as spiritual experiences within nature, contemplation, sense of place, and passive recreational opportunities. Greenhaven Preserve provides regulating ecosystem services by being located on a conservation easement, contains mature trees, and animal habitat. Similarly to Honey Creek Woodlands, no provisioning services are offered since a higher importance is on elements which provide cultural and regulating services.

Table 3.2: Greenhaven Preserve Findings

Cemetery	**Cultural**	**Provisioning**	**Regulating**
Greenhaven Preserve	+ Sense of place + Contemplative atmosphere + No distracting monuments + Opened to all		+ Conservation easement + Emphasis on natural processes + Plant diversity + Mature trees

	religions + Passive recreation + Immersive experience in nature		+ Wildlife habitat
	- Limited visitor access - No enforcement of local materials - Nonnative plants		- Lawn area - Not significant habitat diversity - Nonnative plants

Milton Fields

Milton Fields is a 17 acre natural burial cemetery located in Milton, Georgia that formerly functioned as a farm with rolling hills of grazing pasture. The owner and his family moved to this property with the intention of preserving the land and the farmhouse which was built in 1896. Milton Fields is located in the suburbs outside of Atlanta. Persons of all faiths are welcomed to be buried in Milton Fields. Bell obtained a deed restriction on the property which allows it to always remain a cemetery, which will preserve the farmhouse and land. Additionally, Milton Fields has been approved as a perpetual care cemetery by the Georgia Secretary of State which will guarantee this cemetery will be cared for in perpetuity. Unlike Honey Creek Woodlands and Greenhaven Preserve, the owner partnered with Conservation Burial Partners, the consulting branch of the Green Burial Council, to help create Milton Fields. He was aware of Dr. Billy Campbell and his success with Ramsey Creek Preserve, but he chose the assistance of the Green Burial Council since he considers the organization to be the leading standard within the natural burial profession (Bell 2018).

To complement the existing farmhouse, maintaining the grazing pasture aesthetic of the land was essential. Adding a gravel road is the only modification Bell made to the site. The gravel road meanders through the middle of the pasture following the rolling topography. Figure 3.14 shows the gravel road running through the burial grounds. There

Figure 3.14: Cemetery and Gravel Road, Milton Fields. *Photo by Author*

is no designated parking, and visitors are encouraged to park along the road or in the pasture where there are no burials. The cemetery is frequently mowed to maintain the grazing pasture aesthetic. Keeping the grass low improves grave visibility and accessibility. Unlike Honey Creek Woodlands and Greenhaven Preserve, the graves are not mounded with dirt after burial. The mounded graves would disrupt the flat pasture aesthetic and would cause difficulty when mowing. Instead, the graves are kept level, and are filled in with soil when the grave begins to settle (Bell 2018).

People may choose their burial plot, but there is little distinction between burial sections. The site is divided into a grid system of 10'x6' burial plots. Survey markers designate the different burial sections and are barely visible in the ground. The grave markers must be flush to the ground to guarantee mowing efficiency and maintain the flat pasture aesthetic. Any vertical elements would ruin both of these goals. Figure 3.15 shows a typical grave in Milton Fields. Also unlike Honey Creek Woodlands and Greenhaven Preserve, Milton Fields digs every grave with machinery. Without the concern of maneuvering among the woods and ignoring the engine emissions, Milton Fields can quickly and efficiently dig a grave if "pre-need" services were not purchased before the death of the individual. Similar to Honey Creek Woodlands and Greenhaven Preserve, Milton Fields only allows un-embalmed bodies in a biodegradable shroud or casket to be buried. All ornamentation on the casket must be limited to biodegradable materials. Cremated remains are allowed to be scattered only in a designated portion of the pasture, shown in Figure 3.16 (Bell 2018).

Milton Fields encourages visitation and believes visiting the graves assists with the grieving process. Visitors do not have to call ahead of time to notify their arrival. Like many cemeteries, Milton Fields struggles with managing visitors' behavior and actions on site. Leaving grave decorations is strongly discouraged since it clutters the pasture aesthetic and makes mowing difficult. If any decorations are left by the grave, a staff member notifies the family before removing the items. Memorial plantings are permitted, but families may only choose to plant a white dogwood tree to echo the dogwoods found along the perimeter of the site. Although plantings are allowed, it seems to be an unpopular choice since there are only a couple of small trees in the cemetery (Bell 2018).

Figure 3.15: Grave, Milton Fields. *Photo by Author*

Figure 3.16: Cremated Remains Scattering Area, Milton Fields. *Photo by Author*

The design elements of Milton Fields which contribute to ecosystem services are summarized in Table 3.3. Since this cemetery focuses on maintaining a pasture aesthetic, ecosystem services are not as evident in this cemetery than in the previous two case studies. However, some cultural and regulating ecosystem services are provided by Milton Fields. It provides cultural services through emphasizing the sense of place. Milton, Georgia formerly was home to multiple farms and grazing pastures. Milton Fields preserves this identity through maintaining the cemetery in the local style. Because of the pasture aesthetic, Milton Fields does not provide as many regulating services as Honey Creek Woodlands and Greenhaven Preserve. The low amount of vegetative diversity interferes with the ability to provide this service. This cemetery chooses to focus on maintaining the pasture identity of the site and assisting visitors to grieve rather than offering provisioning services.

Table 3.3: Milton Fields Findings

Cemetery	**Cultural**	**Provisioning**	**Regulating**
Milton Fields	+ Sense of place + Contemplative atmosphere + No distracting monuments + Open to all religions		+ Grassland habitat
	- No enforcement of local materials - Nonnative plants - Recreation not present -		- Expansive lawn area - Not significant habitat diversity - Intensive management

CHAPTER 4

SITE SELECTION PROCESS

This chapter explains the process for choosing an appropriate site for a natural burial cemetery. The site selection process involves two major analyses: a proximity analysis and a weighted overlay analysis. The proximity analysis identifies suitable site locations based on the site's proximity to other major influences. The weighted overlay further narrows the suitable site locations based on physical parameters by identifying areas with suitable soils, slope aspect, land cover, and slope gradient. As identified in Chapters 2 and 3, natural burial cemeteries are commonly located within mature woodlands and farmland converted to woodlands. Therefore, one weighted overlay analysis was conducted to identify suitable mature woodland sites, and a second analysis was conducted to identify suitable farmland sites which might be suitable for conversion to woodland environments.

Proximity Analysis

Proximity to a major city is critical to the business model for long term operation and success of any cemetery, including natural burial cemeteries (Whittaker 2018). For this proximity analysis, a cemetery located 10-20 miles from a major city was deemed an appropriate distance for users of the site (Watts, 2018, Whittaker, 2018). As shown in Figure 4.1, to conduct this Georgia-based test of location and site design principles, 10 mile and 20 mile buffers were created around major cities in Georgia including Atlanta, Athens, Augusta, Columbus, Albany, Gainesville, Macon, Rome, Statesboro, and

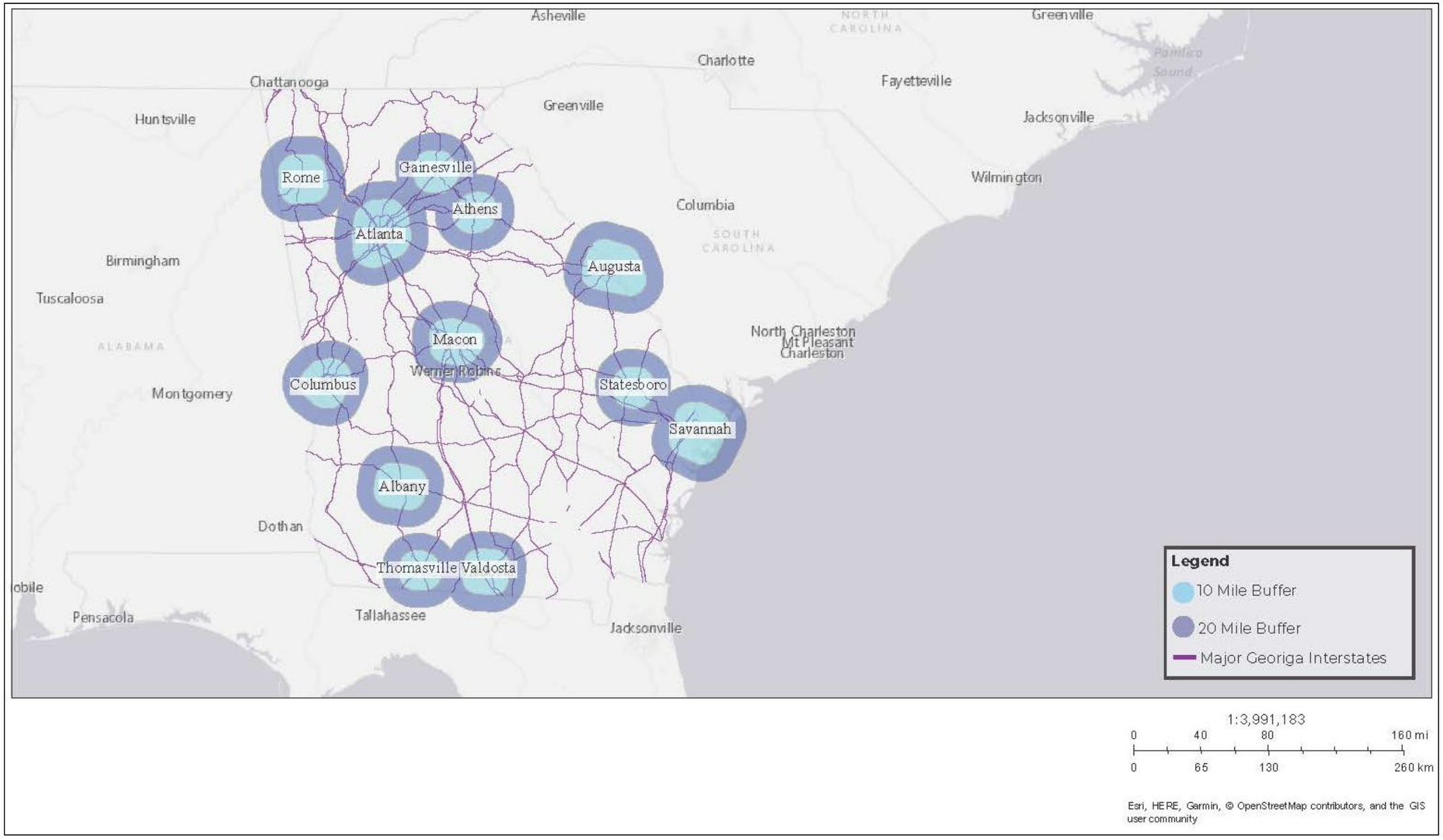


Figure 4.1: 10 mile and 20 mile Buffer of Major Georgia Cities

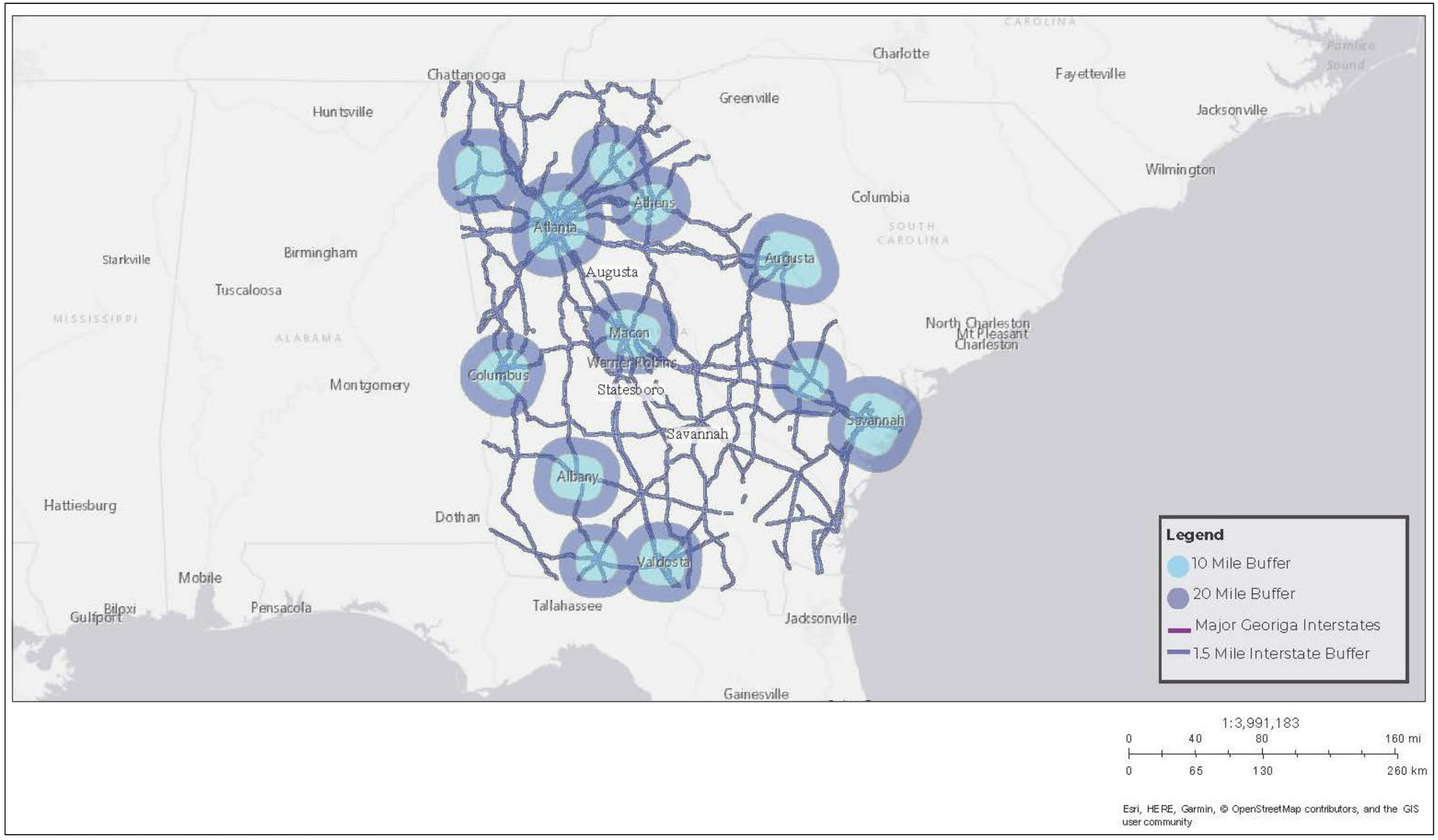


Figure 4.2: 1.5 Mile Noise Buffer of Major Georgia Cities

Savannah. A site located within 10 miles from a major city was deemed most desirable, and a site located within 20 miles was acceptable.

Within each major city, a traffic noise buffer of 1.5 miles from all major roads and highways was applied, which is shown in Figure 4.2. Traffic noise was deemed distracting to visitors in a cemetery. A natural burial cemetery's contemplative atmosphere could be disrupted by frequent highway noise. A site located outside of this 1.5 mile buffer is desirable (Watts 2018).

Additionally, a stream buffer of 75 feet was applied. The State of Georgia prohibits any removal of vegetation within 25ft off the stream bank. Within Athens-Clarke County, O.C.G.A § 8-6-4 (2015) requires an additional 50ft to the state buffer for a total of 75ft buffer. These buffers intend to protect the waterways and streambanks from human disruption and were adopted as standards for this study.

Weighted Overlay Analysis for Mature Woodlands

A weighted overlay analysis was conducted to further identify suitable sites for a new natural burial cemetery within a mature woodland area. This analysis took into account agricultural soils, slope aspect, land cover, and slope gradient. Desirable soil conditions for burial include sandy, loamy soils with high rates of permeability. Additionally, soils containing high amounts of organic top soil are required to increase water filtration, plant growth, and body decomposition. Impervious or poor draining soils inhibit body decomposition rates due to undesirable anaerobic conditions (Webster 2016). The weighted overlay analysis offered by GeoPlanner for ArcGIS allows the user to numerically rank desirable soils from highly suitable to low suitability, shown in Table 4.1. For this analysis, using National Resource Conservation Service soil classifications,

non-prime farmland and farmland of low importance were deemed highly suitable. Farmland of statewide importance, farmland of statewide importance with some modifiers, and farmland of unique importance were deemed fairly suitable. Prime farmland and prime farmland with some modifiers were deemed to have low suitability since the highest quality farmland should be reserved for primary agricultural production (Soil Survey Staff n.d.).

Table 4.1: Agricultural Soil Suitability for Mature Woodlands

Agricultural Soil Classification	**Suitability Level**
Non-prime Farmland	High
Farmland of Low Importance	High
Farmland of Statewide Importance	Fair
Farmland of Statewide Importance with Some Modifiers	Fair
Farmland of Unique Importance	Fair
Prime Farmland	Low
Prime Farmland with some Modifiers	Low

Next in Table 4.2, the weighted overlay took into account slope aspect, the direction that a slope faces. Flat land, eastern, northeastern, and north-northeastern facing slopes were considered highly suitable. Flat land is highly desirable for user mobility and grave access. Eastern, northeastern, and north-northeastern slopes are highly desirable for some widely practiced religions, such as Christianity and Islam, which suggest individuals should be buried facing an easterly direction. Southern, southeastern, western, southwestern, north western, and north-northwestern slopes were deemed fairly suitable.

Table 4.2: Slope Aspect Suitability

Slope Aspect	**Suitability Level**
Flat	High

Eastern	High
Northeastern	High
North-northeastern	High
Southern	Fair
Southeastern	Fair
Western	Fair
Southwestern	Fair
North western	Fair
North-northwestern	Fair

Following slope aspect, the weighted overlay considered land cover suitable for a natural burial cemetery within mature woodland, Table 4.3. Using the United States Geological Survey (USGS) National Land Cover Database 2011 (NLCD) classifications, forest and grassland were considered to be highly suitable for burial and for ecological diversity (U.S. Geological Survey 2014). Shrubland and barren land were considered to be less suitable since this particular analysis is attempting to identify existing mature woodlands. Open water, polar-ice, developed, and wetlands were deemed to have low suitability for burial conditions as well as ecological diversity.

Table 4.3: Land Cover Suitability for Mature Woodlands

Land Cover	**Suitability Level**
Forest	High
Grassland	High
Shrubland	Fair
Barren Land	Fair
Open Water	Low
Polar-ice	Low
Developed	Low
Wetlands	Low

Lastly, desirable slope gradient was considered in the weighted overlay analysis, shown in Table 4.4. Very low slope (0-3%) and low slope (3-8%) were considered to be

very suitable for this site. Gentle slopes provide easier mobility for visitors, improves grave access, and allows for water drainage. Medium slopes (8-16%) were considered to have fair suitability. Visitor mobility and grave access is moderately impacted by medium slopes. High (16-28%) and very high slopes (26-82%) were considered to have low suitability since visitor mobility and grave access are drastically inhibited by these slopes.

Table 4.4: Slope Gradient Suitability

Slope	**Suitability Level**
Very Low (0-3%)	High
Low (3-8%)	High
Medium (8-16%)	Fair
High (16-28%)	Low
Very High (26-82%)	Low

With these four categories considered in the weighted overlay analysis, different weighted percentages were assigned to dictate which categories were most impactful when considering a site, shown in Table 4.5. Land cover was assigned a 55% weight. Agricultural soil was given a 25% weight. Slope had a 15% weight, and aspect was weakly weighted at 5%. Once these weighted percentages were assigned, a green to red color ramp indicated which locations on the map were considered suitable or poor, respectively. Figure 4.3 shows this weighted overlay analysis for the state of Georgia.

Table 4.5: Weighted Overlay for Mature Woodlands

Weighted Overlay Categories	**Weighted Percentages**
Land Cover	55%
Agricultural Soil	25%
Slope Gradient	15%
Slope Aspect	5%

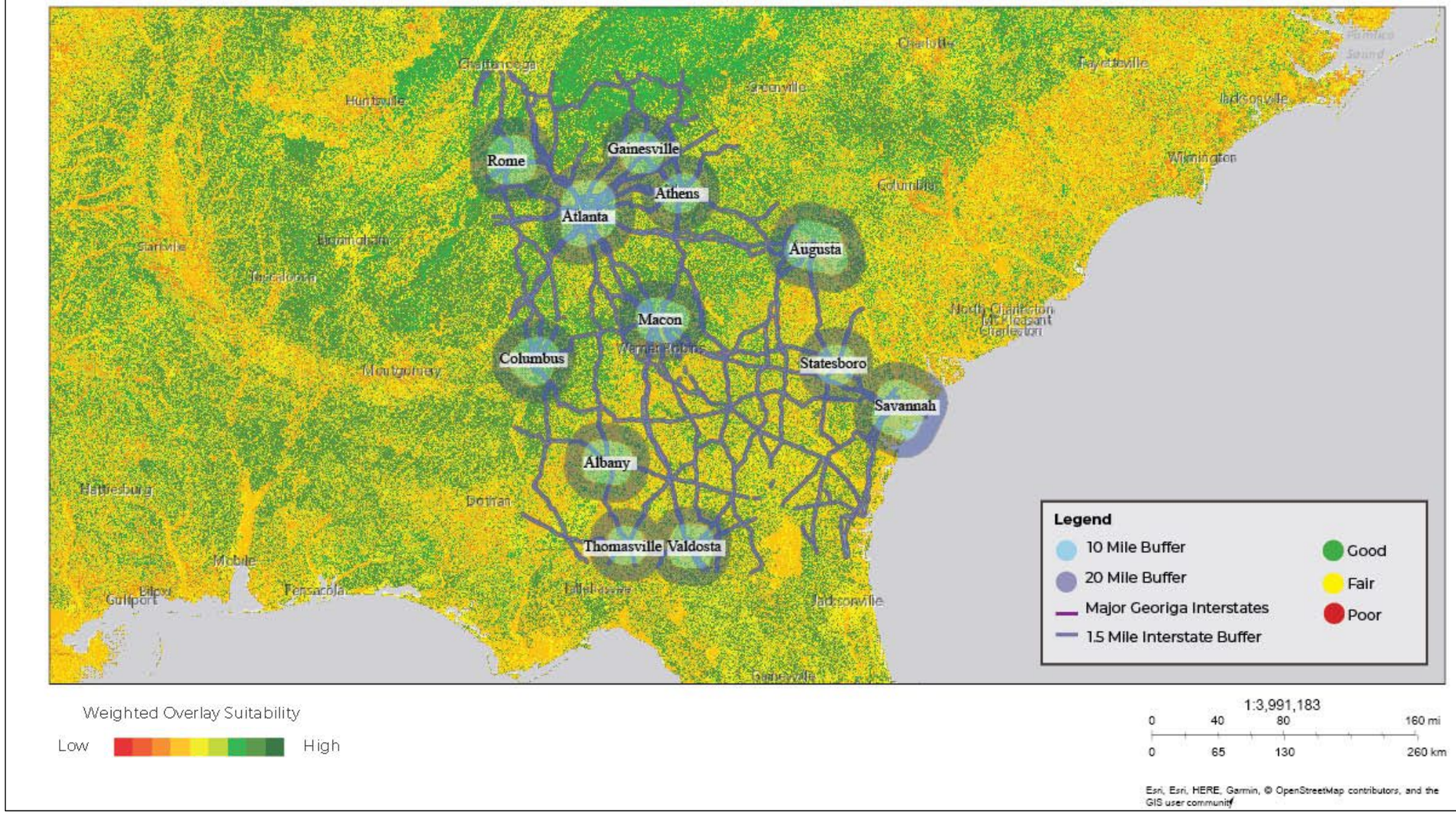


Figure 4.3: Weighted Overlay Analysis for Mature Woodlands

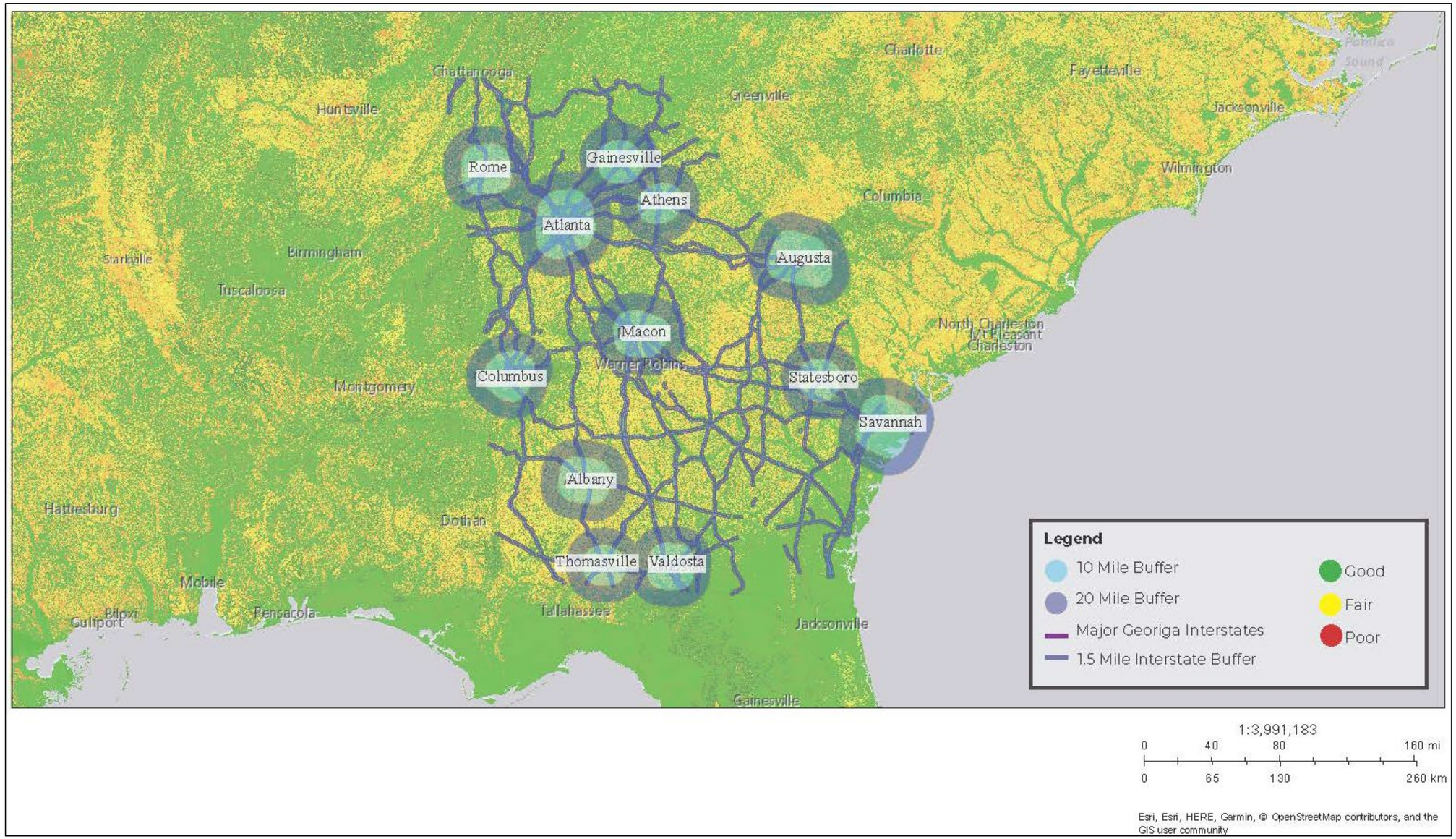


Figure 4.4: Weighted Overlay Analysis for Converting Farmland

Weighted Overlay Analysis for Converting Farmland to Woodland

A second weighted overlay was conducted to identify potential sites for converting existing farmland to a natural burial environment. This weighted overlay analysis took into account the same criteria as the previous weighted overlay. For a weighted overlay identifying a suitable farmland site, the desirable aspect and slope criteria remain the same as the weighted overlay analysis, shown in Table 4.2 and Table 4.4. However, the agricultural soils and land cover criteria change.

The agricultural soil classifications are shown in Table 4.6. For this analysis, farmland of low importance, farmland of unique importance, and not prime farmland were considered highly suitable. Farmland of statewide importance and farmland of statewide importance with some modifiers were considered to be fairly suitable. Prime farmland and prime farmland with some modifiers were considered low suitability since it was determined improbable for prime farmland to be converted to a cemetery rather than productive land.

Table 4.6: Agricultural Soil Suitability for Farmland

Agricultural Soil Classification	**Suitability Level**
Non-prime Farmland	High
Farmland of Low Importance	High
Farmland of Statewide Importance	Fair
Farmland of Statewide Importance with Some Modifiers	Fair
Farmland of Unique Importance	High
Prime Farmland	Low
Prime Farmland with some Modifiers	Low

Next, the land cover criteria for this weighted overlay analysis, shown in Table 4.7, is different than the criteria for the weighted overlay analysis identifying woodland. Grassland and Shrubland land cover was considered highly suitable. Forest and barren

land were considered fairly suitable. Open water, polar-ice, developed, and wetland were considered to have low suitability.

Table 4.7: Land Cover Suitability for Farmland

Land Cover	**Suitability Level**
Forest	Fair
Grassland	High
Shrubland	High
Barren Land	Fair
Open Water	Low
Polar-ice	Low
Developed	Low
Wetlands	Low

The four categories, agricultural soils, aspect, land cover, and slope were all assigned weighted percentages to dictate which categories were most impactful when identifying a site, shown in Table 4.8. Since this analysis is seeking suitable farmland, agricultural soils were given a 55% weight. Land cover was assigned 25%. Slope was given 15%, and aspect remained at 5%. Similar to the previous weighted overlay analysis, a green to red color ramp on the map indicated which sites were considered suitable or poor, respectively. Figure 4.4 shows this weighted overlay analysis for the state of Georgia.

Table 4.8: Weighted Overlay Farmland

Weighted Overlay Categories	**Weighted Percentages**
Land Cover	25%
Agricultural Soil	55%
Slope	15%
Aspect	5%

To demonstrate the feasibility of the site selection process throughout Georgia, some sites were identified as potential natural burial cemetery sites using the previously described criteria. Figures 4.5 – Figures 4.14 identify these potential natural burial cemetery sites in major cities within Georgia.

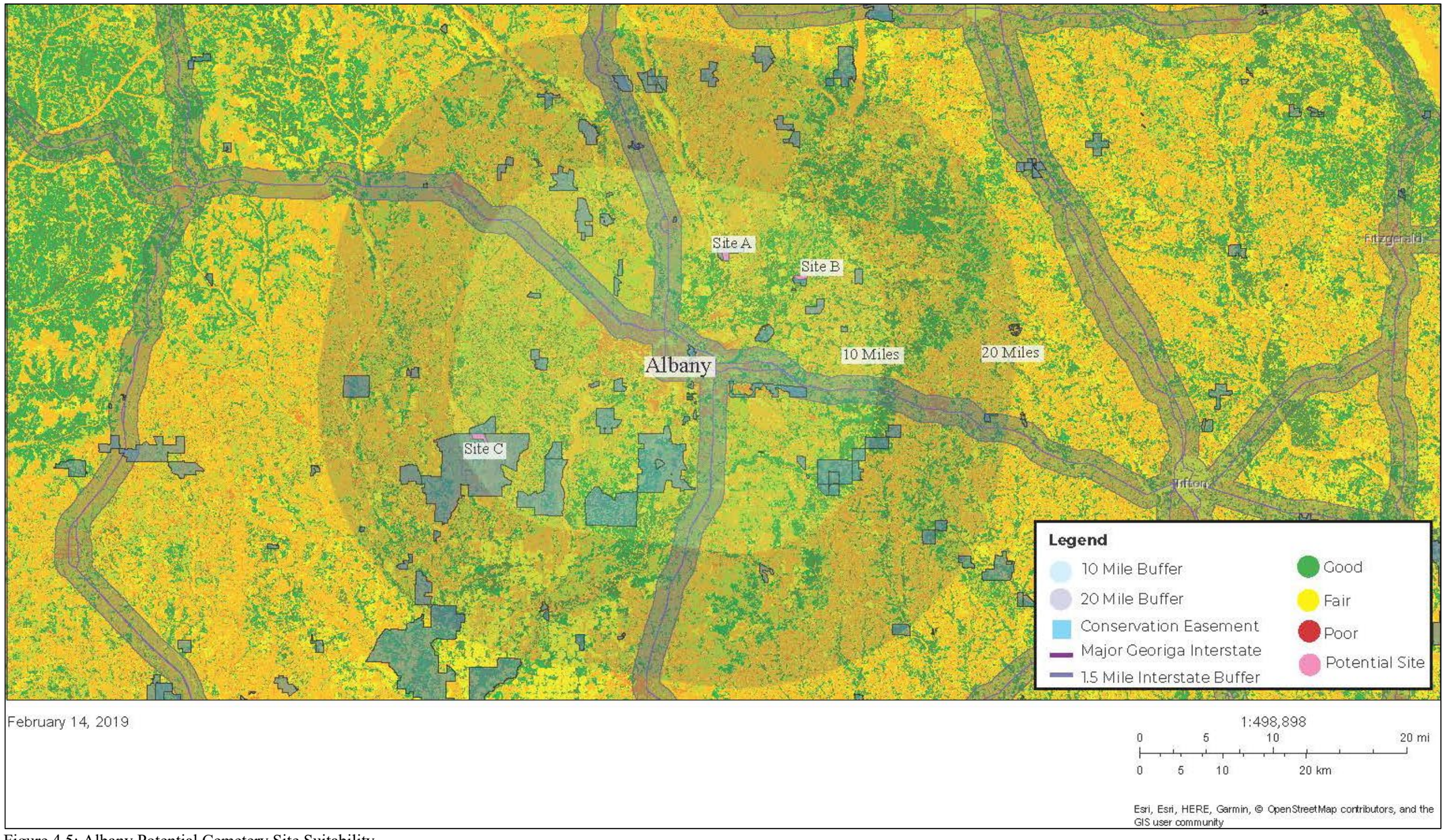


Figure 4.5: Albany Potential Cemetery Site Suitability

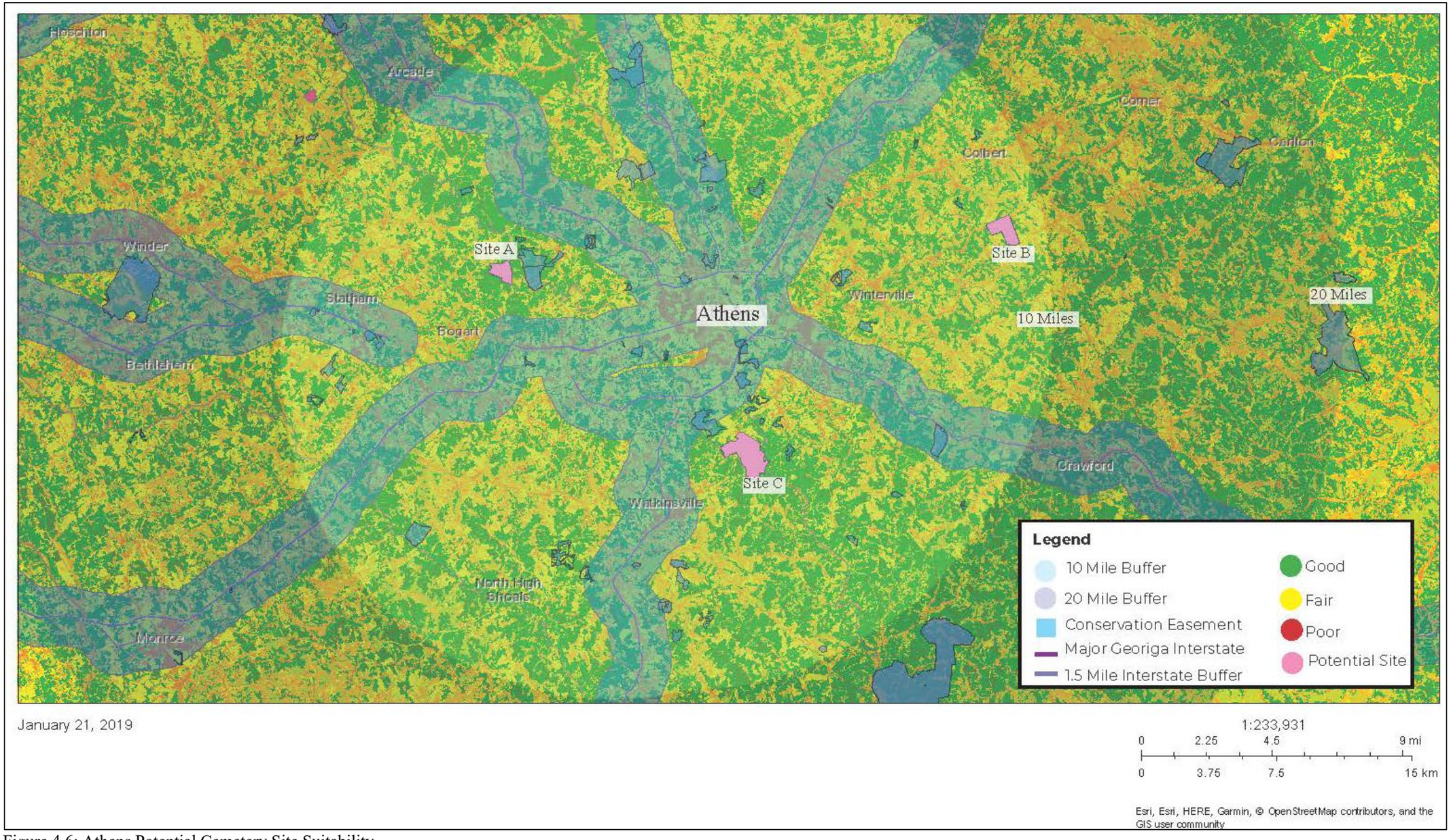


Figure 4.6: Athens Potential Cemetery Site Suitability

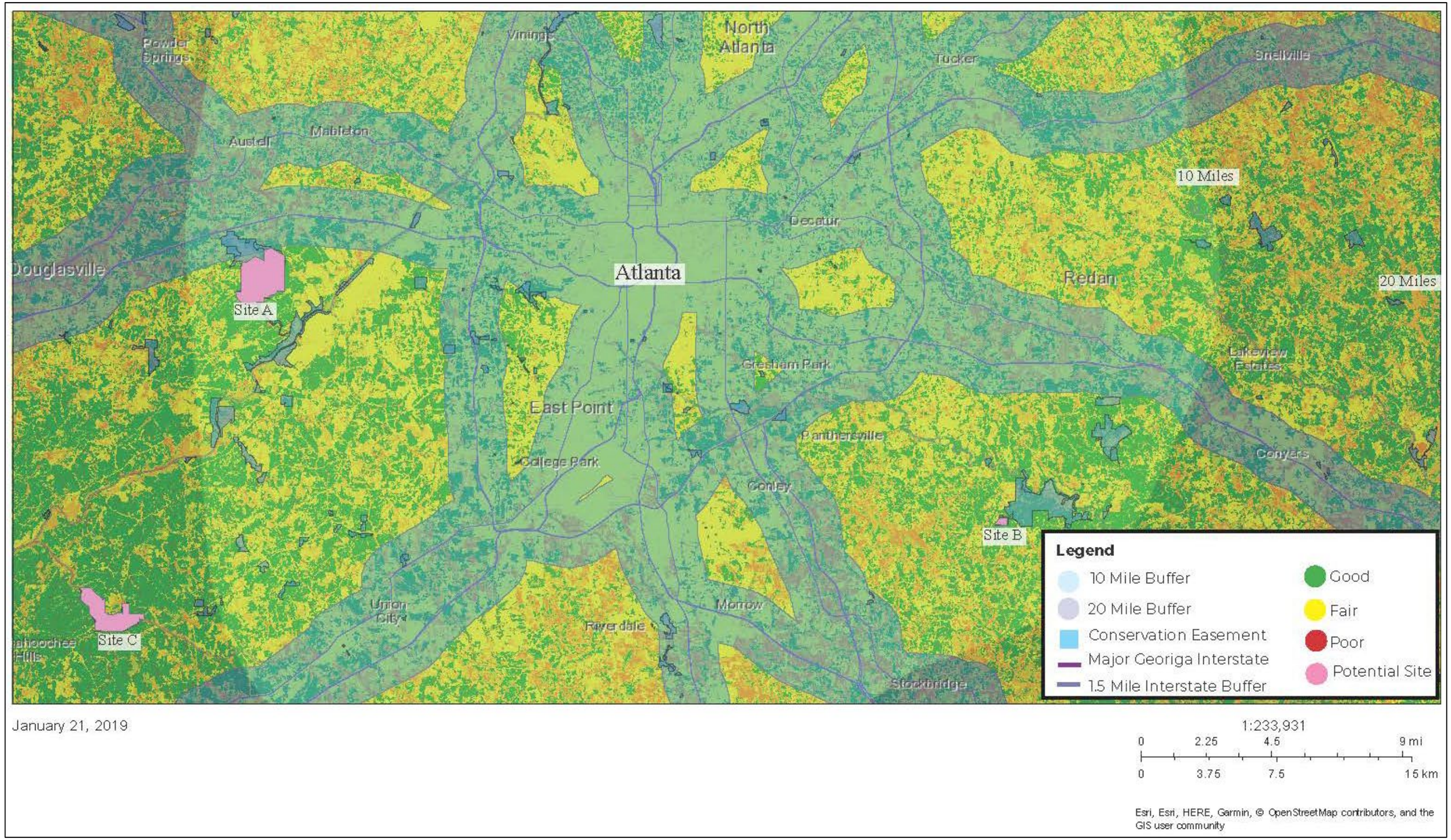


Figure 4.7: Atlanta Potential Cemetery Site Suitability

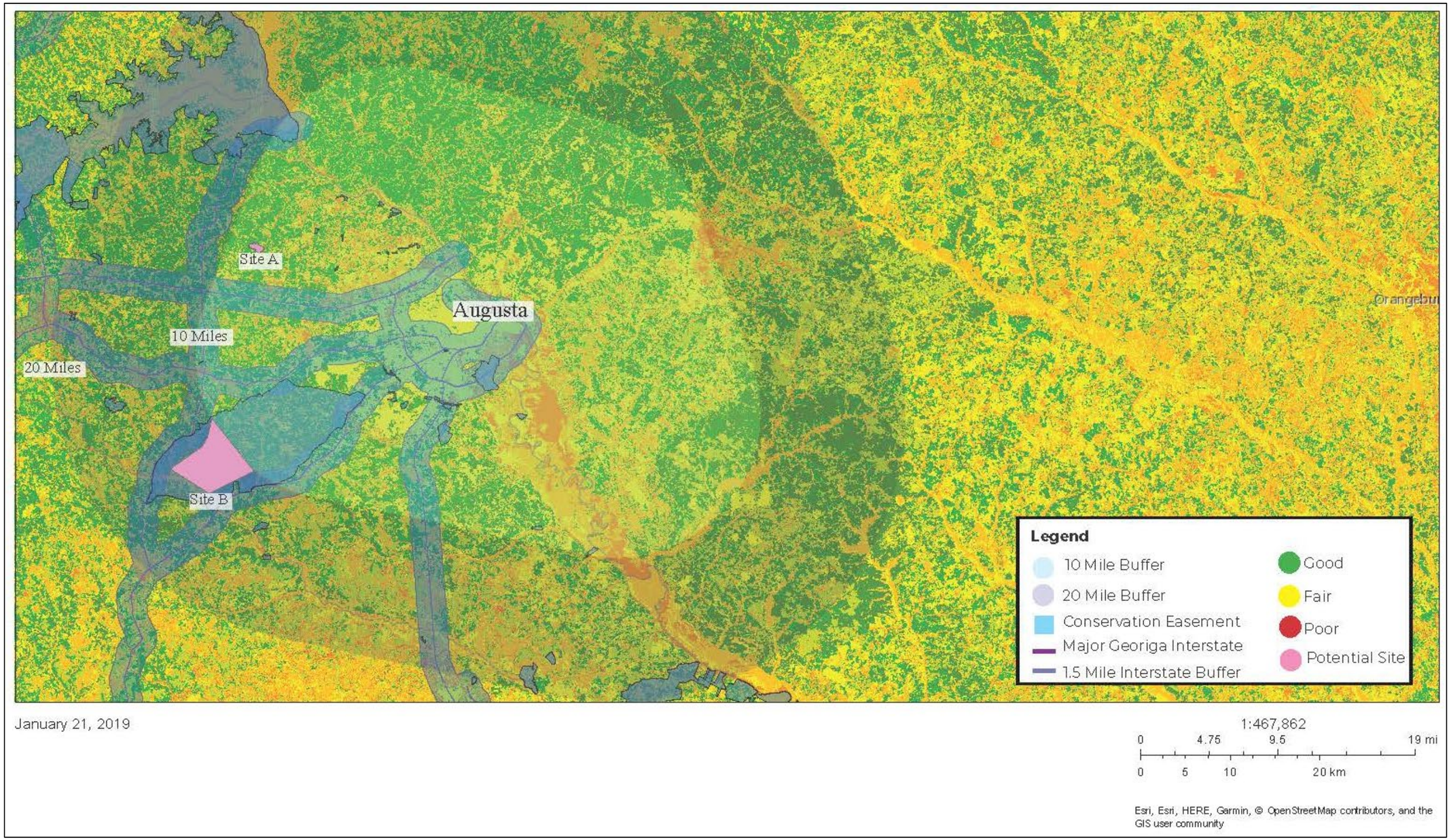


Figure 4.8: Augusta Potential Cemetery Site Suitability

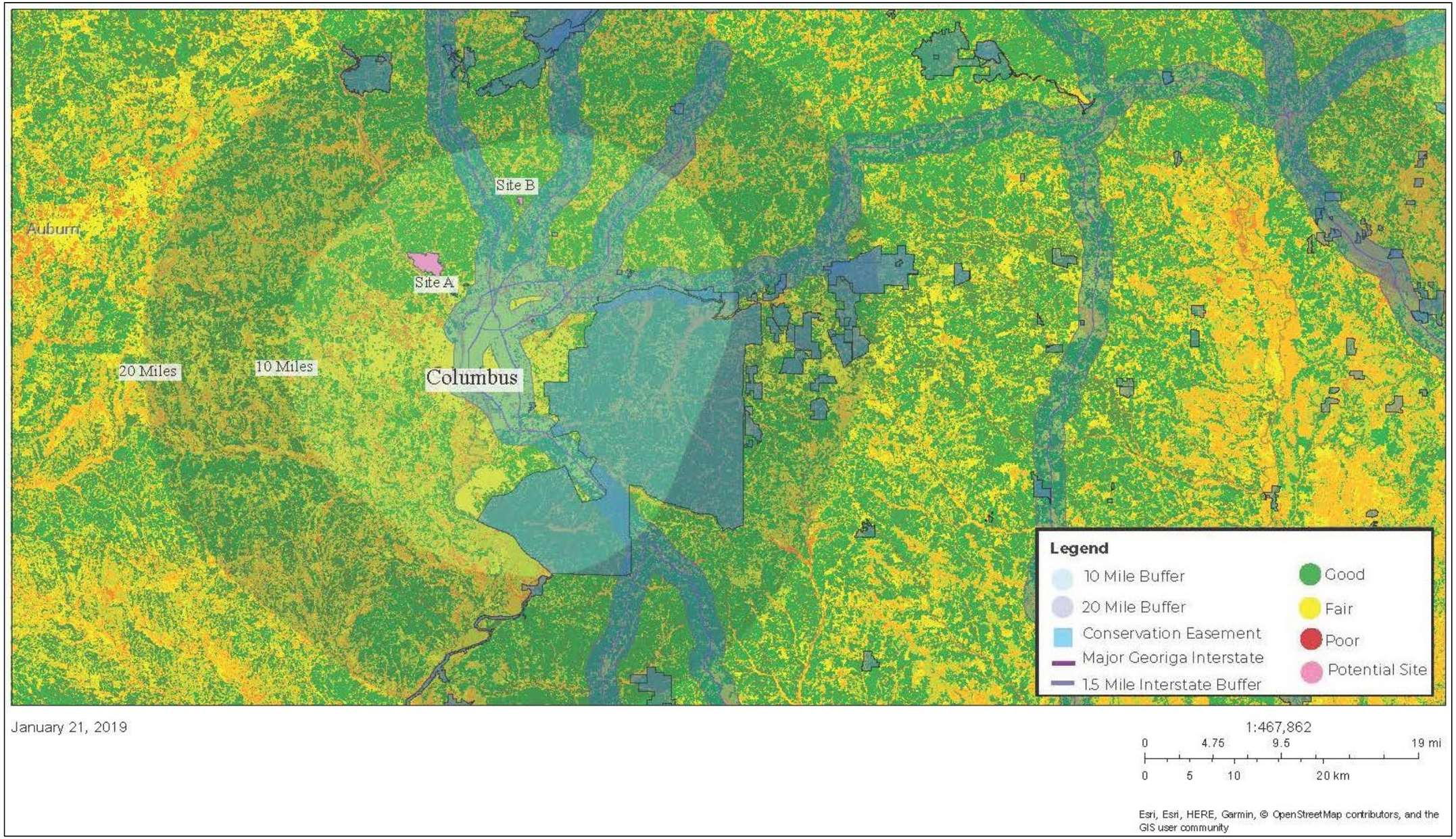


Figure 4.9: Columbus Potential Cemetery Site Suitability

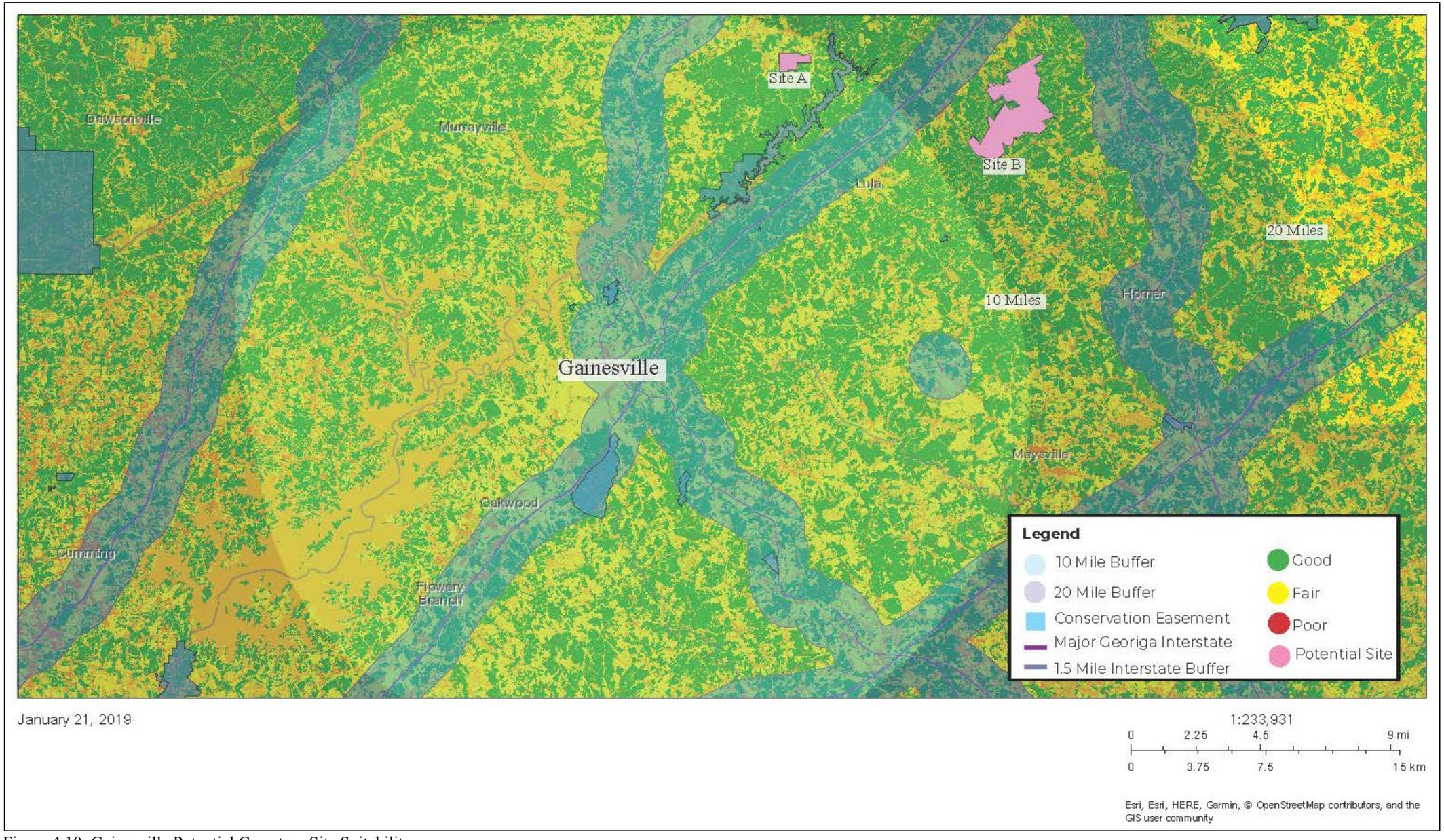


Figure 4.10: Gainesville Potential Cemetery Site Suitability

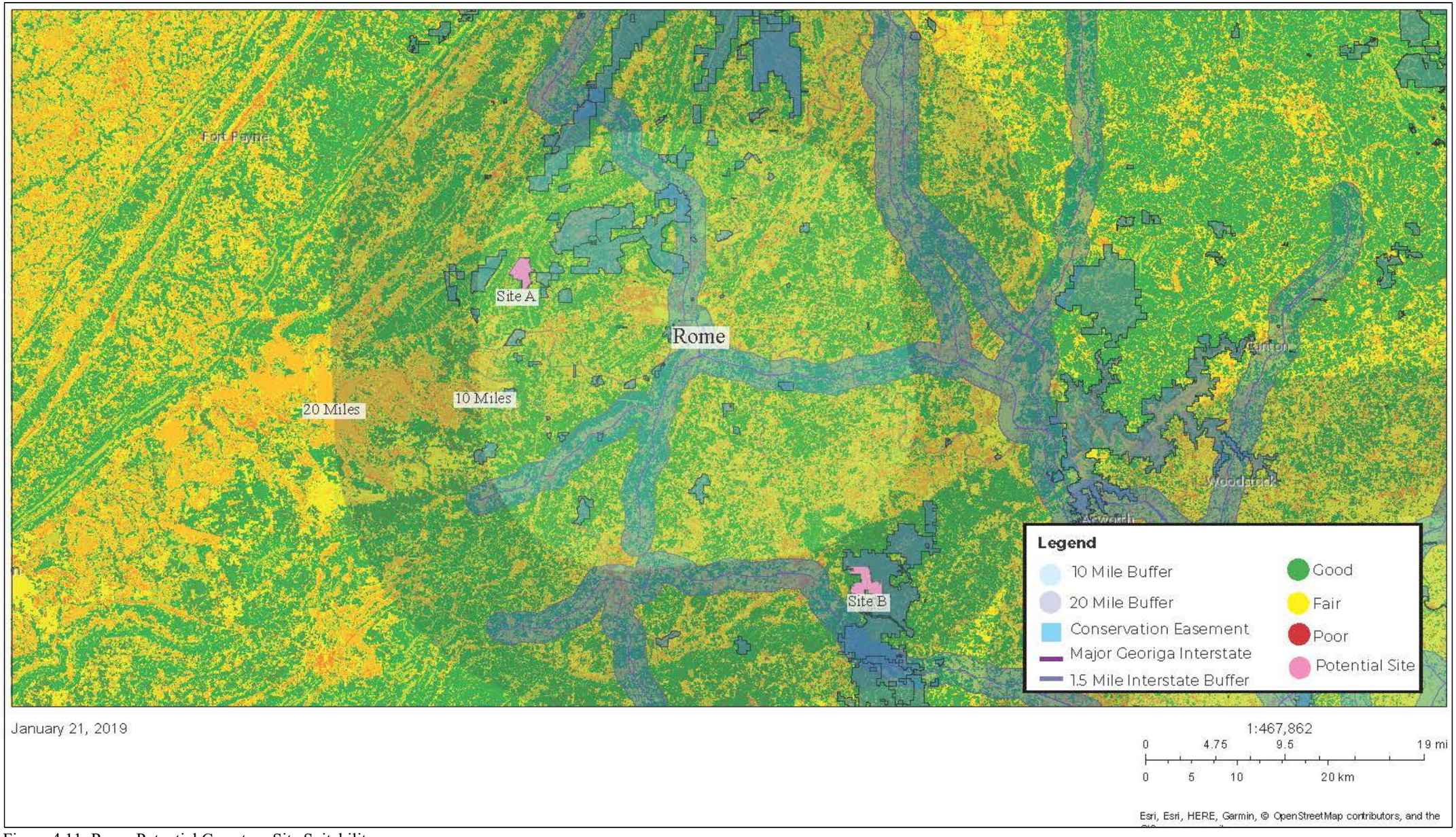


Figure 4.11: Rome Potential Cemetery Site Suitability

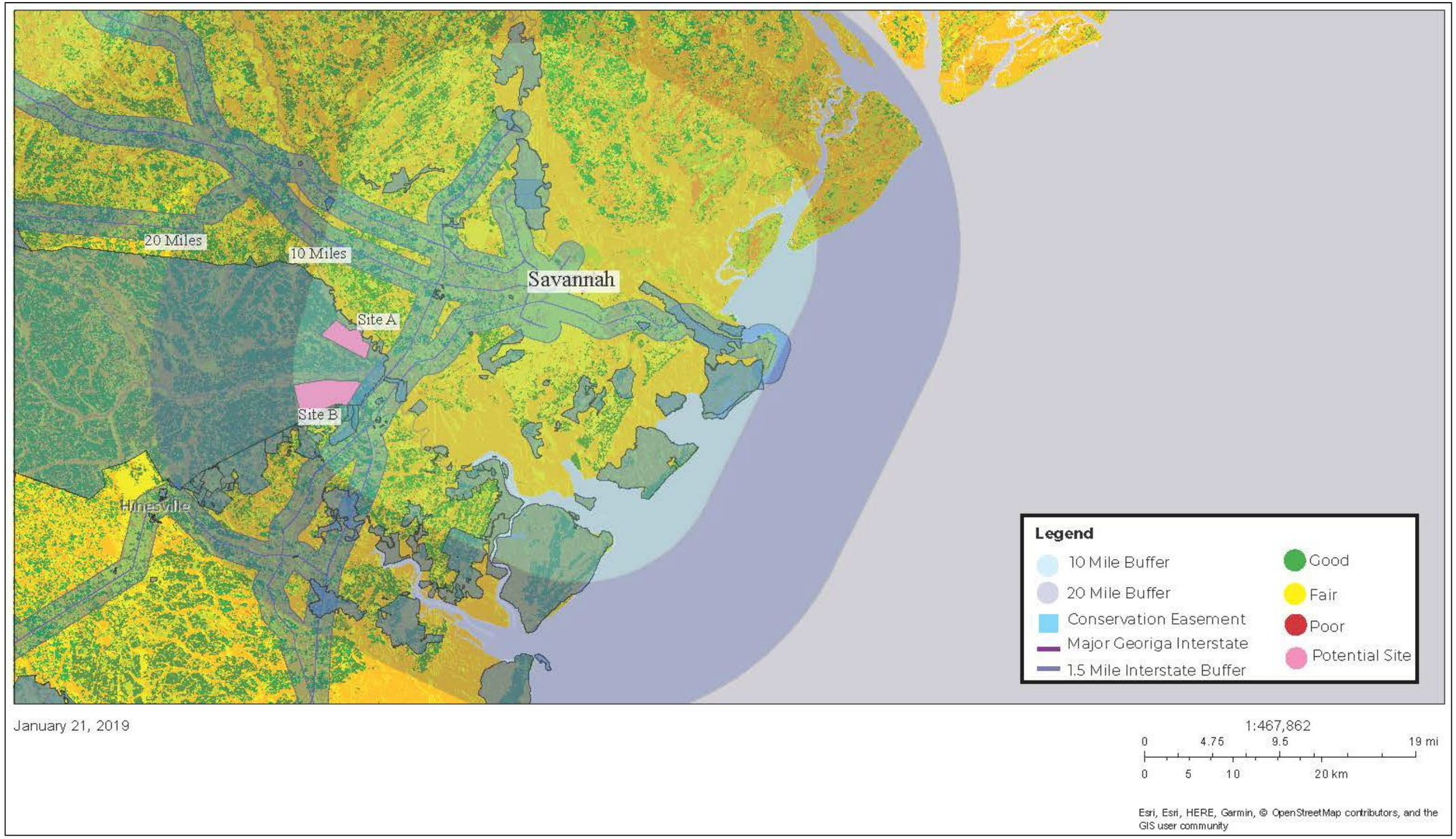


Figure 4.12: Savannah Potential Cemetery Site Suitability

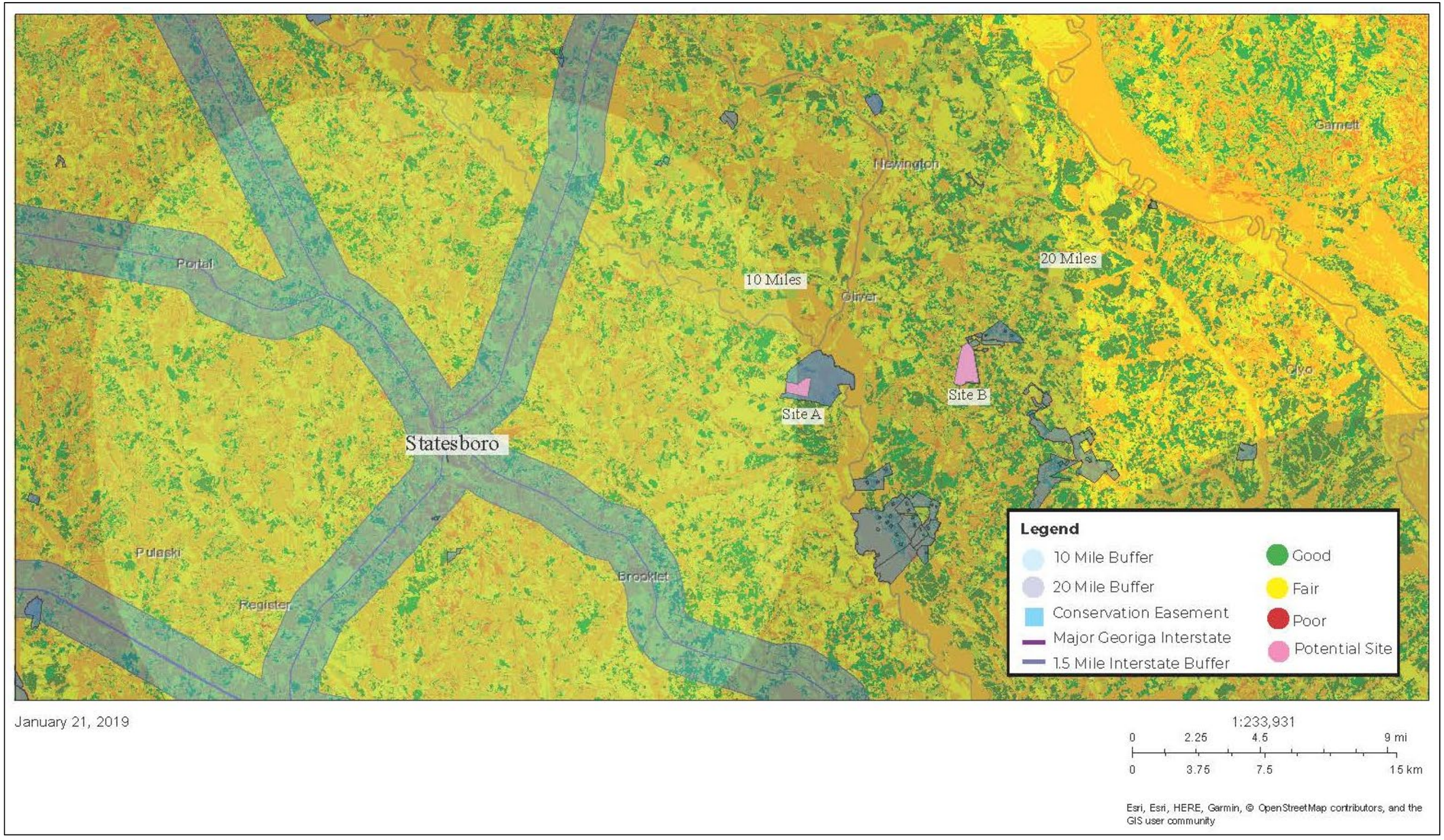


Figure 4.13: Statesboro Potential Cemetery Site Suitability

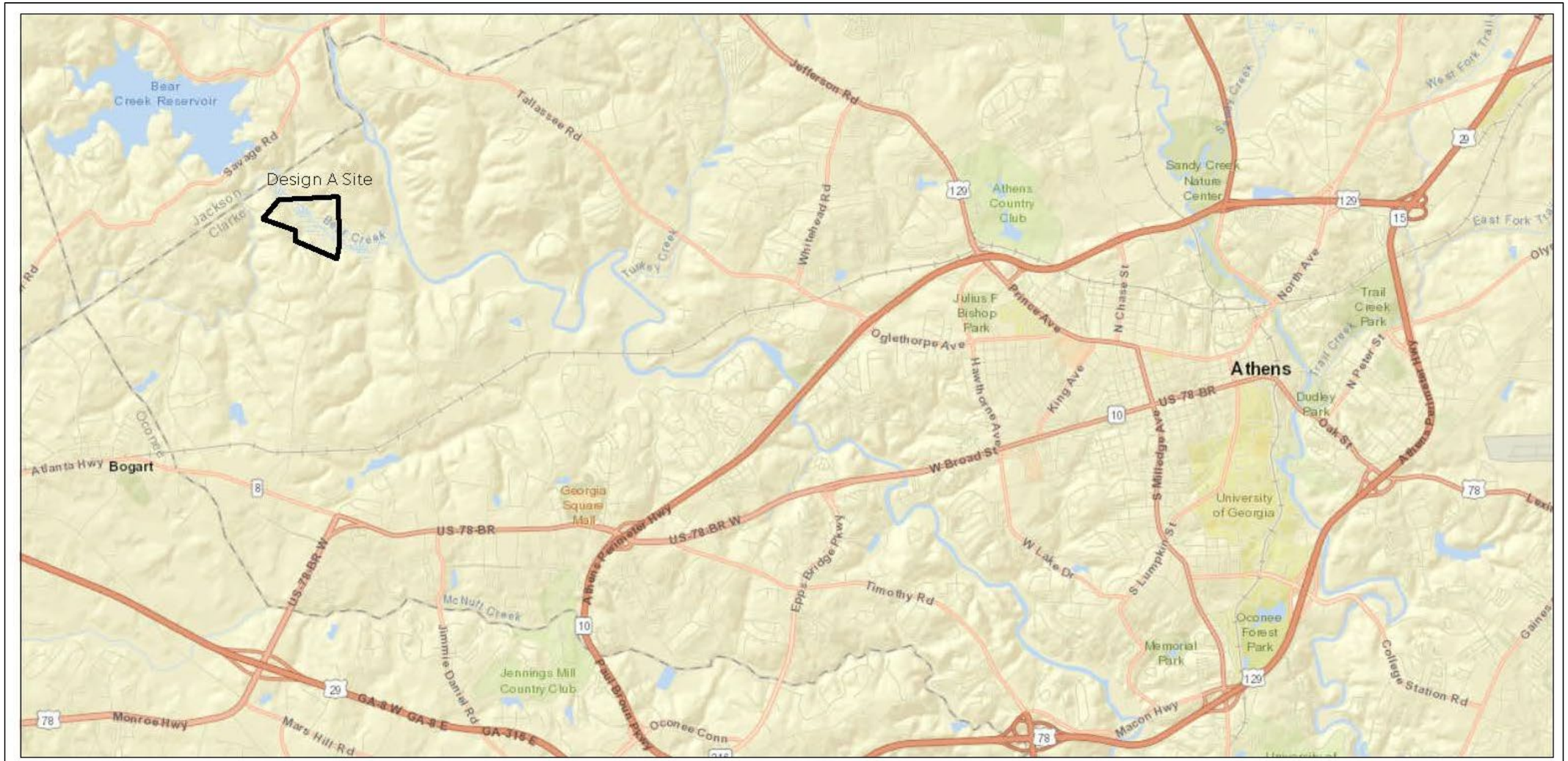
Figure 4.14: Valdosta Potential Cemetery Site Suitability

Sites Chosen for Hypothetical Design Studies

This thesis will prove the feasibility of the proposed design standards on three unique sites with three different land uses. Design A will be implemented on a site which has mature woodland located on an existing conservation easement. Design B will expand the burial grounds of an existing lawn cemetery to the nearby existing woodlands. Design C will convert a farmland site to a natural burial cemetery use. All three designs will use the same proximity analysis. Design A and Design B will use the weighted overlay analysis for mature woodlands, while Design C uses the weighted overlay analysis for existing farmland.

Site Selection- Design A

The chosen site for Design A is located at 120 Big Bear Rd, Athens, GA, which was selected for this thesis because the area is familiar to the author. Figure 4.15 shows the parcel located at 120 Big Bear Rd within the Athens context. The Athens Land Trust holds a conservation easement on this property. Unfortunately, the author was unable to gain access to the site. However, USGS NLCD 2011 maps derived from satellite data provided insight on the existing land cover of the site. Each pixel, shown in Figure 4.16, represents a determined land cover based on the satellite imagery. This data showed a woody wetland running northwest to southeast dividing the parcel into two areas. The western area is approximately 32.9 acres, while the eastern area is approximately 25.1 acres. According to the USGS NLCD 2011, the western area contains all deciduous forest, while the eastern area has mostly deciduous forest, some evergreen forest, and a little mixed forest. Additionally, a portion of the eastern area, adjacent to the woody wetland contains some shrub/scrub land cover (U.S. Geological Survey 2014).



February 14, 2019

1:58,483

0 0.5 1 2 mi

0 0.75 1.5 3 km

Figure 4.15: Site Context for 120 Big Bear Road

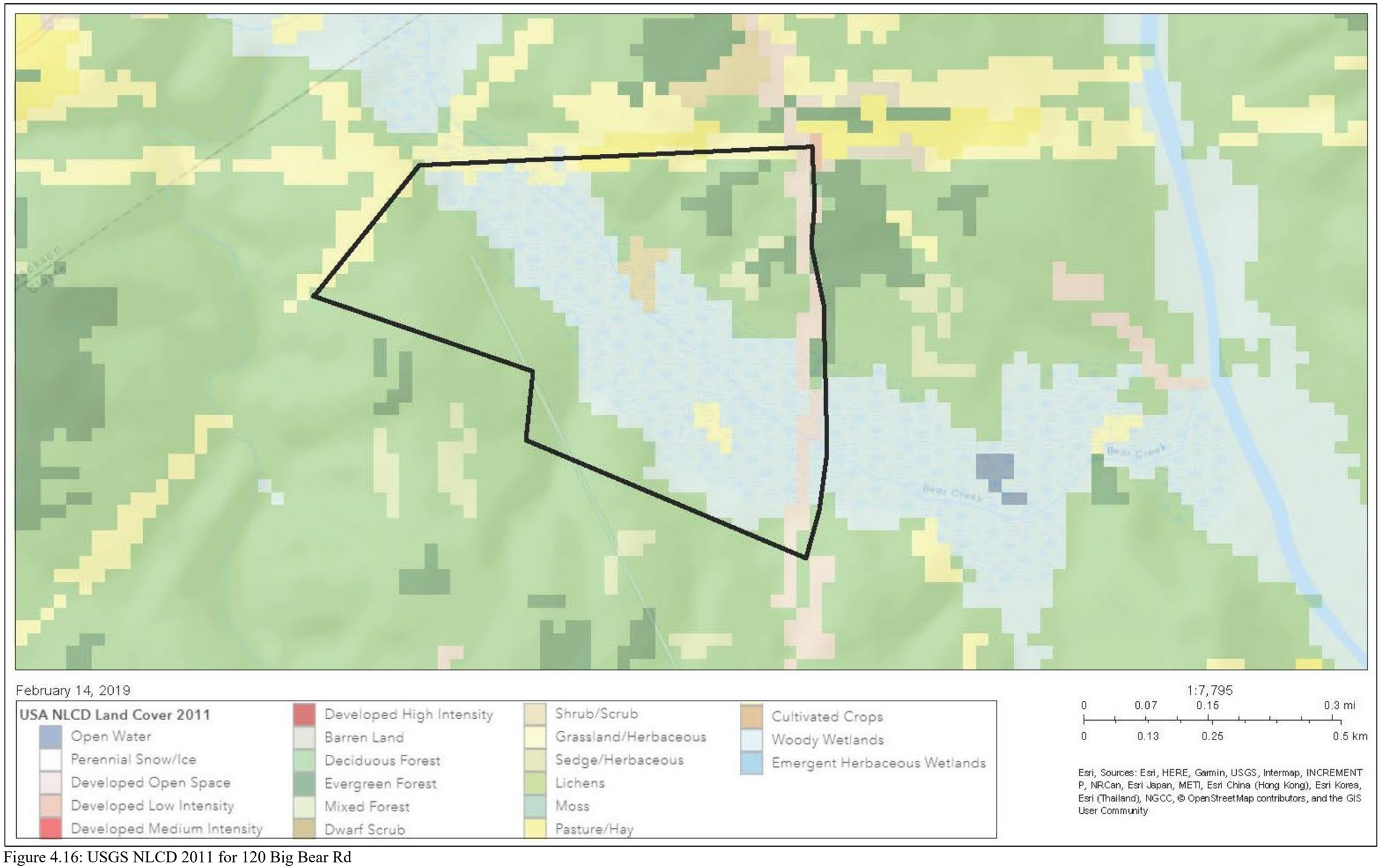


Figure 4.16: USGS NLCD 2011 for 120 Big Bear Rd

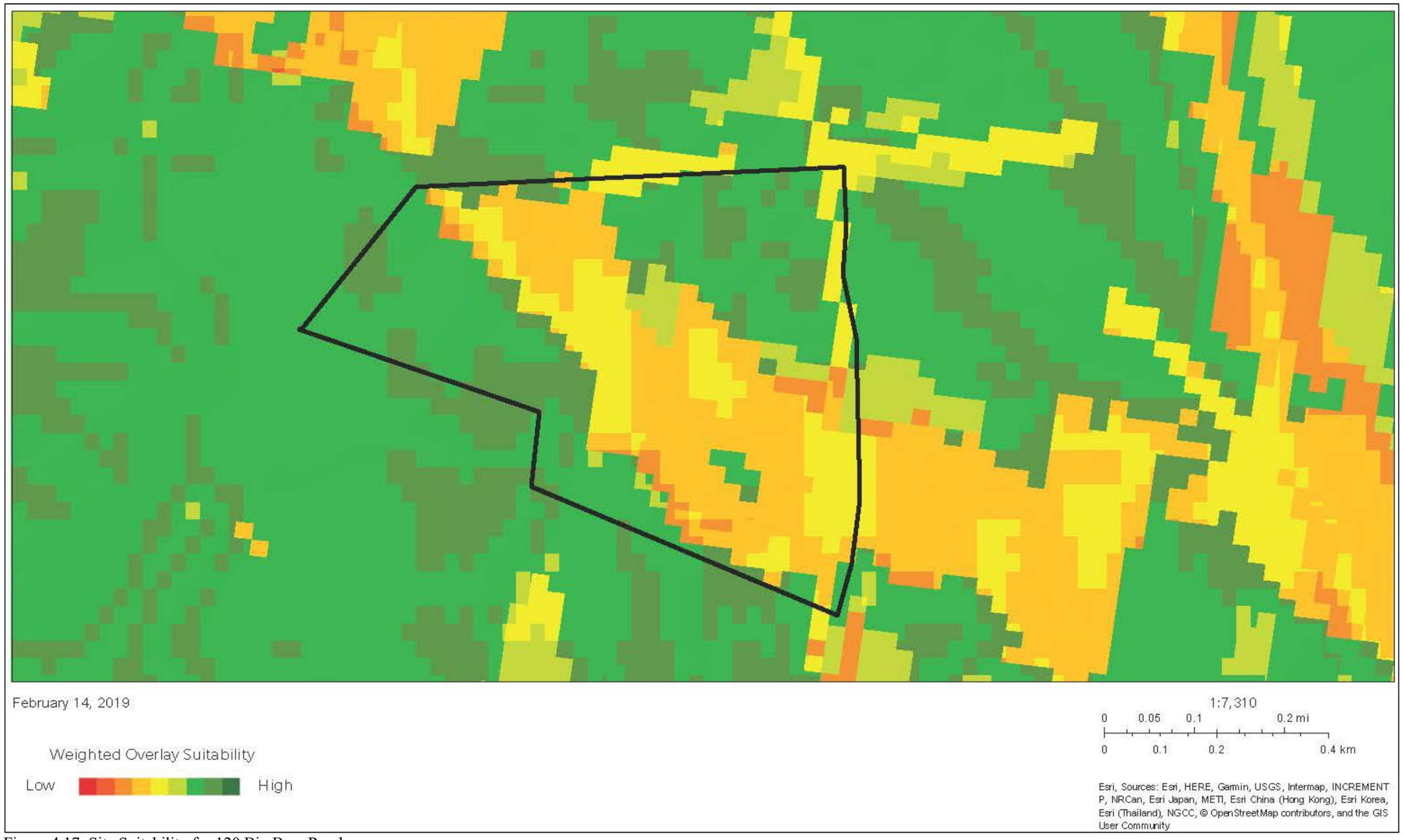


Figure 4.17: Site Suitability for 120 Big Bear Road

The weighted overlay analysis for a woodland environment shown in Figure 4.17 reveals the east and west portions of the site are highly suitable, while the central portion of the site is highly unsuitable for a natural burial cemetery due to the woody wetlands. Figure 4.18 reveals that the western side has a higher suitability than the eastern side. The west has 98% high suitability while the eastern has 87% high suitability. This suggests that both areas are appropriate, suitable choices for a natural burial cemetery. Big Bear Rd currently connects to the entire parcel on the western 32.9 acre portion of the site which makes the western portion more accessible and therefore, the best choice to start the cemetery here than the eastern side. In the developed design, the eastern 25.1 acre area is set aside for future expansion of the cemetery when more burial space is needed.

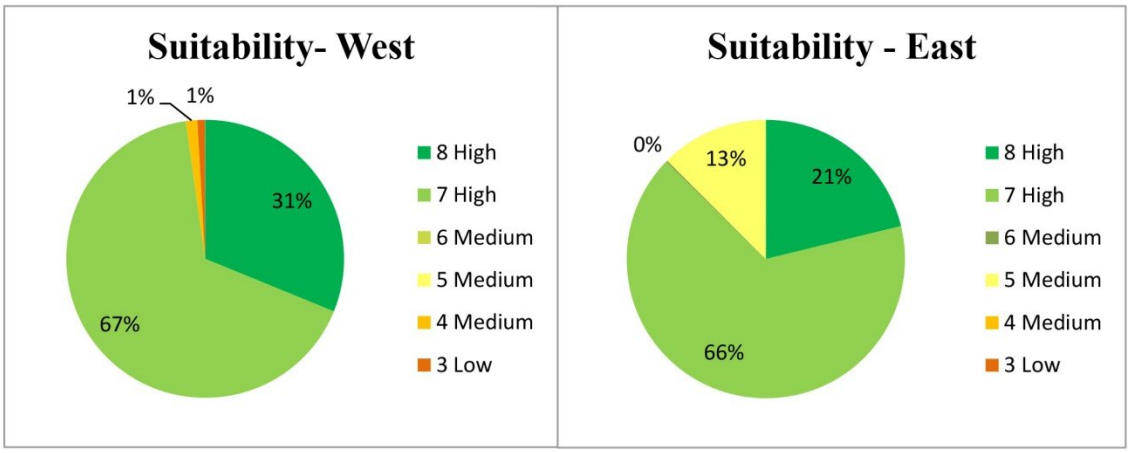


Figure 4.18: Site Suitability Design A

Site Selection- Design B

Next, the site for Design B will be implemented on a site that currently is a traditional lawn cemetery but will be expanded using the proposed design standards for natural burial. To select this site, the proximity analysis and weighted overlay analysis for

woodland environments were used. The identified site for Design B is located at Jackson Memorial Park in Commerce, GA.

This site is an existing cemetery which only offers traditional lawn burial, and it fits the desirable site selection criteria. This site is located in the same familiar region as the site for Design A. It is located within 20 miles from Athens, GA and Gainesville, GA which for this purpose are both considered major Georgia cities. Figure 4.19 shows Jackson Memorial Park located within the Athens context. Jackson Memorial Park is a 20.2 acres parcel. 7.3 acres of the site is currently used as traditional lawn burial, while 12.9 acres of the site is undeveloped deciduous forest, according to USGS NLCD 2011 (U.S. Geological Survey 2014). Figure 4.20 displays the land cover of the Jackson Memorial Park parcel based on satellite imagery. This data clearly shows 12.9 acres deciduous forest on the northwestern portion of the site and 7.3 acres of pasture/hay to the southeast which is the location of the existing cemetery.

The weighted overlay analysis shown in Figure 4.21 uses the same parameters used for Design A. This analysis reveals the undeveloped deciduous forest is highly suitable for natural burial. Figure 4.22 reveals the weighted overlay suitability for the wooded portion of the site.

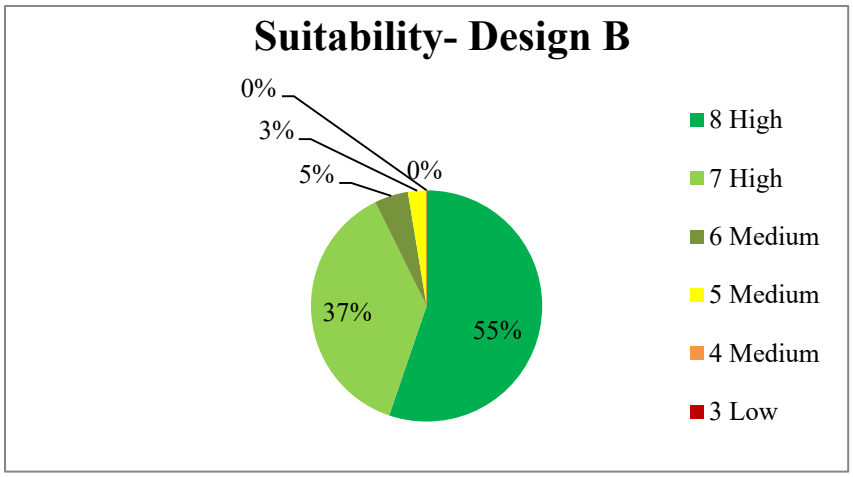


Figure 4.22: Site Suitability for Design B

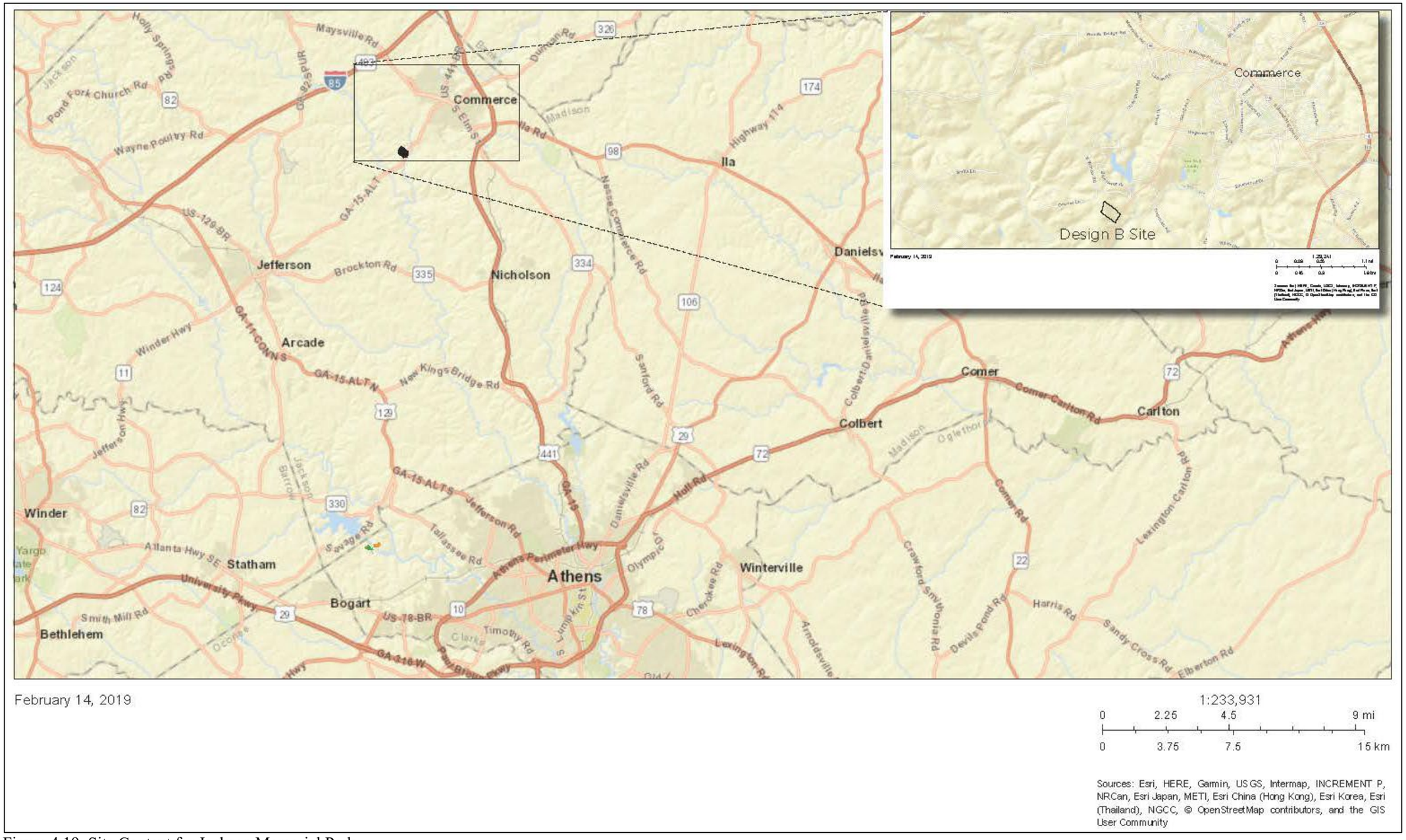


Figure 4.19: Site Context for Jackson Memorial Park

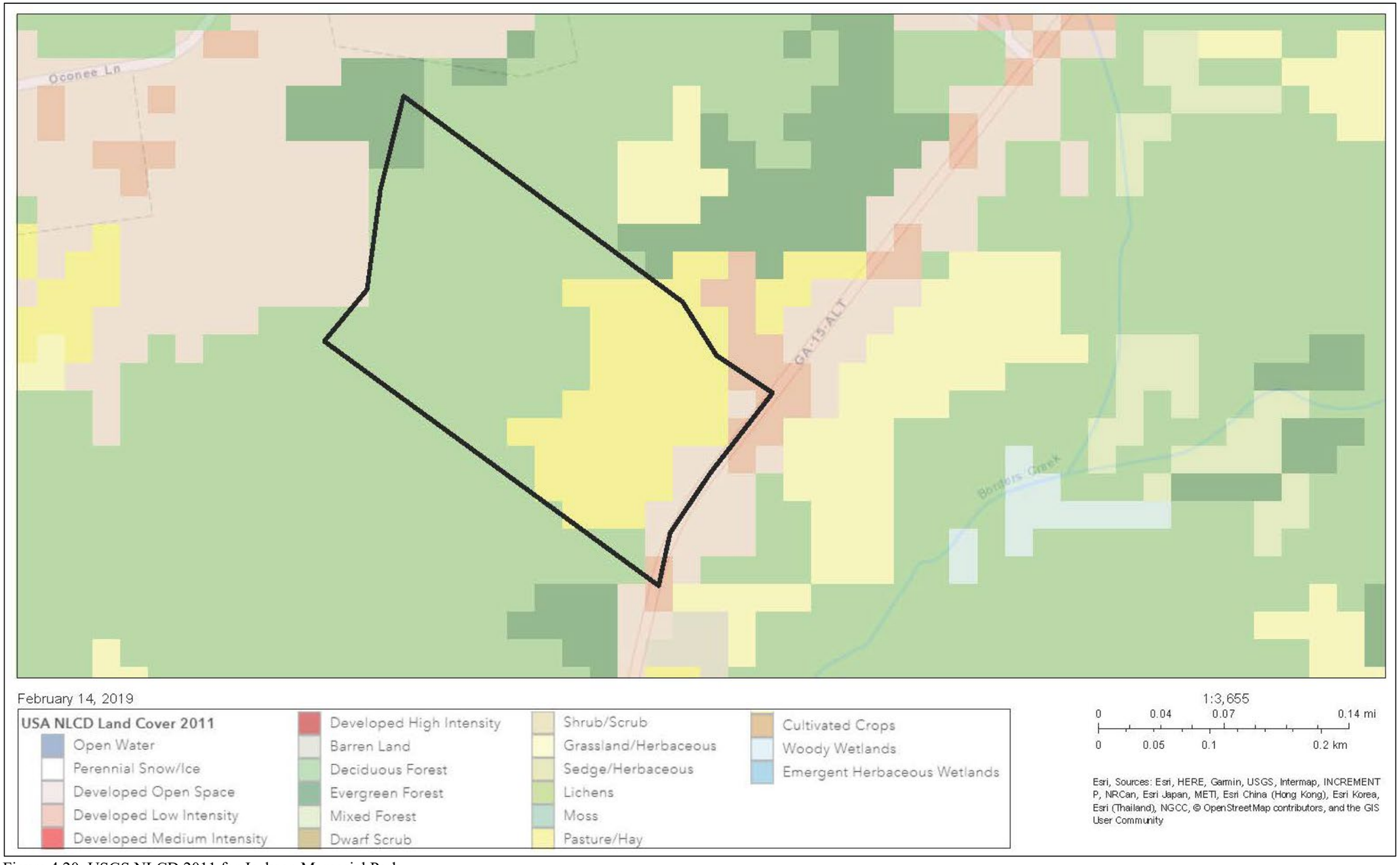


Figure 4.20: USGS NLCD 2011 for Jackson Memorial Park

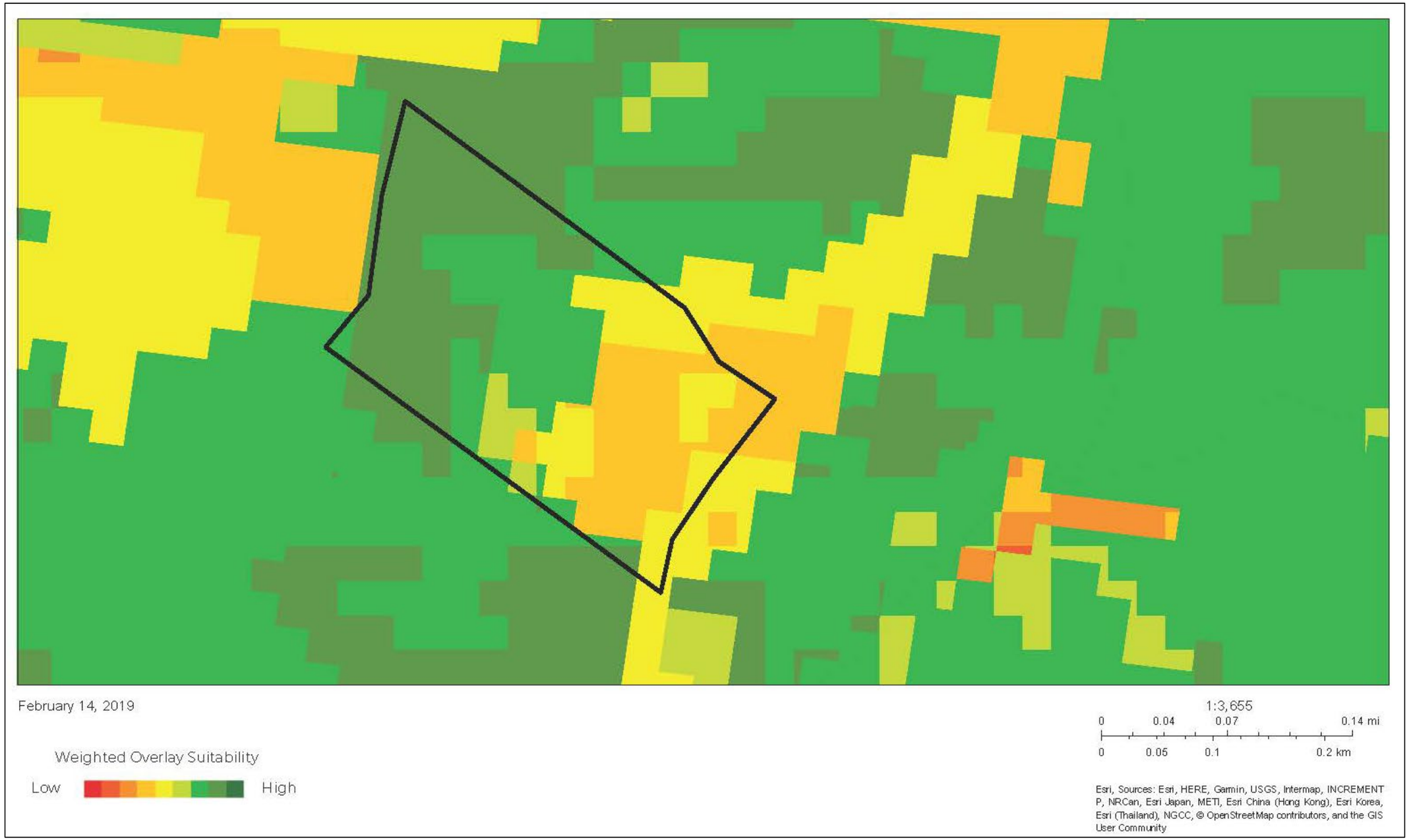


Figure 4.21: Weighted Overlay for Jackson Memorial Park

Site Selection- Design C

Lastly, Design C will be implemented on a site which is presently used as farmland, but for the hypothetical design purpose will be converted over time into a woodland natural burial environment. To select this site, the proximity analysis and weighted overlay analysis for farmland was used. The site identified for Design C is located at 1145 W H Hayes Road in Winder, GA. This site is an 82.6 acres parcel located within 20 miles from Athens, GA. It is currently used as a pasture for grazing animals. Figure 4.23 shows this farmland located within the Athens, GA context. According to the USGS NLCD 2011, approximately 52.5 acres of the site is pasture/hay, shown in Figure 4.24 (U.S. Geological Survey 2014). About 19.75 acres of the site consists of deciduous forest. The remainder of the site consists of about 5.82 acres of grassland/herbaceous, while roughly 4.53 acres is developed open space.

The weighted overlay analysis for farmland reveals this parcel moderately suitable for a site to test the proposed design standards. This weighted overlay analysis on the site, shown in Figure 4.25, reveals a peculiarly linear portion of the site rated medium suitability running directly from Geiger Rd to the existing house. Since the USGS NLCD 2011 data reveals this same piece of land is pasture/hay, this thesis is going to assume the weighted overlay analysis is using slightly out of date data when other land cover, such as a former drive or other unsuitable land cover, previously existed (U.S. Geological Survey 2014). With this in mind, the site suitability, shown in Figure 4.26, reveals the farmland site is still fairly suitable to convert into burial site.

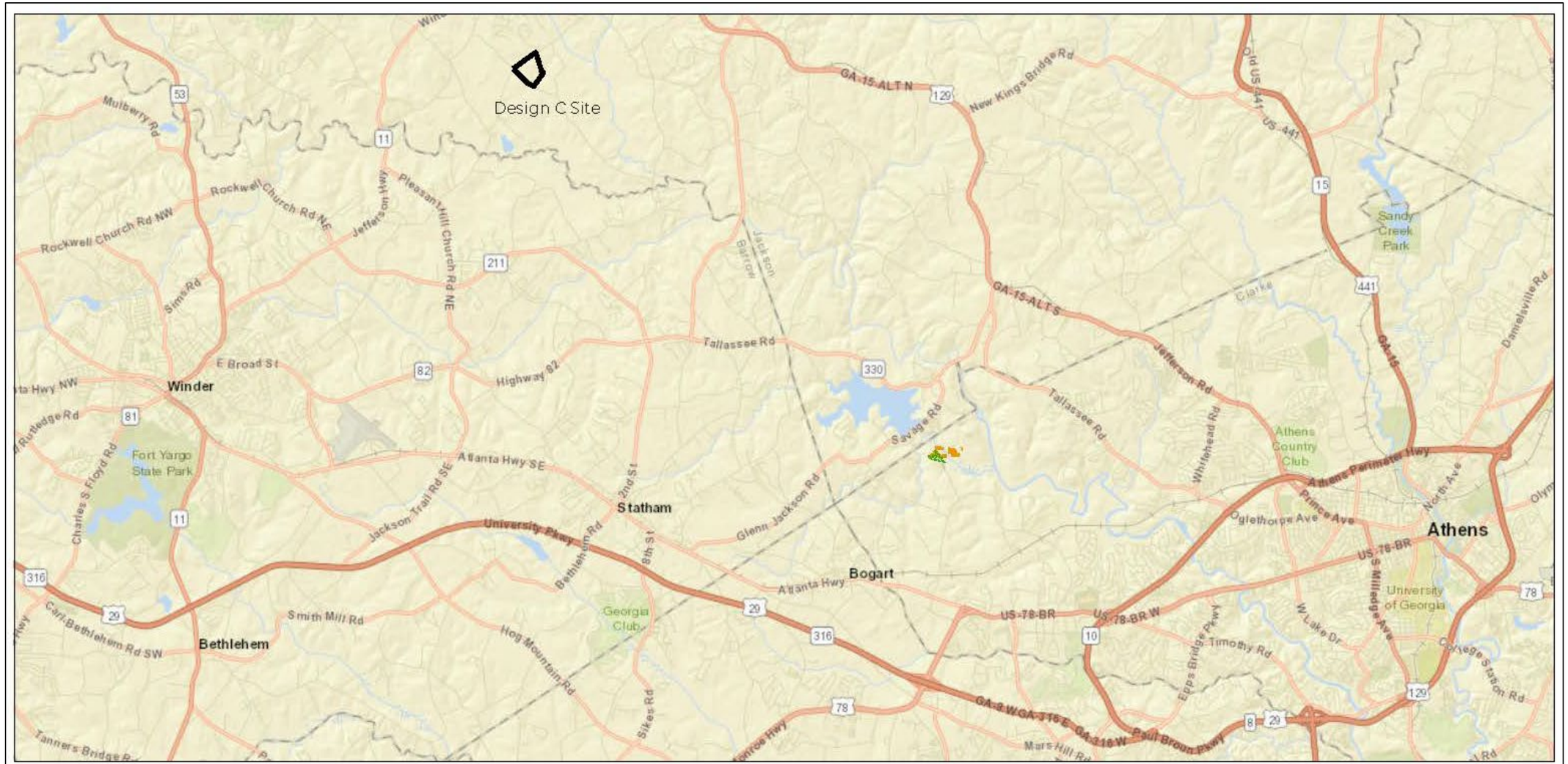


Figure 4.23 Site Context Map for Design C

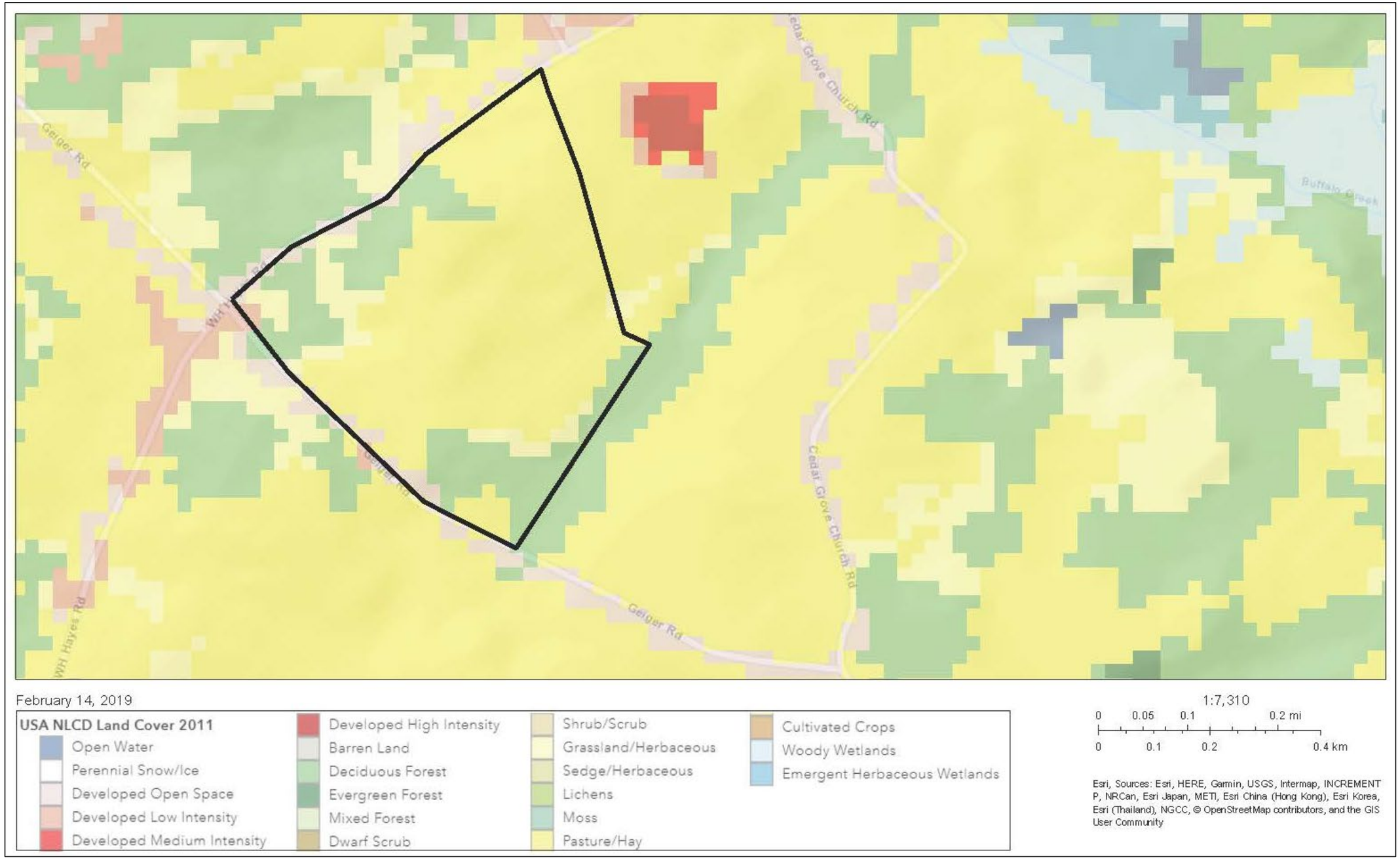


Figure 4.24 USGS NLCD 2011 for Design C

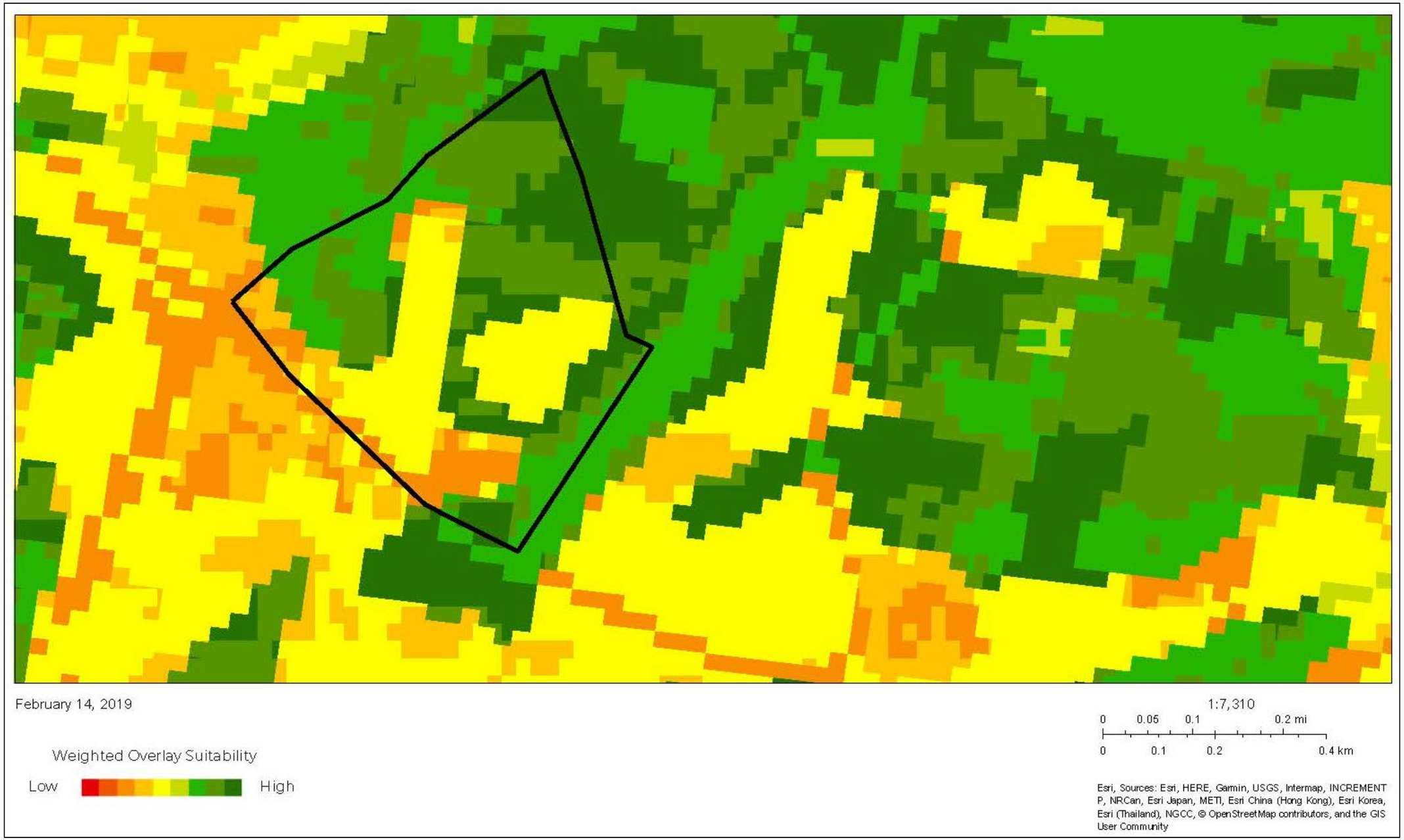


Figure 4.25: Weighted Overlay for Design C

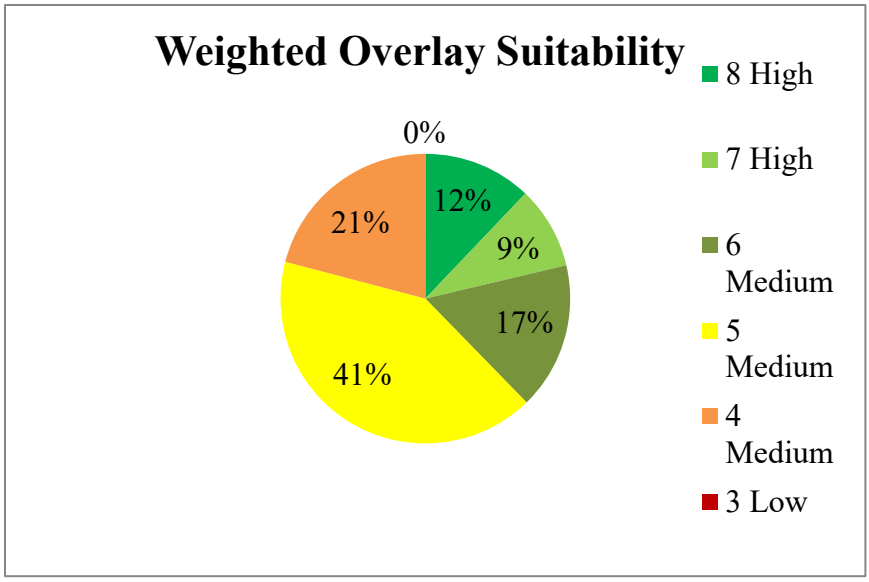


Figure 4.26: Site Suitability for Design C

CHAPTER 5

NATURAL BURIAL DESIGN STANDARDS

In this chapter, the natural burial cemetery design standards for ecosystem services will be identified in a series of Tables. These proposed standards were created based on case studying findings, interviews, and existing literature review. Each table is grouped by theme or proximity in a cemetery. Table 5.1 describes the standards for arrival. Table 5.2 describes the standards for cemetery facilities and operations. Following each table, there is a description of how the standards would be implemented in a cemetery. Table 5.3 describes the standards for elements found within the burial grounds. Table 5.5 describes the standards for visitor experience.

Standards for Arrival

Table 5.1: Standards for Arrival

Design Element	**Description**
Boundary Definition	- The property boundary should be clearly defined to designate the point of transition from everyday world to the sacred space (Rugg 2000) - The marked boundary should prevent trespassers and people mistakenly wandering onto the cemetery property after hours (Whittaker 2018) - The boundary can be defined by a modest fence of local materials, a native hedge planting, or a combination of these options (Whittaker 2018, Bell 2018, Rugg 2000)
Cemetery Entrance	- The entrance should signify a point of arrival to the cemetery - Entrance signage should clearly display the name of the cemetery - Landscape plantings should be consistent with the native ecology of the surrounding area and should not disrupt the visibility of signage - Modest decoration and ornamentation at the entrance and

	throughout the cemetery is important to be consistent with the desired aesthetic of natural burial
Main Drive	- The main drive should be 20' wide, which is appropriate to comfortably accommodate traffic on site - When entering the cemetery, the main drive should be treated as a transitional space from the everyday world to the sacred, contemplative burial ground (Rugg 2000) - To mark this transitional zone, it is recommended to plant two specimen trees at the beginning and end of the drive. - The main drive should be aligned on axis with an important focal point such as a chapel, reception hall, or memorial space (Watts 2018) - The main drive's turnaround in front of the chapel should provide enough turn radius for a funeral hearse or a horse and carriage to easily complete a U-turn (Watts 2018)

A clear, strong transition from the commotion of everyday lives to the peaceful, sacredness of the burial ground is necessary when entering this space. The arrival should mentally prepare the visitors about the revered place they are entering. Natural burial cemeteries have a modest aesthetic with little ornamentation, and the arrival should reflect that idea to the visitors. The property boundary must be defined to identify the cemetery as a special place but also to prevent people from accidentally wandering onto the property. Some examples of suitable boundaries include simple wooden fences, modest stone walls constructed from local materials, and hedge plantings. A combination of these options is also acceptable. Vegetation along the property boundary should seamlessly blend into vegetation from the adjacent properties. At the entrance, a sign displaying the name of the cemetery should be clearly visible, but not in an ostentatious style.

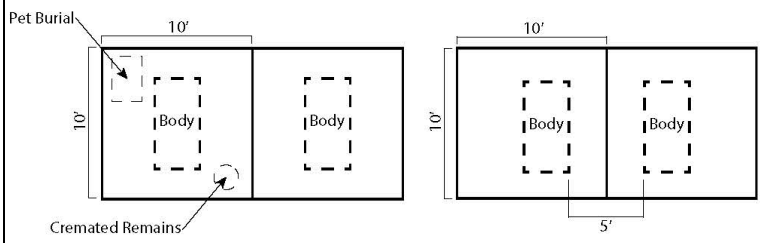
As the visitor enters the property via the main drive, two specimens of deciduous, native trees border the edge of the road buffering the road from the native vegetation

behind and announcing the arrival into the sacred space. At the end of the drive past two more specimen trees, the chapel is visible in a forest clearing.

Standards for Cemetery Facilities and Operations

Table 5.2 Standards for Cemetery Facilities and Operations

Design Element	**Description**
Building Structures	- All structures on site should be built in a vernacular style with local materials - A non-denominational chapel may be located at the terminus of the main drive to allow funeral services for people of all faiths (Watts 2018) - A reception hall should be located in close proximity to the chapel, either attached or in a detached building nearby (Watts 2018) - Visitor restrooms are located in the reception hall (Watts 2018) - The main office should be located in a detached building near the reception hall and chapel or directly attached to the chapel and reception hall (Watts 2018, Whittaker 2018) - Storage facilities for all maintenance equipment and tools necessary for a burial should be located in an accessible area that is out of sight from visitors (Watts 2018, Whittaker 2018)
Visitor Parking	- Main visitor parking should accommodate enough vehicles for a typical funeral. Approximately 75 parking spots are recommended in the main visitor parking lot. (Whittaker 2018, Watts 2018) - Visitor parking should be located in close proximity to the chapel and reception hall. Overflow parking for funerals is allowed along the main drive (Watts 2018) - The visitor parking surface should not be paved, but instead should be kept mowed and clear of debris (Watts 2018, Bell 2018, Whittaker 2018)
Wayfinding	- Wayfinding signage with the names of each prominent destination should be displayed at all points of entry to the property, near all building structures, at cemetery road intersections, and at the boundary of each burial area. - Signage should be in a style which complements the architecture of the building structures. - Prominent destinations requiring wayfinding include

	visitor parking, chapel, reception hall, burial areas, and main office (Whittaker 2018) - Within each burial area, trail blazes, approximately 2”x6”, should be periodically hung on trees at about eye level to be visible from walking trails. Sequential trail blazes should be hung within line of sight of the blaze before and after it. (Whittaker 2018, Menke 1996) - Vegetation must be maintained to avoid disrupting visibility of the blaze
Secondary Road	- A secondary road, at least 8’ wide, is permitted within the burial grounds if the property is larger than 30 acres (Whittaker 2018) - The secondary road may be either paved or surfaced with gravel
Graveside Parking	- If the cemetery is large enough to have a secondary road, parking is allowed along the shoulder of the road or at designated parking lots within the burial grounds (Whittaker 2018)
Burial Plot	- Each burial plot should be a 10’ x 10’ square (Whittaker 2018, Watts 2018, Bell 2018) - One burial may contain at most one body, one cremated remains of an additional family member, and one small pet such as a cat or dog (Watts 2018) - Shown in Figure 5.1, bodies of family members are allowed to be buried within 5’ of each other but must use separate plots. Unrelated people should be buried at least 10’ away (Watts 2018) - Burial density of 100-125 bodies per acre is recommended where the terrain allows (Whittaker 2018) - Burial plots should be arranged in a regular pattern (Watts 2018, Bell 2018) and recorded with GPS coordinates (Whittaker 2018, Webster 2015)  Figure 5.1: Unrelated burial plot arrangement (left) and related burial plot arrangement (right)

Walking Paths	- Gravel walking paths should be 5’ in width with a 5’ buffer on either side. No burials are permitted within the 5’ buffer (Watts 2018). - Dirt or mown paths should be 3’ in width with a 5’ buffer on either side (Watts 2018) - All paths should be clear of debris and all tripping hazards (Whittaker 2018)
Burial Practices	- Graves must be dug by hand since heavy machine equipment has the potential to be accidentally destructive traveling through the burial grounds (Whittaker 2018) - Graves should be 3’-4’ deep. This soil depth contains essential organic material and oxygen flow which is optimal for the decomposition of the body (Webster 2016) - After burial, the excavated soil should be mounded on top of the burial site, approximately 2’-3’ high, instead of leveled. The mound denotes newer graves to visitors and solves the issue of constantly refilling leveled graves that settle. Over a period of about three years, the mound will erode and become level with the ground around it (Whittaker 2018, Watts 2018)

Built in a vernacular style from local materials, a focal cemetery chapel located at the end of the main drive increases the sense of arrival for arriving visitors. Allowing people of all faiths to hold funeral services in this building strengthens the idea of inclusiveness and openness to all who visit the cemetery. Togetherness and remembering the life of the deceased is an important part of the bereavement process. A reception hall, located in the same building as the chapel or in an adjacent building, offers a space for family and friends to mourn the death of their loved one. Providing a space for visitors to grieve together is essential to the success of the cemetery.

Concealed behind a screen of vegetation, storage facilities should be hidden out of site from visitors. They do not need to be located close to the chapel and reception hall

but must be easily accessible to burial sites without disturbing grieving visitors. The storage facility contains all landscape maintenance supplies, grave digging tools, and repair equipment discretely out of sight, as well as golf carts for graveside accessibility for elderly or disabled visitors.

Reducing confusion during a difficult experience such as grieving the loss of a loved one is should be a top priority for a cemetery. Displaying wayfinding signage at prominent, easy to read locations is an easy solution to reducing confusion. Important locations to place signage include along roads, walkways, and buildings. To complement the aesthetic of the cemetery, the signage should match the vernacular architecture of the building structures, which further enhances the sense of place. To reinforce the feeling of being immersed within nature, trail blazes within the burial woodlands assist with wayfinding and are resonant with visitors who frequently hike.

Secondary roads, at least one lane wide, are recommended for grave accessibility if the cemetery is larger than 30 acres. Smaller cemeteries can be serviced by gravel walking paths and electric golf carts. Secondary roads allow visitor vehicles to enter the burial grounds and may park along the shoulder of the road or at designated parking lots within the burial grounds. Ideally, vehicle parking should be available within 100-200 yards of any gravesite. Once parked, visitors can either walk along the paths to the grave or use an electric golf cart to assist them.

A variety of paths should be used throughout the cemetery to denote a hierarchy of uses. The 5’ gravel walking path supports all electric golf cart access and can be used for quick access to graves. The 3’ wide dirt or mown path has a secondary importance. The dirt or mown paths wind deeper into the burial grounds off the gravel path. This path

is more intimate and leads closer to the individual burial site. A dirt path should be used in a woodland setting while the mown path can be used in grassy meadows or burial glades. All paths should be maintained to be free of tripping hazards and debris. Each path has a 5’ grave buffer flanking each side of the path. This keeps visitors from inadvertently walking on top of a grave. Visitors are allowed to walk off the path to access graves.

The 10’x10’ burial plot size is ideal for the structural support of the soil between body burials. If bodies in a natural burial are buried closer than ten feet, the structural integrity of the soil separating the two bodies could be compromised and collapse. Within this square plot, there is sufficient space to bury a single human body, the cremated remains of a body, and the body of a small pet. If spouses or close family members would like to be buried near each other, an exception is made to bury related persons no closer than five feet apart, but a separate neighboring plot must be purchased. This exception should be infrequent, and the structural integrity of the burial ground should not be an issue. All of the burial plots will be arranged on a regular pattern to facilitate with wayfinding and purchasing plots. A plot that is deemed to be unsuitable for burial should not be sold if the space has existing conditions including an extremely steep slope, low accessibility due to rocky terrain and dense vegetation, or large existing trees.

The newer burials are more obvious to the visitors since the burial location is clearly marked with the freshly mounded dirt piled about 3’ high. With time, the mounds will erode and sprout new vegetation to ultimately become indistinguishable from the surrounding woodland floor.

Standards for Burial Areas

Table 5.3 Standards for Burial Areas

Design Element	**Description**
Woodland Burial	- Woodland burials should maintain a naturalistic aesthetic (Whittaker 2018, Clayden et al. 2015) - Existing mature woodlands should be incorporated as much as possible into the cemetery (Clayden et al. 2015, Whittaker 2018, Watts 2018) - When establishing a woodland, plant trees before the burial grounds open to draw users to the vision and environmental aspirations of the cemetery (Clayden et al. 2015)
Burial Glade	- Selectively clear openings in the existing woodland to create burial glades connected by a centralized gravel path and accessed by informal mown paths (Clayden et al. 2010) - Glades should be planted with plants favorable to targeted edge-dwelling animal species - Glades should be offered to users as a desirable, secluded burial location (Clayden et al. 2015)
Meadow Burial	- Meadow burials should be planted with native grasses and perennials (Whittaker 2018, Clayden et al. 2015) - A mown path through the meadow allows burial site access (Whittaker 2018) - A gravel surfaced path is allowed as a main pathway within the meadow - Meadow should be maintained as a meadow to prevent succession into a woodland environment. The meadow should be completely mowed once or twice a year (Whittaker 2018, Clayden et al. 2015)
Pet Cemetery	- Small dogs and cats are allowed to be buried in the designated pet cemetery (Watts 2018) - Both animal bodies and cremated remains in biodegradable containers are allowed (Watts 2018) - The pet cemetery should be located near the cemetery entrance since this is a less desirable area for humans to be buried

Visitors should experience the tranquility of the sacred site once they enter the woodland burial portion of the cemetery. Woodland burial locations are accessible by foot for those able to walk the distance or by parking along the side of the road before entering the woodland. Long, straight 5’ wide gravel paths are visible from the main drive. As shown in Figure 5.2, gravel paths enable grave accessibility and accommodate electric golf cart access for those who are unable to walk. The gravel paths divide the woodland into distinguishable blocks which assist with wayfinding and grave location. Trail blazes occasionally mark the trees to help direct the visitors to the correct path. A 3’ wide dirt path also meanders along the natural topography of the site through the deciduous trees. Visitors will feel a sense of quietness while enveloped in nature. As displayed in Figure 5.3, all burials are found on either side of the path, just beyond the 5’ buffer. Burials are discretely identified by flat native stones which are inscribed with the names of the deceased.

Figure 5.2 Woodland Burial

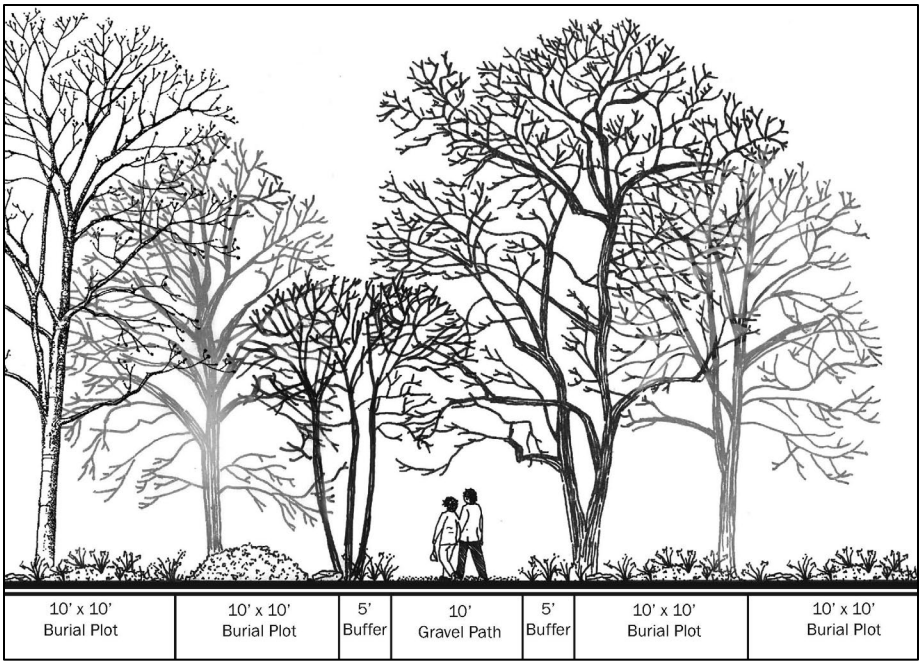


Figure 5.3: Woodland Burial Cross Section

The native stone enhances the sense of place to the visitor and maintains the naturalistic aesthetic which is desirable in this cemetery. Among the graves and meandering dirt path, low-growing native grasses, perennials, and understory trees create an ever changing seasonal display of blooming flowers, fall color, and new surprises with each visit. Overhead, a canopy of native trees shelters the visitors. The rich, vegetative diversity in the woodland burial invites an array of birds and mammals to thrive in the sacred habitat.

Burial glades, shown in Figure 5.4, puncture holes in the dense woodland canopy to make way for a diversified habitat of edge-dwelling animal species. Figure 5.5 shows a mown path leading visitors through the burial glade while respectfully navigating the burial sites. They can be reserved for family burials. Burial glades could be named after native bird species preferring a woodland edge habitat in the Southeastern United States

including American Robin, Carolina Chickadee, Eastern Bluebird, Northern Cardinal, Ruby-throated Hummingbird, and Song Sparrow.

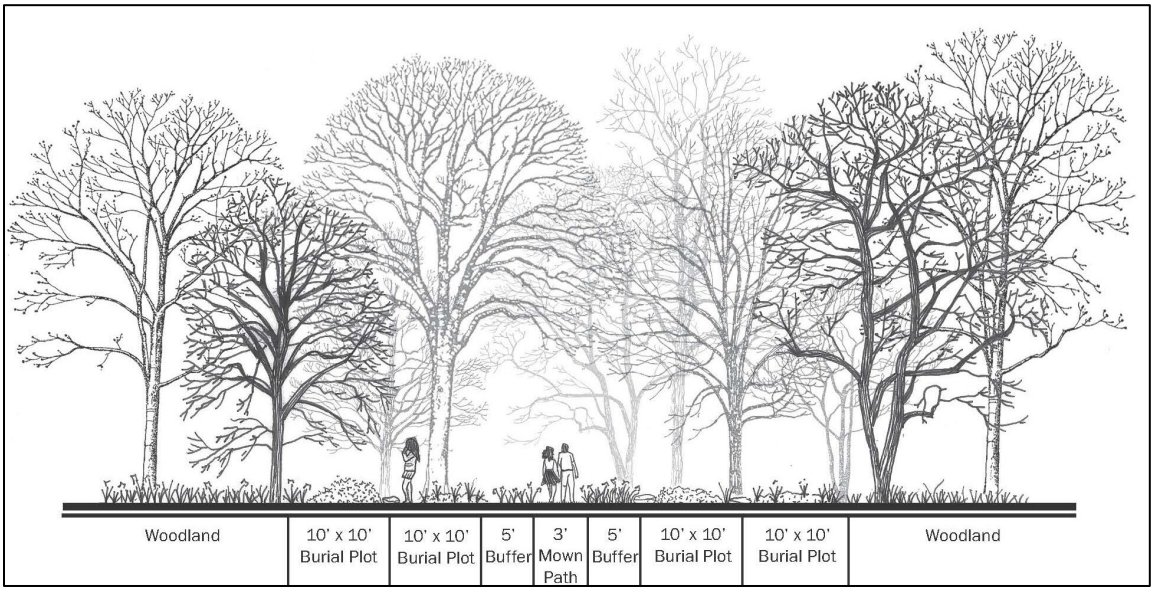


Figure 5.4: Burial Glade Cross Section

Figure 5.5: Burial Glade

Table 5.4 lists recommended plant species to attract the desired bird species for food or habitat in burial glades. Plant species chosen for their year-around aesthetic appeal can bring new delights for both human visitors and animals.

Table 5.4: Recommended plant species for burial glades in the Southeast

Bird Species	**Recommended Plant Species**
American Robin	*Celtis occidentalis, Celtis tenuifolia, Cornus florida, Ilex glabra, Ilex opaca, Ilex verticillata, Morus rubra, Prunus caroliniana, Prunus serrotina, Prunus pensylvanica, Rhus copallinum, Vaccinium arboretum, Vaccinium virgatum* (Vanderhoff et al. 2016)
Carolina Chickadee	*Cercis canadensis, Helianthus* spp*., Lonicera fragrantissima, Morus rubra, Parthenocissus quinquefolia, Rubus* spp*., Vaccinium arboretum, Vaccinium virgatum* (Mostrum et al. 2002)
Eastern Bluebird	*Celtis laevigata, Cornus florida, Eleagnus pungens, Elaeagnus umbellate, Ilex cassine, Ilex opaca, Juniperus virginiana, Nyssa sylvatica, Prunus laurocerasus, Prunus serotina, Pyracantha spp., Rhus typhina, Vaccinium arboretum, Vaccinium virgatum* (Gowaty and Plissner 2015)
Northern Cardinal	*Cornus florida, Celtis occidentalis, Liriodendron tulipifera, Morus rubra, Panicum* spp., *Rubus* spp. (Halkin and Linville 1999)
Ruby-throated Hummingbird	*Aesculus pavia, Aquilegia Canadensis, Bignonia campreolata, Campsis radians, Gelsemium sempervirens, Liriodendron tulipifera, Lobelia cardinalis, Lonicera sempervirens, Monarda didyma, Silene virginica* (Weidensaul et al. 2013)
Song Sparrow	*Amelanchier alnifolia, Helianthus* spp*., Morus* spp*., Trifolium* spp*., Rubus* spp*.,Prunus* spp*., Sisyrinchium* spp*., Vaccinium* spp.(Arcese et al. 2002)

Naming a burial glade for a native bird is intended to appeal to people who might have a sentimental attachment for a particular bird. They might recall a special memory of their loved one and the bird, or they simply favor the bird's song or the coloring on its

feathers. Recognizing the habitat or the bird flittering between the trees creates a sense of place for the visitor and assists with celebrating the memory of their loved one. Burial glades are organized in a similar way to the woodland burials.

As shown in Figure 5.6, a mown path leads from the main drive into the meadow of native grasses and perennials. Occasionally, a low growing tree interrupts the soft texture of the grassy landscape to provide shade and shelter. Off the path, burials are barely visible through the movement of the native grasses which almost obscure the tops of the mounds. Again, each burial is modestly marked with an engraved flat native stone. Once a visitor arrives to the burial plot of their loved one, the mound is the only grave the visitor can see since the neighboring burials are concealed by the vegetation. The grasses provide an intimate, almost private experience for mourners. Figure 5.7 shows a gravel walking path through a meadow. Figure 5.8 shows the recommended burial plot and path organization of the meadow burial.

Figure 5.6: Burial Meadow with Mown Path

Figure 5.7: Burial Meadow with Gravel Path

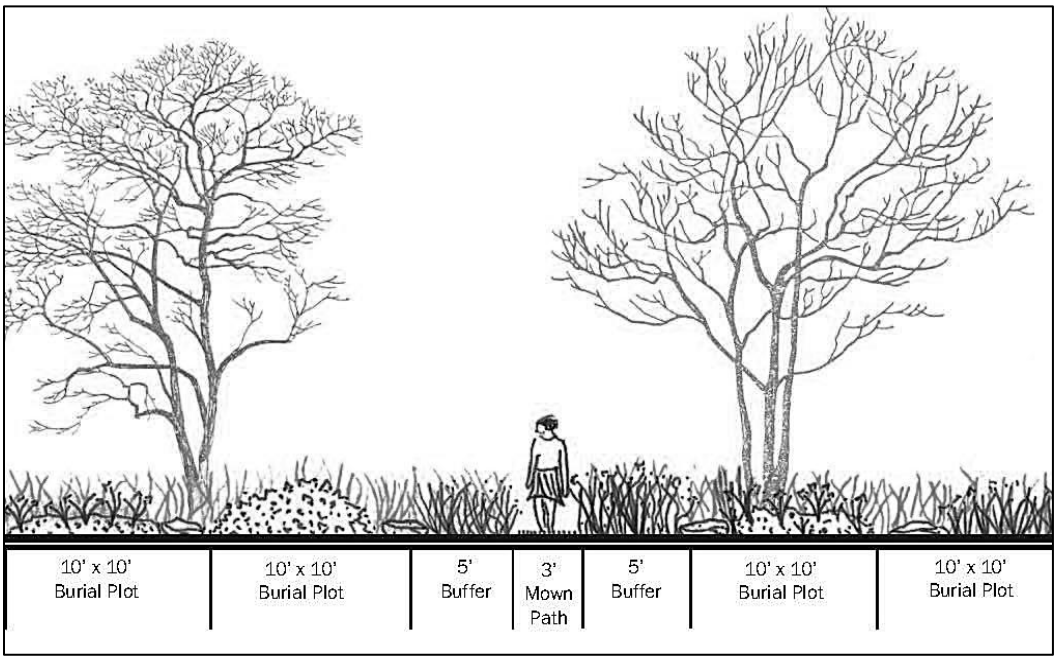


Figure 5.8: Burial Meadow Cross Section

Although not human, for many, pets are valuable members of the family. A modest pet cemetery can be located to honor beloved dogs, cats, and other small animals.

It is recommended to locate the pet cemetery near the chapel, reception hall, or main visitor parking since this area is typically less desirable to bury humans. A mown path meanders through the area, allowing visitors to reflect upon pleasant memories of when their animal was once alive. Each burial is marked with a flat, native stone engraved with the pet's name and a sentimental inscription.

Standards for Visitor Experience

Table 5.5: Standards for Visitor Experience

Design Element	**Description**
Accessibility	- Due to the visitors' range of mobility within varied terrain, accommodations must be made to allow grave accessibility for funerals and future visits to mourn (Whittaker 2018) - Efforts should be made to provide golf carts or other small motorized vehicles to transport people with mobility disabilities from parking areas to the gravesite (Whittaker 2018) - Secondary roads should be located within 100 yards from all grave sites to assist with graveside parking (Whittaker 2018) - Tripping hazards such as holes, roots, and rocks must either be removed or clearly marked (Whittaker 2018)
Memorial Planting Restrictions	- Families are allowed, although not encouraged, to plant memorial plants on the burial plot of their deceased family member. - They must choose a plant from the approved list of native plants. - They family must do the planting themselves, and the family is responsible for the health and watering of the plant. - To ensure the survival of the plant, the family is encouraged to plant in the late fall or winter. - Visitors are not allowed to place any artificial flowers on the gravesite (Whittaker 2018, Bell 2018, Watts 2018, Webster 2015)
Graveside Gift Restrictions	- Visitors are strongly discouraged from leaving gifts on the grave including teddy bears, candles, candy and food, wind chimes, and figurines.

	- The cemetery should notify the family before removing the gifts from the gravesite. - Leniency is allowed during birthdays and holidays, but the gifts must be removed after a short period of time (Whittaker 2018, Bell 2018, Watts 2018). - Benches are not allowed to be placed by the graveside, but visitors are encouraged to bring a portable chair if they would like to sit near the grave (Whittaker 2018).
Recreation	- Visitors are encouraged to hike, jog, picnic, and bring their leashed dogs. - The cemetery is open to the public from dawn to dusk. - Visitors do not have to notify the cemetery that they will be visiting, but they are encouraged to behave in a respectful manner towards the land and other visitors (Whittaker 2018, Bell 2018, Watts 2018).

Since a natural burial cemetery is in a seemingly wild environment, it is difficult to make the entire site completely handicap accessible as revealed through the case studies. However, efforts should be made to increase accessibility for visitors with all ranges of mobility. Sites should be chosen which naturally have gentle slopes for easy walkability. Electric carts are strongly encouraged to be provided to guests who have mobility disabilities. Carts drastically reduce the amount of walking for less able visitors since the carts are able to drive on most paths and roads within the cemetery. Tripping hazards and debris should be removed on all paths and roads. Additionally, low hanging branches along paths should be trimmed to above 6’ to limit inconveniences and potential injuries.

Since grieving is a sensitive process for those who have lost a family member or loved one, delicate care should be taken to manage visitors’ actions on site. Maintaining the desired natural aesthetic is important which requires creating restrictions for visitors. Although many people wish to have a memorial plant on the gravesite of their deceased

loved one, this causes challenges when maintaining not only the desired cemetery aesthetic but also the survivability of the memorial plant. Despite the challenges this concept creates, families are allowed, but not encouraged, to choose a memorial plant from the approved list of native plants in Table 5.6. If every grave has a memorial plant, it is considered an unreasonable responsibility for the cemetery management staff to care for each plant on each grave. With this in mind, families are responsible for taking care of the memorial plant. To increase the survivability, families are encouraged to plant during the fall when there are greater chances of survivability. Depositing graveside gifts is another problem frequently encountered by cemeteries. It is strongly discouraged to leave any memento including toys, artificial flowers, food, candles, figurines, benches, and wind chimes. These items clutter the desired aesthetic of the natural burial cemetery and should not be placed on the grave. Inevitably, visitors will typically place gifts on the graves soon after the burial and during holidays or birthdays. To respect the grieving process, some leniency is allowed during those special times, but the gifts will be removed after a short period of time.

One of the goals of this natural burial cemetery is to provide additional land uses besides solely burial. Passive recreation is strongly encouraged on the cemetery site to visitors who may or may not know people buried within the cemetery. From dawn to dusk, visitors can participate in hiking, running, leashed dog walking, biking, and bird watching throughout the diversity of burial spaces. Interacting with the natural environment through recreational activities provides an alternative land use for the natural burial cemetery.

Table 5.6: Approved Native Plant List (Watts 2018)

COMMON NAME	SCIENTIFIC NAME
TREES	
Tulip Tree	*Liriodendron tulipifera*
White Oak	*Quercus alba*
Yellow Buckeye	*Aesculus flava*
Yellowwood	*Cladastris kentuckea*
Redbud	*Cercis Canadensis*
SHRUBS	
Arrowwood	*Viburnum dentatum*
Bush-honeysuckle	*Diervilla sessilifolia*
Cinnamonbark	*Clethra acuminate*
Winterberry	*Ilex verticilata*
Drooping Leucothoe	*Leucothoe fontanesiana*
Flame Azalea	*Rhododendron celendulaceum*
Hearts-A-Bursting	*Euonymous americanus*
Highbush Blueberry	*Vaccinium corymbosum*
Large Fothergilla	*Fothergilla major*
Mock Orange	*Philadelphus idororus*
Mountain Laurel	*Kalmia latifolia*
Mountain Rosebay	*Rhododendron catawbiense*
Pinkshell Azalea	*Rhododendron vaseyi*
Pinxter Azalea	*Rhododendron periclymendoides*
Shrubby St. John's Wort	*Hypericum prolificum*
Smooth Sumac	*Rhus glabra*
Snowhill Hydrangea	*Hydrangea arborescens*
Sparkleberry	*Vaccinium arboretum*
Spicebush	*Lindera benzoin*
Swamp Rose	*Rosa palustris*
Sweet Azalea	*Rhododendron arborescens*
Sweetshrub	*Calycanthus floridus*
Virginia Sweetspire	*Itea virginica*
HERBACEOUS PERENNIALS	
Alumroot	*Heuchera Americana*
Bee Balm	*Monarda didyma*
Bishop's Cap	*Mitella diphylla*
Black Cohosh	*Caulophyllum thalictroides*
Black-Eyed Susan	*Rudbeckia hirta*
Blazing Star	*Liatris spicata*
Bleeding Heart	*Dicentra eximia*
Bloodroot	*Sanguinaria Canadensis*
Blue Cohosh	*Caulophyllum thalictroides*
Blue Star	*Amsonia tabernaemontana*
Blue-Eyed Grass	*Sisyrinchium angustifolium*

Butterfly Weed	*Asclepias tuberosa*
Cardinal flower	*Lobelia cardinalis*
Carolina Ipecac	*Euphorbia ipecacuanhae*
Carolina Phlox	*Phlox carolina*
Chalice Phlox	*Phlox amoena*
Coreopsis	*Coreopsis pubescens*
Creping Phlox	*Phlox stolonifiera*
Dwarf Crested Iris	*Iris cristata*
False Goats Beard	*Astilbe biternata*
Fire Pink	*Silene virginica*
Foamflower	*Tiarella cordifolia*
Fringed Loostrife	*Lysimachia cilata*
Garden Phlox	*Phlox paniculata*
Goat's Beard	*Aruncus dioicus*
Golden Aster	*Pityopis graminifolia*
Hairy False Foxglove	*Aureolaria pectinate*
Jewelweed	*Impatiens capensis*
Joe-Pye Weed	*Eupatorium fistulosum*
Late Purple Aster	*Aster patens*
Little Brown Jugs	*Hexastylis arifolia*
Lobelia	*Lobelia puberula*
Mouse Eared Coreopsis	*Coreopsis auriculata*
New York Ironweed	*Veronia neveboracensis*
Oconee Bells	*Shortia galacifolia*
Puccoon	*Lithospermum caroliniense*
Pussy Toes	*Antennaria planaginfolia*
Sandhills Thistle	*Cirsium repandum*
Sharp-Lobed Hepatica	*Hepatica acutiloba*
Shooting Star	*Dodecatheonmeadia*
Solomon's Seal	*Ploygonatum biflorum*
Thimbleweed	*Anemone virginiana*
White Wood Aster	*Aster divaricatus*
Wild Blue Phlox	*Phlox divaricata*
Wild Columbine	*Aquilegia Canadensis*
Wild Geranium	*Geranium maculatum*
Wild Ginger	*Asarum canadense*
Wild Indigo	*Baptisia tinctoria*
Winkle-Leaf Goldenrod	*Solidago rugosa*
Wire Grass	*Aristida stricata*
Yellow-Root	*Xanthorhiz simplicissima*

CHAPTER 6

DESIGNS

This chapter tests the proposed natural burial design standards on the three unique sites that were identified in Chapter 4. These sites possess different land cover and land uses. Demonstrating that the design standards can be implemented on multiple different sites, this thesis shows the potential flexibility of the types of sites on which these design standards can be used. Design A is a site which is located within 10 miles from Athens, GA. The entire parcel is 121.8 acres primarily consisting of an existing mature deciduous forest. Design B is a 20.2 acres site located within 20 miles from Athens, GA. Approximately 7.3 acres of the site is currently used as a traditional lawn cemetery, but the proposed design will focus on expanding the existing cemetery by offering natural burial on the remaining 12.9 acres of undeveloped woodlands. Design C is an 82.6 acres parcel located within 20 miles from Athens, GA. This site is currently used as a pasture for grazing animals. These newly designed cemeteries which encompass the themes and findings as discussed in Chapters 2 and 3 will confirm the proposed design standards will support ecosystem services in natural burial cemeteries. Additionally, all three sites, both existing conditions and proposed designs, will be analyzed by i-Tree Canopy, software produced by the USDA Forest Service, to estimate regulatory benefits provided by tree cover such as air pollution reduction and capturing atmospheric carbon (i-Tree Canopy n.d.). Figure 6.1 shows all three conceptual designs as a side by side comparison of the site arrangement flexibility of the proposed design standards.

Design A: Tests design standards feasibility on a site with existing deciduous woodlands

Design B: Tests design standards feasibility on an existing traditional lawn cemetery. The standards will expand the burial grounds into the existing deciduous woodlands located behind the current active burial grounds.

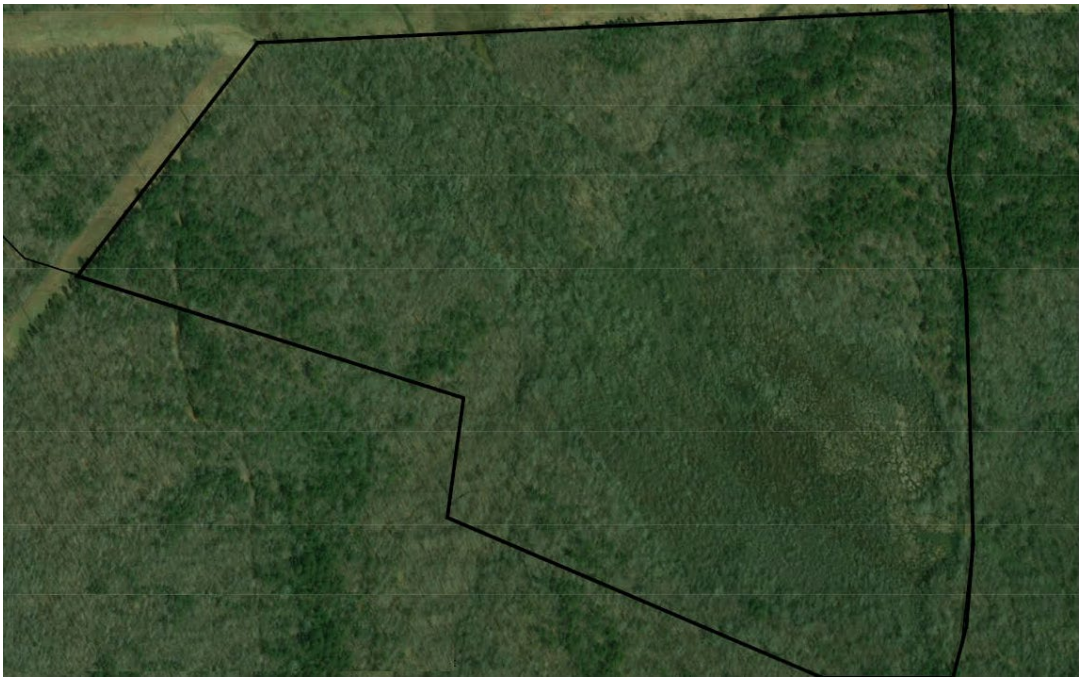
Design C: Tests design standards feasibility on a site that is currently being used for animal grazing. The design standards recommend transitioning the site from pasture to a woodland burial to provide a greater diversity of animal and plant habitat.

Figure 6.1: Three conceptual designs on unique sites to test feasibility of design standards

Design A

The concept for Design A drew inspiration from creating several unique burial spaces which demonstrate a multiplicity of ways natural burial can occur. The distinct burial spaces allow people to choose from a variety of environments for which they might feel more attachment for one than others. Having the ability to choose a plot in a specific environment instantly makes the burial location seem more personal to the individual and to the grieving loved ones. Additionally, each burial environment will provide a range of ecosystem system services to the community.

Figure 6.2: Design A Existing Site



The existing site, shown in Figure 6.2, is a deciduous woodland parcel on a conservation easement. The design evolved from layering the weighted overlay analysis and the USGS NLCD 2011 maps with functional diagrams. The functional diagram, shown in Figure 6.3, assisted with the rough placement of important cemetery elements and land uses.

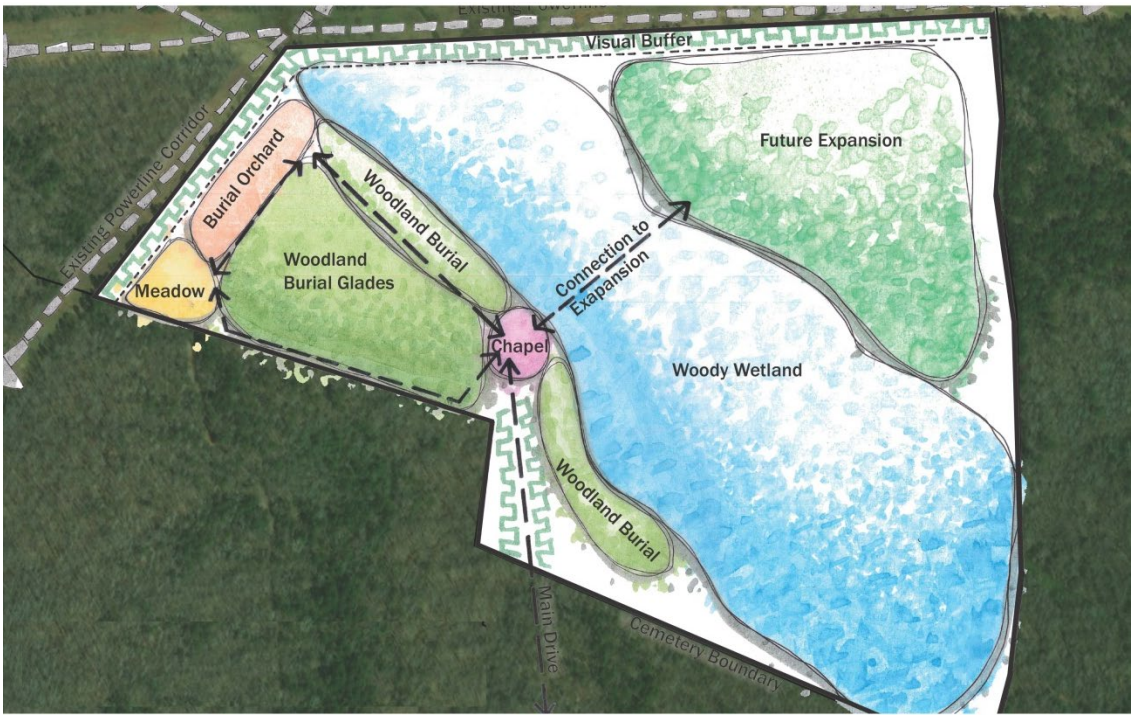


Figure 6.3: Design A Functional Diagram

The proposed elements and land uses identified on the functional diagram include chapel, woodland burial, woodland burial glades, meadow, main drive circulation, visual buffer, and the location of the future expansion. Existing elements were addressed in the bubble diagram including the existing powerline corridor and the existing woody wetland.

The bubble diagram evolved into the conceptual master plan, shown in Figure 6.3. The conceptual master plan for Design A spatially locates the proposed design standards. In accordance with the proposed design standards, the existing gravel paved Big Bear Rd is extended to create the main drive into the cemetery. The chapel and reception hall are located at the end of the main drive, aligned on axis. Visitor parking and the pet cemetery are located near the chapel and reception hall. Since the cemetery is greater than 30 acres, a secondary road is permitted

Figure 6.3: Conceptual Master Plan Design A

through the burial grounds. Woodland burial glades hold the most space and hierarchy on Design A's conceptual master plan since they naturally requires more space. Also, since the existing site is primarily deciduous forest, leaving a majority of the site as a deciduous forest would not disrupt the existing habitat of the plant and animal species. Directly behind the chapel and adjacent to the woody wetland buffer, woodland burials are located. Simple dirt paths meander among the woodland burial area following the topography. To the west of the secondary road, another woodland burial section is located; however, secluded burial glades are located within this section as well. As described in the proposed design standards, each burial glade is named after a native bird species and contains plant species found in the birds' habitats. The increased variety of burial options should appeal to people wanting to be buried in this cemetery. On the western side of the site, a burial meadow is located which will benefit from the high amount of sunlight.

With the main elements of the cemetery in place, the main circulation on the site was easily determined. To assist with easy wayfinding, straight axes were preferred for the main circulation route. From the chapel, the main drive circulates around the woodland burial glades and grants access to all proposed burial types. To connect to the future expansion site, the main drive branches from behind the chapel over the narrowest part of the woody wetland and to the eastern portion of the site with the shrub/scrub land cover.

Executive Summary

Design A follows many of the design standards proposed in Chapter 5. It includes a diversity of environments which adds biodiversity and offers more burial options.

Figure 6.5 shows each of these burial options side by side to give the reader a glimpse of the visitor experience in Design A.

Figure 6.5: Burial options in Design A include woodland, glade, and meadow

Table 6.1: Design A Ecosystem Services Summary

Cemetery	Cultural	Regulating
Design A	+ Increases spatial complexity + Space for contemplation + Sense of place + Native plants + Vernacular architecture + Enhances regional identity + Passive recreation + Immersive experience in nature + Opened to all religions + No distracting monuments + Spiritual and religious nourishment	+ Conservation easement + Plant diversity + Habitat diversity + Mature trees + Pollinator habitat + Minimal lawn area + Air pollution reduction + Captures atmospheric carbon
		- Selective tree removal to create diversity of burial spaces

By incorporating the proposed design standards into this site, Design A provides ecosystem services on the site, summarized in Table 6.1. Design A provides cultural ecosystem services by increasing the spatial complexity of the site. Previously, the site

was primarily deciduous forest. Design A increased the diversity of vegetation by introducing the burial meadow and burial glades. These spaces provide shelter and space for contemplation for the mourning visitors. Through the use of native plants, vernacular architecture of the buildings, and paths following the topography of the site, Design A provides cultural ecosystem services by enhancing the visitor's sense of place and regional identity.

Design A provides regulatory ecosystem services by providing a diversity of habitats through selectively removing existing trees in the woodland which creates burial glades and burial meadow. In addition to the remaining woodland, these burial locations provide additional habitat, refuge, and food for essential insect and animal pollinators. This design requires limited amount of herbicide applications, limited harmful maintenance equipment emissions, and only annual meadow mowing. In an effort to quantify the regulatory ecosystem services in Design A, the existing conditions and the proposed design were both analyzed using i-Tree Canopy (i-Tree Canopy n.d.). By referencing an aerial image of the existing site and the plan of the proposed design, the author assigned a land cover class of tree, grassland/shrub, lawn, or impervious surface to 500 random data points on both the existing and proposed versions of the site. These points were used to estimate the percent land cover as well as the values for benefits provided by tree cover including air pollution reduction and capturing atmospheric carbon. Table 6.2 summarizes the findings from the i-Tree report for the existing conditions of the site for Design A. Table 6.3 summarizes the findings from the i-Tree report for the proposed Design A.

Table 6.2: i-Tree Canopy Results of Exiting Site Conditions for Design A (i-Tree Canopy n.d.)

Cover Class	Description	Data Points	% Cover
Tree	Tree, non-shrub	500	100
Grassland	Grassland or shrub	0	0
Lawn	Mown lawn area	0	0
Impervious	Impervious surfaces	0	0
Abbreviation	**Benefit Description**	**Value (USD)**	**Amount**
CO	Carbon Monoxide removed annually	$13.20	36.17 lb
NO2	Nitrogen Dioxide removed annually	$6.48	83.09 lb
O3	Ozone removed annually	$554.46	1,390.55 lb
PM2.5	Particulate Matter less than 2.5 microns removed annually	$966.15	71.45 lb
SO2	Sulfur Dioxide removed annually	$0.57	19.72 lb
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$617.78	363.93 lb
CO2seq	Carbon Dioxide sequestered annually in trees	$6,186.61	133.48 T
Co2stor	Carbon Dioxide stored in trees (not an annual rate)	$155,368.87	3,352.28 T

Table 6.3: i-Tree Canopy Results of Proposed Site Conditions for Design A (i-Tree Canopy n.d.)

Cover Class	Description	Data Points	% Cover
Tree	Tree, non-shrub	370	74
Grassland	Grassland or shrub	126	25.2
Lawn	Mown lawn area	0	0
Impervious	Impervious surfaces	4	0.08
Abbreviation	**Benefit Description**	**Value (USD)**	**Amount**
CO	Carbon Monoxide removed annually	$9.64	26.42 lb
NO2	Nitrogen Dioxide removed annually	$4.73	60.68 lb
O3	Ozone removed annually	$404.97	1,015.64 lb
PM2.5	Particulate Matter less than 2.5 microns removed annually	$705.67	52.18 lb
SO2	Sulfur Dioxide removed annually	$0.41	14.40 lb
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$451.22	265.81 lb
CO2seq	Carbon Dioxide sequestered annually in trees	$4,518.62	97.49 T
Co2stor	Carbon Dioxide stored in trees (not an annual rate)	$113,479.53	2,448.46 T

In comparison to the existing site conditions, the results of the proposed Design A reveal the regulating ecosystem services provided by tree canopy cover have decreased in every category analyzed by i-Tree Canopy. Since the existing site was completely deciduous woodlands and the proposed design selectively removed trees to create additional burial options, these results are not surprising because i-Tree Canopy only analyzes benefits provided by trees and not by other vegetation (i-Tree Canopy n.d.). Despite the decrease, the proposed design remains majority deciduous woodlands and still provides many regulatory benefits including air pollution reduction and capturing atmospheric carbon.

Design B

Design B demonstrates the proposed design standards can be implemented at an existing traditional lawn cemetery, Figure 6.6. This design shows an existing traditional lawn cemetery can exhibit more ecosystem services during expansion if it utilizes natural

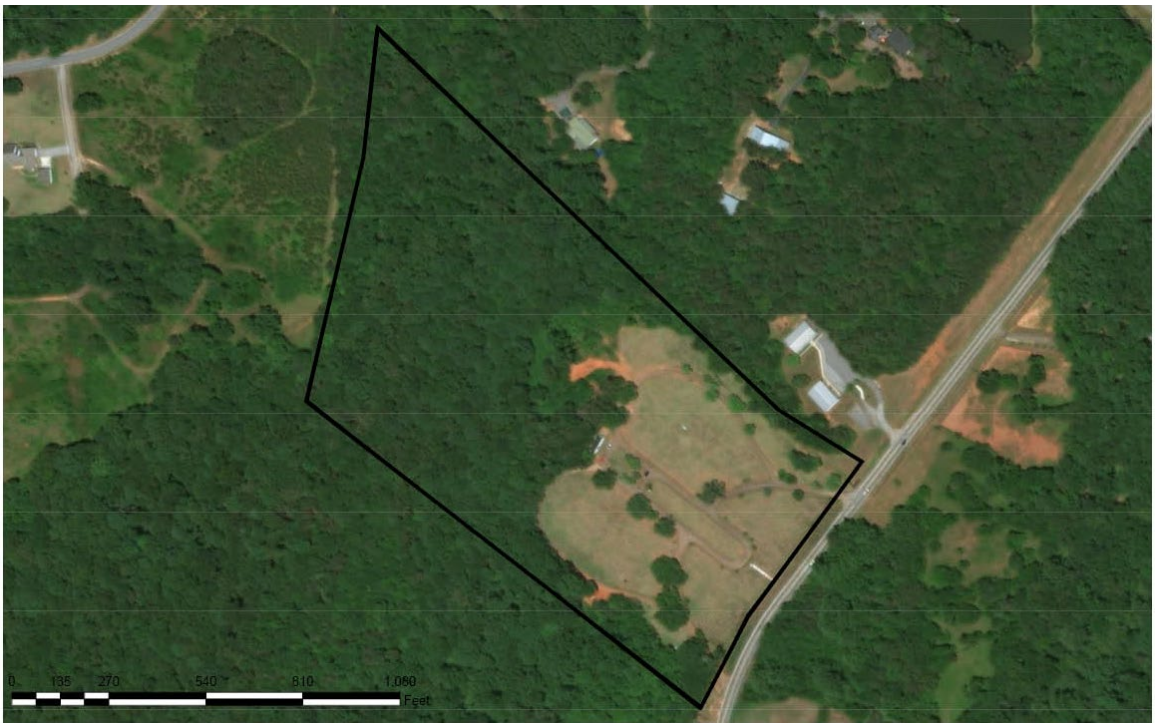


Figure 6.6: Design B Existing Site

burial instead of traditional lawn cemetery burial practices. The site for Design B was selected based on the same site selection analysis criteria as Design A including proximity to major city, at least 1.5 miles away from major roads and highways, contains desirable land cover, and possesses desirable characteristics identified by a weighted overlay analysis. Instead of possessing a conservation easement like the site for Design A, the site for Design B must possess undeveloped land on an existing traditional lawn cemetery.

The concept for Design B intends to provide the most ecosystem services to the Jackson Memorial Park if it expands burial to the wooded portion of the site. Additionally, providing multiple burial environment options is of high priority within this design. Designing for both human desires and ecosystem impact influences the intent of this design.

Similar to Design A, Design B came into fruition through layering the weighted overlay analysis and the USGS NLCD 2011 map with functional diagrams. The functional diagram for Design B, shown in Figure 6.3, assisted with placing key cemetery elements and land uses identified through the proposed design standards. Since some of essential elements identified in the design standards already exist in Jackson Memorial Park such as the main drive, main office and reception hall, and parking, Design B suggests adding the elements that are missing including a chapel, woodland burial, burial glades, meadow burial, and necessary path structure throughout the burial grounds.

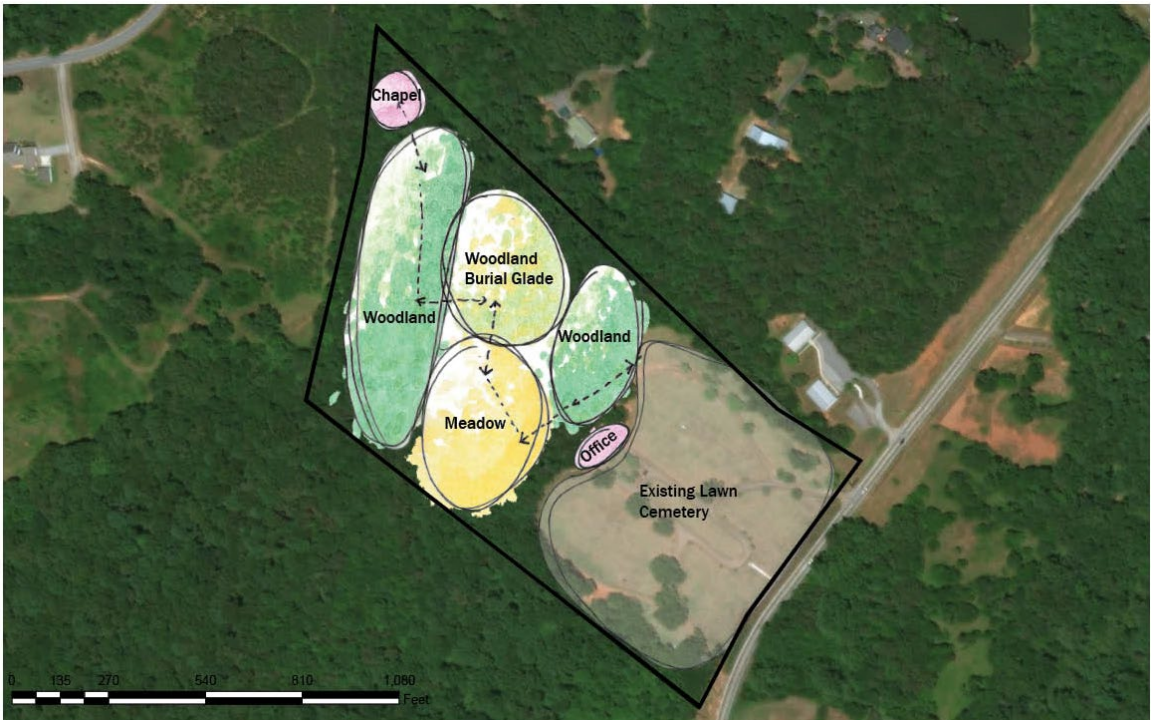


Figure 6.7: Design B Functional Diagram

The functional diagram for Design B evolved into the conceptual master plan, shown in Figure 6.7.The existing main drive enters the site from Jefferson Rd on the eastern corner of the site. It winds through the existing cemetery through a series of connected loops. The main office, reception hall, and parking border the existing deciduous forest on the northwestern border. Although these elements are not on axis with the main drive, they are located in the center of the site with a strong visual axis perpendicular to Jefferson Rd. To the rear of the main office and reception hall, a small clearing in the deciduous forest holds the excavated dirt from the graves. This area is identified as the main access point of the future expansion to the natural burial.

Behind the office building, 12.9 acres of undeveloped deciduous forest is located. According to the functional diagram for Design B, the natural burial extension will consist primarily of woodland burials since the land cover of the site is currently

Figure 6.6: Conceptual Master Plan Design B

deciduous forest. Within the woodlands, a pedestrian access gravel path will switch back along the topography easing the pedestrian access to the burial grounds. According to the proposed design standards, a secondary drive is unnecessary since the natural burial site is less than 30 acres, but the gravel path will allow electric carts to drive through the burial grounds. On the western side of the site, a clearing will be created in the existing woodlands to maximize the sunlight reaching the meadow burial. Past the meadow burial, burial glades will puncture the woodland canopy to create secluded burial sections. As mentioned in the design standards, burial glades are named after desired bird species and contain plants which are commonly found in the respective bird's habitat. As the visitors venture further down the path through the woodland burials, they ultimately reach the end of the path which culminates at the chapel in the clearing in the woodland. Since Jackson Memorial Park has an existing main drive, it is difficult to modify the main drive and surrounding area without disrupting existing burials to adhere to the proposed design standards. Therefore, the long meandering path within the natural burial portion of the cemetery serves as an acceptable substitute to the main drive entering the site.

Executive Summary

Design B adheres to many of the design standards proposed in Chapter 5. It includes a diversity of environments which adds biodiversity and offers more burial options. Figure 6.9 shows each of these burial options side by side to give the reader a glimpse of the visitor experience in Design B.

Figure 6.9: Burial options in Design B include woodland, glade, and meadows with gravel and mown paths

Table 6.4 Design B Ecosystem Services Summary

Cemetery	Cultural	Regulating
Design B	+ Increases spatial complexity + Space for contemplation + Sense of place + Native plants + Vernacular architecture + Enhances regional identity + Passive recreation + Immersive experience in nature + Opened to all religions + No distracting monuments + Spiritual and religious nourishment	+ Plant diversity + Habitat diversity + Mature trees + Pollinator habitat + No lawn area in expanded portion + Air pollution reduction + Captures atmospheric carbon
		- Selective tree removal to create diversity of burial spaces

By expanding the cemetery through the means of natural burial into the existing woodlands, Design B enhances cultural ecosystem services within Jackson Memorial

Park, summarized in Table 6.4. The natural burial portion of the Jackson Memorial Park greatly increases the spatial complexity of the site. The diversity of vegetation and variations in form and texture found within the woodland, meadow, and glades are in a dramatic juxtaposition against the sterile lawn and even rows of headstones. These natural burial spaces within the woodland provide shelter and a space for quiet contemplation. Additionally, the native plants found within the expanded portion of the cemetery, vernacular architecture of the chapel, and the informal walking paths responding to the existing topography enhance the visitor's sense of place and regional identity of Jackson Memorial Park. Since passive recreation is encouraged within the expanded portion of Jackson Memorial Park, cultural ecosystem services are further improved.

Also, Design B enhances regulatory ecosystem services currently provided by Jackson Memorial Park. Instead of completely eliminating the existing woodland to create lawn for future burials, Design B recommends selectively removing trees to create burial glades and burial meadows. The introduction of these new burial spaces provides new habitat, both refuge and food, for essential insect and animal pollinators. By not creating more lawn burial area, this design will require limited use of herbicides, only annual mowing within the burial meadows, and have limited machinery equipment emissions. The naturalistic environment of the natural burial section of the cemetery will have a less harmful impact on the environment than the existing intensively managed lawn burial of Jackson Memorial Park. To quantify the regulatory ecosystem services in Design B, the existing conditions and the proposed design were both analyzed using i-Tree Canopy (i-Tree Canopy n.d.). By referencing an aerial image of the existing site and

the plan of the proposed design, the author assigned a land cover class of tree, grassland/shrub, lawn, or impervious surface to 500 random data points on both the existing and proposed versions of the site. The existing conditions analysis only took into account the lawn burial section, while the proposed design analysis incorporated the existing lawn burial with the added natural burial section. These points were used to estimate the percent land cover as well as the values for benefits provided by tree cover including air pollution reduction and capturing atmospheric carbon. Table 6.5 summarizes the findings from the i-Tree report for the existing conditions of the site for Design B. Table 6.6 summarizes the findings from the i-Tree report for the proposed Design B.

Table 6.5: i-Tree Canopy Results of Exiting Site Conditions for Design B (i-Tree Canopy n.d.)

Cover Class	Description	Data Points	% Cover
Tree	Tree, non-shrub	62	12.4
Grassland	Grassland or shrub	0	0
Lawn	Mown lawn area	390	78.2
Impervious	Impervious surfaces	47	9.42
Abbreviation	**Benefit Description**	**Value (USD)**	**Amount**
CO	Carbon Monoxide removed annually	$0.09	1.03 lb
NO2	Nitrogen Dioxide removed annually	$0.05	2.43 lb
O3	Ozone removed annually	$5.07	42.61 lb
PM2.5	Particulate Matter less than 2.5 microns removed annually	$10.11	2.26 lb
SO2	Sulfur Dioxide removed annually	$0.00	9.36 oz
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$3.59	11.23 lb
CO2seq	Carbon Dioxide sequestered annually in trees	$204.46	4.41 T
Co2stor	Carbon Dioxide stored in trees (not an annual rate)	$5,134.81	110.79 T

Table 6.6: i-Tree Canopy Results of Proposed Site Conditions for Design B (i-Tree Canopy n.d.)

Cover Class	Description	Data Points	% Cover
Tree	Tree, non-shrub	278	55.5
Grassland	Grassland or shrub	59	11.8
Lawn	Mown lawn area	143	28.7
Impervious	Impervious surfaces	20	4.01
Abbreviation	**Benefit Description**	**Value (USD)**	**Amount**
CO	Carbon Monoxide removed annually	$1.08	12.55 lb
NO2	Nitrogen Dioxide removed annually	$0.58	29.46 lb
O3	Ozone removed annually	$61.57	516.98 lb
PM2.5	Particulate Matter less than 2.5 microns removed annually	$122.63	27.37 lb
SO2	Sulfur Dioxide removed annually	$0.05	7.10 lb
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$43.55	136.30 lb
CO2seq	Carbon Dioxide sequestered annually in trees	$2,480.59	53.52 T
Co2stor	Carbon Dioxide stored in trees (not an annual rate)	$62,286.89	1,34413 T

In comparison to the existing site conditions, the results of the proposed Design B reveal the regulating ecosystem services provided by tree canopy cover have significantly increased in every category analyzed by i-Tree Canopy. Since the existing burial grounds were intensively managed as a lawn, these results revealed that expanding the cemetery into the woodlands increased the regulatory benefits provided by the burial grounds of Jackson Memorial Cemetery.

Provisioning ecosystem services is not represented in Design B. The size of the parcel was determined not large enough to provide food or other raw materials. This design primarily focused on cultural and regulating services.

Design C

A third conceptual cemetery design was created to demonstrate the design standards are able to be implemented on existing farmland (Figure 6.10). Converting

farmland to a natural burial cemetery will create a more complex habitat with an increase of biodiversity and diverse vegetation. Additionally, this conceptual design aims to provide a variety of burial environments for people to choose.

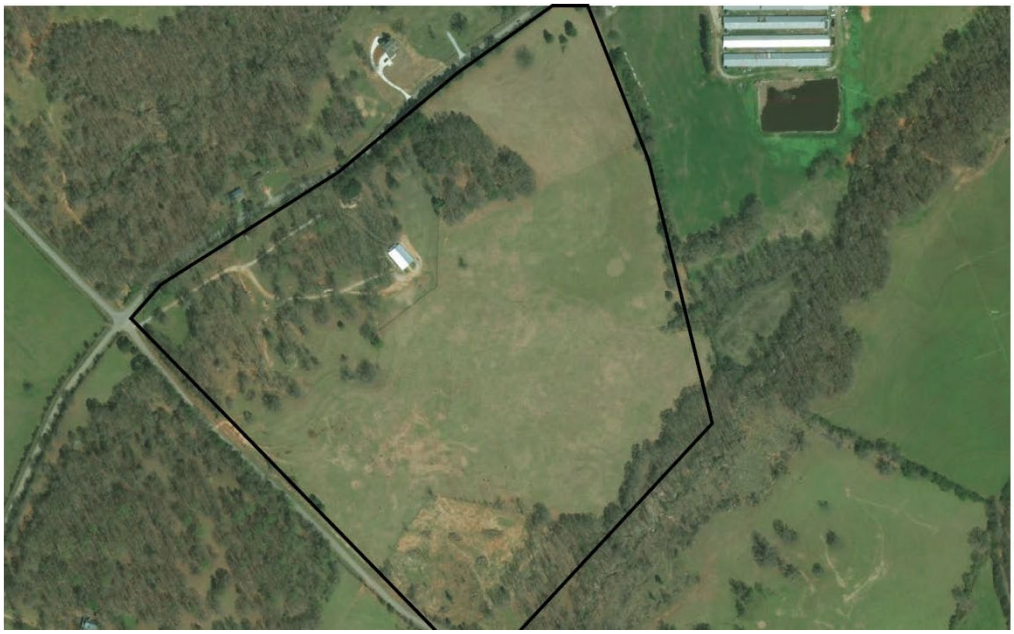


Figure 6.10: Design C Existing Site

Following the same design process as Design A and Design B, this design evolved from creating functional diagrams overlaid with the USGS NLCD 2011 and the farmland weighted overlay analysis. This functional diagram, shown in Figure 6.8, assisted with organizing the major cemetery land uses and elements such as main drive, chapel, woodland burial, burial glades, facility storage, parking, and visual buffers.

The functional diagram evolved into a conceptual master plan, shown in Figure 6.11. On the southeastern portion of the site, the suitability analysis revealed a piece of land with moderate suitability, and the USGS NLCD 2011indicates that it is pasture/hay land cover. Due to the moderate suitability, this portion of the site seemed ideal to place the chapel, reception hall, parking, and facility storage. In accordance with the design

standards, the entrance to the site was relocated more south on Geiger Road to be on axis with the chapel.

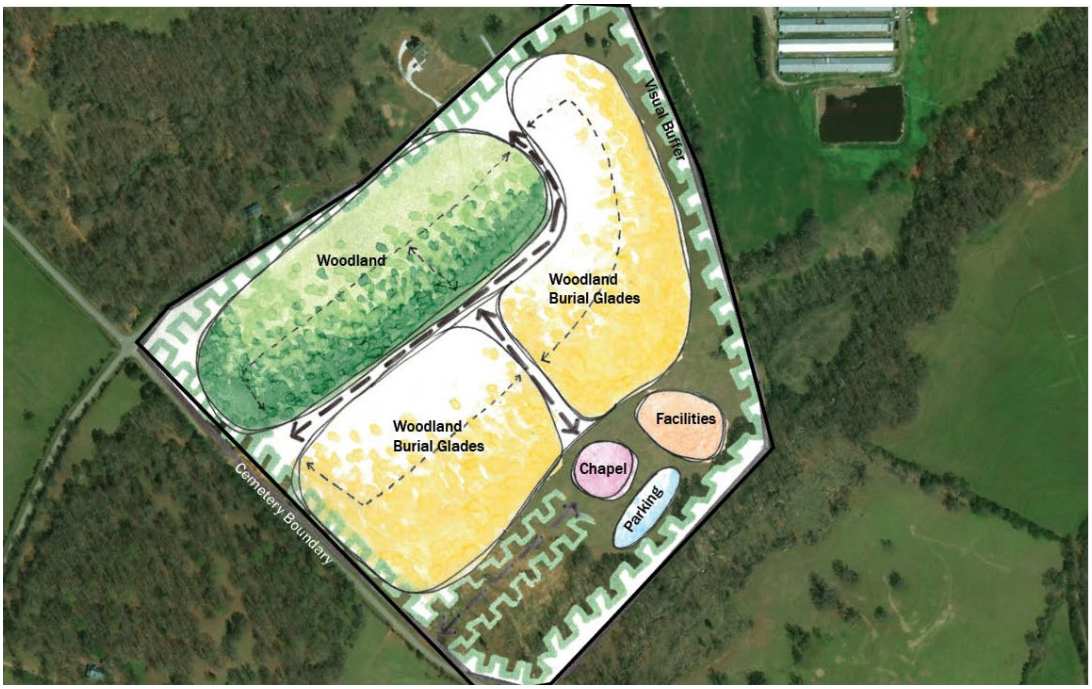


Figure 6.11: Design C Functional Diagram

Figure 6.9: Conceptual Master Plan Design C

The USGS NLCD 2011indicates that a majority of the site is covered in pasture/hay (U.S. Geological Survey 2014). Since the design standards aim to create a diverse habitat, the pasture/hay area will be transitioned to woodland which incorporates a meadow edge throughout. This area will contain both woodland and meadow burials. The northernmost portion of the site is existing deciduous woodland. To minimize habitat disruption, this existing woodland will remain, but it will

merge into the newly established woodland which replaces the existing pasture.

Once the main elements of the site were placed, the driving circulation was easily identified to connect the existing woodland to the newly added woodland. A secondary road was determined to be necessary since the site is larger than 30 acres, according to the proposed design standards. Pedestrian circulation was added through the means of a gravel path to assist visitors accessing graves within the burial sites.

Executive Summary

Design C adheres to many of the design standards proposed in Chapter 5. It includes a diversity of environments which adds biodiversity and offers more burial options. Figure 6.13 shows each of these burial options side by side to give the reader a glimpse of the visitor experience in Design C.

Figure 6.13: Burial options in Design A include woodland, glade, and meadow

Table 6.7: Design C Ecosystem Services Summary

Cemetery	Cultural	Regulating
Design C	+ Increases spatial complexity + Space for contemplation + Sense of place + Native plants + Vernacular architecture + Enhances regional identity + Passive recreation + Immersive experience in nature + Opened to all religions + No distracting monuments + Spiritual and religious nourishment	+ Plant diversity + Habitat diversity + Pollinator habitat + No pasture + Reduced mowing + Air pollution reduction + Captures atmospheric carbon

By incorporating the proposed design standards, Design C provided more ecosystem services than were previously offered by this site, summarized in Table 6.7. This design has enhanced the mown pasture by increasing the spatial complexity and diversity of the vegetation. The introduction of a variety of textures and forms within the newly planted burial woodland, burial glade, and burial meadows increases the aesthetic appeal and interest of the site. These new spaces provide the contemplation and quiet sheltered spaces necessary for mourning deceased loved ones. The native plants, vernacular architecture, and naturalistic paths following the topography of the site increase the sense of place and regional identity of the site.

Through the proposed design standards, Design C also provides regulating ecosystem services. Since the pasture is being converted to woodland, regulating ecosystem services on the site will greatly increase. Due to the reduction in area to mow, the mowing frequency, use of herbicides, and harmful emissions from maintenance equipment will increase regulating ecosystem services on the site. Additionally, the

newly introduced burial spaces including the burial woodland, burial meadow, and burial glades provide food and shelter for essential insect and animal pollinators. The greater diversity of habitats should increase the diversity of pollinators found in the cemetery.

To quantify the regulatory ecosystem services in Design C, the existing conditions and the proposed design were both analyzed using i-Tree Canopy (i-Tree Canopy n.d.). By referencing an aerial image of the existing site and the plan of the proposed design, the author assigned a land cover class of tree, grassland/shrub, lawn, or impervious surface to 500 random data points on both the existing and proposed versions of the site. These points were used to estimate the percent land cover as well as the values for benefits provided by tree cover including air pollution reduction and capturing atmospheric carbon. Table 6.8 summarizes the findings from the i-Tree report for the existing conditions of the site for Design C Table 6.9 summarizes the findings from the i-Tree report for the proposed Design C.

Table 6.8: i-Tree Canopy Results of Exiting Site Conditions for Design C (i-Tree Canopy n.d.)

Cover Class	**Description**	**Data Points**	**% Cover**
Tree	Tree, non-shrub	102	77.4
Grassland	Grassland or shrub	386	20.4
Lawn	Mown lawn area	0	0
Impervious	Impervious surfaces	11	2.20
Abbreviation	**Benefit Description**	**Value (USD)**	**Amount**
CO	Carbon Monoxide removed annually	$1.64	19.08 lb
NO2	Nitrogen Dioxide removed annually	$0.88	44.79 lb
O3	Ozone removed annually	$93.62	786.10 lb
PM2.5	Particulate Matter less than 2.5 microns removed annually	$186.47	41.62 lb
SO2	Sulfur Dioxide removed annually	$0.08	10.79 lb
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$66.22	207.25 lb
CO2seq	Carbon Dioxide sequestered	$3,771.89	81.38 T

	annually in trees		
Co2stor	Carbon Dioxide stored in trees (not an annual rate)	$94,726.39	2,043.84 T

Table 6.9: i-Tree Canopy Results of Proposed Site Conditions for Design C(i-Tree Canopy n.d.)

Cover Class	Description	Data Points	% Cover
Tree	Tree, non-shrub	391	78.2
Grassland	Grassland or shrub	105	21.0
Lawn	Mown lawn area	0	0
Impervious	Impervious surfaces	4	0.80
Abbreviation	**Benefit Description**	**Value (USD)**	**Amount**
CO	Carbon Monoxide removed annually	$6.51	75.62 lb
NO2	Nitrogen Dioxide removed annually	$3.51	177.48 lb
O3	Ozone removed annually	$370.97	1.56 lb
PM2.5	Particulate Matter less than 2.5 microns removed annually	$738.90	164.92 lb
SO2	Sulfur Dioxide removed annually	$0.31	42.77 lb
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$262.41	821.25 lb
CO2seq	Carbon Dioxide sequestered annually in trees	$14,946.58	322.49 T
Co2stor	Carbon Dioxide stored in trees (not an annual rate)	$375,364.61	8,098.96 T

In comparison to the existing site conditions, the results of the proposed Design C reveal the regulating ecosystem services provided by tree canopy cover have significantly increased in every category analyzed by i-Tree Canopy. The proposed design converted the existing pasture to woodland which greatly improved the regulatory ecosystem services provided by the site.

CHAPTER 7

CONCLUSIONS

Summary

While urban areas in the United States continue to expand rapidly, land use for non-agricultural or non-development purposes within and outside urban areas is becoming a growing critical issue. As the world's population is predicted to grow, humans are confronted with the inevitable challenge of disposing of the remains of deceased loved ones. Presently, cemeteries comprise a land use that requires a large amount of area dedicated to the sole use of burying the dead. While the current burial practices of lawn cemeteries are known to be detrimental to the environment and expensive for the consumer, reintroducing natural burial as a legitimate burial option is a means to alleviate these issues and to derive greater societal values beyond the spiritual and cultural. The intent of this research was to answer the initial question: *Can natural burial cemeteries provide ecosystem services, while achieving the goals of honoring the deceased loved ones, to justify the re-purposing of land for natural burial cemeteries?*

Chapter 2 sought to understand the foundations of ecosystem services, burial practices of major world religions, and the evolution of relevant cemetery design styles through history. This analysis distilled important information from these findings into a list of elements that can potentially provide ecosystem service support in a natural burial cemetery design. Chapter 3 allowed the author to gain a greater understanding of current natural burial practices by conducting case studies of three local natural burial cemeteries

and interviews of their respective cemetery managers. Essential design elements which support both natural burial and ecosystem services at each cemetery were identified. Chapter 4 described the process for selecting a suitable site for a natural burial cemetery on two distinct locations: a mature woodland site and a farmland site which will be converted to woodland. Chapter 5 set forth the proposed set of design standards which included directions for designing the arrival, facilities and operations, burial grounds, and visitor experience. This chapter laid the framework for the three designs in Chapter 6. Chapter 6 was the culmination of the research which tested the proposed set of design standards on three unique sites.

Design Evaluation

By comparing the summarized findings matrices in Chapter 2 and Chapter 3 to the summarized matrices for each of the designs in Chapter 6, a critique of the designs, and thus the proposed design standards, was achieved.

It is evident that cultural ecosystem services are thoroughly represented throughout each of the three designs. From the findings in Chapters 2 and 3, it is not surprising that cultural ecosystem services can be heavily represented in any cemetery, especially in a natural burial cemetery. A natural burial cemetery can be designed to provide multiple opportunities for recreational space, a contemplative atmosphere, spiritual enrichment, and sense of place. Design A provides a sense of place through utilizing the existing woodland on site. Walking, bird watching, and contemplating are all passive recreation opportunities provided on this site. Cultural ecosystem services are provided in Design A through religious nourishment in the chapel as well as spiritual enrichment within the unique burial environments. Design B improves the sense of place

of the existing lawn cemetery since the burial grounds are expanded into the mature woodlands behind the existing cemetery. Likewise, passive recreation opportunities such as walking, bird watching, and contemplating are also offered in Design B. Adding a chapel to this cemetery provides religious nourishment that the existing cemetery was unable to provide. Additionally, spiritual enrichment is provided within the expanded burial environments. Design C provides cultural ecosystem services as well. Although the site was previously farmland, Design C enhances the sense of place of the site converting the land cover to woodlands found within its Piedmont region. Passive recreation is introduced to the site through walking, bird watching, and contemplation. Like the Designs A and B, this site provides a chapel and spiritual enrichment through the immersive experience of being in nature.

The findings in Chapters 2 and 3 revealed that provisioning ecosystem services are not represented within the context of burial and cemeteries. It is a service that is not represented as much as cultural, regulating, or supporting. The author believed not incorporating provisioning services in a natural burial cemetery is supported by the findings in Chapters 2 and 3.

Chapters 2 and 3 demonstrated that regulating ecosystem services can be adequately represented within natural burial cemeteries. Providing biodiversity and a variety of wildlife habitats is important when planning for regulating ecosystem services. Design A explores an arrangement of burial glades within the mature woodlands to provide habitat for some woodland edge-dwelling bird species. Additionally, adding a burial meadow increases pollinator habitat and additional habitat for bird species preferring more open space. Designs B and C explore a different arrangement of burial

glades which extend finger-like from a centralized meadow space. These arrangements both provide habitat for desired edge-dwelling bird species and pollinators. All three designs intended to provide regulating ecosystem services through introducing biodiversity into a space with a variety of plant species and habitat arrangement. Through the i-Tree Canopy analysis, it is evident that increasing the amount of tree canopy cover on a site will provide more regulating services such as air pollution reduction and capturing atmospheric carbon.

As the research in Chapter 2 discovered, supporting ecosystem services is difficult to plan for since they provide long-term, indirect, and intangible benefits to humans. The best approach is to maximize cultural, provisioning, and regulating ecosystem services and expect that supporting services will emerge from that commitment over time.

Natural Burial and the American Trends of Memorialization of Deceased

As evident in the evolution of cemetery design styles in Chapter 2, burial and memorialization methods in America directly reflect the societal views and values of the time period.

Chapter 2 revealed a trend which shifted away from individual memorialization towards a more family focused burial. With the advances in medicine and growing urbanization, the life expectancy in America has almost doubled from 41 years in 1900 to 76 years in 2015 (Roser 2019). Individuals now live significantly longer which allow them to form bonds with their families in a way which was not possible previously. These strengthened relationships is reflected in the desires of families to be buried near one another, the visitation frequency, and the mourning practices (Sloane 1991).

Another identified trend is the shift away from historical and artistic ideals towards a space which cherished the memories of the deceased, resulting from other cultural institutions such as museums and botanical gardens assuming these functions. The creators of memorial parks further emphasized this shift by obscuring any morbid association with cemeteries by referring to them in this delicate way (Sloane 1991).

Also revealed in Chapter 2, a trend is shifting away from burials on sacred and religious spaces towards secular spaces which harbor community and cultural interactions. Currently, there is yet another trend which shifts even further away from the secular space. This shift reveals a desire to reduce any negative environmental impacts and to minimize the physical footprint of a grave managed in perpetuity (Sloane 1991). This trend is especially evident in the concept of human composting, which is in the process of being legalized in Washington State. This method of burial plans to compost human remains over a period of 30 days which will turn into soil which family members are encouraged to take home to use in their garden as a reminder that life and death are connected. Since individuals are composted and not buried, there is not permanent grave location for loved ones to visit (Recompose n.d.).

Natural burial is aligned with all of these identified trends. Since an analysis in history of cemetery design movement reveals a desire for these changes in memorialization, natural burial should be embraced as an acceptable solution. Although human composting responds to these trends, natural burial provides the grieving and religious components which human composting lacks.

Implications for Further Research

While the proposed design standards successfully addressed the identified elements which provide ecosystem services support in a natural burial cemetery, further additional research could help develop these to be successful when realized in practice. Thus, through further research, the author hopes that the proposed design standards can be expanded upon and refined. Some of the opportunities for future research include:

- Identify ways to equally represent all ecosystem services within a natural burial cemetery, specifically a more balanced representation of provisioning services
- Investigate the benefits and drawbacks of privately and federally operated and funded cemeteries
- Examine the demographics of current users of natural burial
- Develop approaches for disseminating and popularizing the adoption of natural burial cemeteries in areas with conservative traditions
- Investigate ways to make land use more efficient in natural burials to achieve a greater burial site density than currently practice
- Evaluate the impact these design standards could potentially have on climate change and issues such as heat island effect in urban areas
- Develop means for quantifying the benefits of ecosystem services in natural burial cemeteries

By sharing the ideas presented in this thesis, the author hopes to initiate a discussion about the underutilized potential natural burial cemeteries could have for relieving pressing environmental and land use issues. Popularizing this burial method could provide numerous benefits to grieving individuals and to the surrounding ecosystem. Perhaps with more education and awareness about natural burial, this country could witness a transition away from the current detrimental burial practices towards a cemetery that supports the needs of grieving individuals and is an example of ecological responsibility.

BIBLIOGRAPHY

Antyeshti Samskar Committee. 2009. *Hindu Antyeshti Samskar (Practical Guidelines for Final Rites) for North America*: Vishwa Hindu Parishad of America, Inc.

Arcese, P., M. K. Sogge, A. B. Marr, and M. A. Patten. 2002. Song Sparrow (*Melospiza melodia*), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.704

Bachelor, P. 2004. *Sorrow & Solace: the social world of the cemetery*. Amityville, NY, Baywood Publishing Company, Inc.

Basmajian, C. and C. Coutts. 2010. "Planning for the Disposal of the Dead." Journal of the American Planning Association 76(3): 305.

Bell, J. 2018. “Milton Fields Interview”. Interview by Mary Mathis. September 06, 2017.

Bennett, G. and P. J. Davies .2015. "Urban cemetery planning and the conflicting role of local and regional interests." Land Use Policy 42: 450-459.

Britton, J. 2014. "'Feeling Is Our Objective': Green-Wood Cemetery, Sentiment, and Refinement in Antebellum New York." Nineteenth-Century Contexts 36(1): 19-34.

Buckham, Susan. 2003. “Commemoration as an Expression of Personal Relationships and Group Identities: A Case Study of York Cemetery.” *Mortality* 8, no. 2 (May 2003): 160–75. doi:10.1080/1357627031000087406

Campbell, B. n.d. "Ramsey Creek Preserve Planning." Accessed Novemeber 04, 2018, from http://www.memorialecosystems.com/Locations/WestminsterSC/Planning/tabid/60/Default.aspx.

Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2010. “From Cabbages to Cadavers: Natural Burial Down on the Farm.” In *Deathscapes: Spaces for Death, Dying, Mourning and Remembrance*, edited by Avril Maddrell and James D. Sidaway, 119–40. Surrey, England: Ashgate. http://proxy-remote.galib.uga.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=mzh&AN=2011015337&site=eds-live.

Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2015. *Natural Burial: Landscape, Practice and Experience*. London, England: Routledge.

Clayden, A., Green, T., Hockey, J., & Powell, M. 2018. “Cutting the lawn − Natural burial and its contribution to the delivery of ecosystem services in urban cemeteries”. *Urban Forestry & Urban Greening*, 33, 99–106. https://doi.org/10.1016/j.ufug.2017.08.012

Clayden, A., et al. 2010. "Natural Burial: The De-materialising of Death?" *Matter of Death: Space, Place & Materiality*: 148.

Clayden, A. and J. Woudstra .2003. "Some European approaches to twentieth-century cemetery design: continental solutions for British dilemmas." *Mortality* 8(2): 189-208.

Green Burial Council. 2015. “Cemetery Certification Standards”. http://greenburialcouncil.org/standards/.

Coutts, Christopher, Carlton Basmajian, Joseph Sehee, Sarah Kelty, and Patrice C. Williams. 2019. “Natural Burial as a Land Conservation Tool in the US.” *Landscape And Urban Planning* 178: 130–43. Accessed March 11. doi:10.1016/j.landurbplan.2018.05.022.

Curl, James Stevens. 1980. *A Celebration of Death : An Introduction to Some of the Buildings, Monuments, and Settings of Funerary Architecture in the Western European Tradition.* London : Constable, 1980.

Davies, P.J., and G. Bennett. 2016. “Planning, Provision and Perpetuity of Deathscapes—Past and Future Trends and the Impact for City Planners.” *Land Use Policy* 55 (September): 98–107. doi:10.1016/j.landusepol.2016.03.029.

Forest Lawn n.d. “The Royal Wedding.” Accessed 6 March 2019. https://forestlawn.com/2018/05/18/the-royal-wedding/

Francis, Doris, Leonie Kellaher, and Georgina Neophytou. 2000. “Sustaining Cemeteries: The User Perspective.” *Mortality* 5 (1): 35–52. doi:10.1080/713685994.

Gowaty, P. A. and J. H. Plissner .2015. Eastern Bluebird (*Sialia sialis*), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.381

Halkin, S. L. and S. U. Linville .1999. Northern Cardinal (*Cardinalis cardinalis*), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.440

Higgins, Jessica Faith. 2013. *Deathscapes: Designing Contemporary Landscapes to Solve Modern Issues in Cemeteries*. 2013.

i-Tree Canopy. i-Tree Software Suite v5.x. n.d.. Web. Accessed 8 March. 2019. http://www.itreetools.org

Jernigan, Scarlet. 2015. "'Why Should a Christian Desire to Sleep Here?': The Unitarian Rural Cemetery Movement and Its Adoption in Macon, Georgia." *Georgia Historical Quarterly*.

Johnson, Christopher Jay, and Marsha G. McGee. 1998. *How Different Religions View Death & Afterlife.* Philadelphia, PA : Charles Press, 1998.

Johnson, Peter. 2008. "The Modern Cemetery: A Design for Life." *Social & Cultural Geography* 9 (7): 777–90. doi:10.1080/14649360802383154.

Keune, Hans, Nicolas Dendoncker, and Sander Jacobs. 2014. *Ecosystem Services : Global Issues, Local Practices*. San Diego, CA: Elsevier.

Lee, Tom1. 2015. "Place and Identity: What Can We Learn from the Dead?" *Craft Plus Design Enquiry*, no. 7 (January): 99–112.

Maddrell, Avril, and James D. Sidaway. 2010. *Deathscapes : Spaces for Death, Dying, Mourning and Remembrance*. Farnham, Surrey, England: Routledge.

Menke, B. 1996. "North Country Scenic Trail: a Handbook for for Trail Design, Construction, and Maintenance". N. P. S. United States Department of the Interior.

Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.

Mostrum, A. M., R. L. Curry, and B. Lohr. 2002. Carolina Chickadee (*Poecile carolinensis*), version 2.0. In The Birds of North America (A. F. Poole and F. B.

Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.636

O.C.G.A § 8-6-4 (2015).

O.C.G.A § 31-21-4 (2017).

Parry, J. K. and A. S. Ryan (1995). *A Cross-Cultural Look at Death, Dying, and Religion*. Chicago : Nelson-Hall Publishers, 1995.

Recompose n.d. "FAQ." Accessed 3 April 2019. https://www.recompose.life/faq

Roser, Max 2019. "Life Expectancy". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/life-expectancy'

Rugg, J. 1998. "'A Few Remarks on Modern Sepulture': Current Trends and New Directions in Cemetery Research." *Mortality -Abingdon*.

Rugg, J. 2000. "Defining the Place of Burial: What Makes a Cemetery a Cemetery?" *Mortality -Abingdon.*

Sloane, D. C. 1991. *The Last Great Necessity : Cemeteries in American History*. Baltimore : Johns Hopkins University Press, 1991.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Series Classification Database. Available online. Accessed 12 November 2018.

United Nations. 2015. "Transforming our world: the 2030 Agenda for Sustainable Development". [accessed 2018 March 02] https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

U.S. Geological Survey, 20140, *NLCD 2011 Land Cover* (2011 Edition): U.S. Geological Survey, Sioux Falls, SD.

Vanderhoff, N., P. Pyle, M. A. Patten, R. Sallabanks, and F. C. James. 2016. American Robin (*Turdus migratorius*), version 2.0. In The Birds of North America (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.462

Watts, R. 2018. "Greenhaven Preserve Interview". Interview by Mary Mathis. September 04, 2018.

Webster, L. 2015. "Opening, Closing, and Maintenance of a Green Burial Grave". *Green Burial Counci.l* 1-6

Webster, L. 2016. "The Science Behind Green and Conventional Burial". *Green Burial Council*. 1-12

Weidensaul, S., T. R. Robinson, R. R. Sargent, and M. B. Sargent. 2013. Ruby-throated Hummingbird (*Archilochus colubris*), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.204

Weidner, Emily, Robert Deal, Lisa Fong, and Erin Phelps. 2016. *Integrating Ecosystem Services into National Forest Service Policy and Operations / Robert Deal, Lisa Fong, and Erin Phelps, Technical Editors*. General Technical Report PNW: 943.

Whittaker, J. 2018. "Honey Creek Woodlands Interview". Interview by Mary Mathis. September 27, 2019

Wingren, C. 2013. "Place-Making Strategies in Multicultural Swedish Cemeteries: The Cases of ‘Östra Kyrkogården’ in Malmö and Järva Common." *Mortality* 18(2): 151-172.

Woodthorpe, K. (2011). "Sustaining the Contemporary Cemetery: Implementing Policy Alongside Conflicting Perspectives and Purpose." *Mortality* 16(3): 259.

Worpole, Ken. 2003. *Last Landscapes : The Architecture of the Cemetery in the West*. London : Reaktion, 2003.

arwood, Richard, James D Sidaway, Claire Kelly, and Susie Stillwell. 2015. “Sustainable Deathstyles? The Geography of Green Burials in Britain.” *The Geographical Journal*, no. 2: 172. doi:10.1111/geoj.12087.

APPENDIX A

GREEN BURIAL COUNCIL: CEMETERY CERTIFICATION STANDARDS

New Standard #	Criteria	Hybrid	Natural Burial Grounds	Conservation Burial Grounds
	CUSTOMER RELATIONS CRITERIA			
1.	Accurately represent earned level of GBC certification in marketing materials, websites, and conversations with the public, clients, and the media.	√	√	√
2..	Obtain GBC certification for any funeral homes that operate on the premises.	√	√	√
	BURIAL PRACTICES CRITERIA			
3.	Provide clients and families with the opportunity to participate in the burial and ritual process in keeping with state law and with these standards.	√	√	√
4.	Accept for burial only decedents that have not been embalmed or those embalmed only with GBC-approved, nontoxic chemicals.	√	√	√
5.	Prohibit the use of a vault (partial, inverted, or otherwise), a vault lid, concrete box, slab or partitioned liner in the burial plot.	√	√	√
6.	Limit burial containers, shrouds, and all associated materials to those made from biodegradable, natural materials.	√	√	√
	SITE PLANNING			
7.	Operate only outside sensitive areas as identified in the ecological assessment.		√	√
8.	Conduct an ecological assessment that includes baseline information on existing geology, hydrology, soils, topography, cultural resources, and existing and potential native animals and plants.		√	√
9.	Preserve, enhance, or restore a historic native or natural community of the region.			√
10.	Conserve or restore minimum of 10 acres, or 5 acres if contiguous to other protected lands.			√

New Standard #	Criteria	Hybrid	Natural Burial Grounds	Conservation Burial Grounds
	CARE OF GROUNDS			
11.	Compile a list of native plants based on the ecological assessment to use memorial features and to enhance plant diversity on the site.		√	√
12.	Develop a plan for protecting or salvaging rare plants identified in the ecological assessment.		√	√
	OPERATIONS AND MANAGEMENT			
13.	Develop a Maintenance and Operations Manual to be given to all staff members, contractors, and volunteers to communicate site goals and methods of meeting them.	√	√	√
14.	Implement an invasive plant and pest control plan to employ best management practices for the control of invasive species and to discourage the use of pesticides, except as a last resort.	√	√	√
15.	Develop a plan for dealing with unauthorized grave decoration and landscaping.	√	√	√
16.	Use excavation and burial techniques that minimize impacts on soil health and plant diversity.		√	√
17.	Develop a plan for limiting the types, sizes, and visibility of memorial markers/features to preserve or restore naturalistic vistas in the cemetery landscape.		√	√
18.	Develop a plan for limiting access to sensitive areas as well as policies for families who choose backcountry or off-trail burial		√	√
	PRESERVATION AND STEWARDSHIP			
19.	Establish an endowment fund to ensure the long-term maintenance of the site by setting aside at least 10% of all burial plot sales.	√	√	√
20.	Guarantee preservation of burial ground by deed restriction, conservation easement, or other legally biding and irrevocable agreement that runs with the land and is enforceable in perpetuity.		√	√
21.	Operate in conjunction with a government agency or a nonprofit conservation organization that has legally binding responsibility for perpetual enforcement of the easement and must approve any substantive changes to operational or conservation policies that might impact the ecological objectives of the site.			√

APPENDIX B

HONEY CREEK WOODLANDS RULES AND REGULATIONS

1. Honey Creek Woodlands will not accept embalmed bodies for burial
2. No burial vault of any kind may be used at Honey Creek Woodlands
3. Honey Creek Woodlands requires 48 hour notice prior to burial for cremation. 72 hours for full body burials.
4. All caskets, urns and shrouds must be made of all natural biodegradable materials
5. Only approved native vegetation may be planted at Honey Creek Woodlands
6. No grave decorations other than natural cut flowers are permitted
7. No statues or upright monuments of any kind are permitted
8. Grave markers are limted to native fieldstones purchased through Honey Creek Woodlands
9. As of 3/1/2015 – the placement of benches is no longer allowed at Honey Creek Woodlands
10. All pets must be on a leash at all times while visiting Honey Creek Woodlands. Please clean up after your pet.
11. Approval is required prior to the placement of any bird houses.
12. No mulch, straw, or bark shall be brought into Honey Creek Woodlands. These items may contain seeds of invasive species.
13. Do not remove or destroy any vegetation at Honey Creek Woodlands
14. Carts must remain on cart paths at all times

15. No balloons or balloon releases are allowed at Honey Creek Woodlands

16. Cars are only permitted in preserve for burial

Bachelor, Philip. 2004. *Sorrow & Solace: the social world of the cemetery*. Amityville, NY: Baywood Publishing Company, Inc.
Basmajian, Carlton, and Christopher Coutts. 2010. "Planning for the Disposal of the Dead." *Journal of the American Planning Association* 76 (3):305. doi: 10.1080/01944361003791913.
Bell, Jim. 2018. Milton Fields Interview. edited by Mary Mathis.
Bennett, G., and P. J. Davies. 2015. "Urban cemetery planning and the conflicting role of local and regional interests." *Land Use Policy* 42:450-459. doi: 10.1016/j.landusepol.2014.08.011.
Campbell, Billy. "Ramsey Creek Preserve Planning." accessed Novemeber 04, 2018. http://www.memorialecosystems.com/Locations/WestminsterSC/Planning/tabid/60/Default.aspx.
Clayden, Andrew, and Jan Woudstra. 2003. "Some European approaches to twentieth-century cemetery design: continental solutions for British dilemmas." *Mortality* 8 (2):189-208. doi: 10.1080/1357627031000087424.
Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2010. "From Cabbages to Cadavers: Natural Burial Down on the Farm." In *Deathscapes: Spaces for Death, Dying, Mourning and Remembrance*, edited by Avril Maddrell and James D. Sidaway, 119-140. Surrey, England: Ashgate.
Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2015. *Natural Burial: Landscape, Practice and Experience*. London, England: Routledge.
Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2018. "Cutting the lawn - Natural burial and its contribution to the delivery of ecosystem services in urban cemeteries." *Urban Forestry & Urban Greening*. doi: 10.1016/j.ufug.2017.08.012.
Council, Green Burial. 2015. Cemetery Certification Standards. http://greenburialcouncil.org/standards/.
Curl, James Stevens. 1980. *A celebration of death : an introduction to some of the buildings, monuments, and settings of funerary architecture in the Western European tradition*: London : Constable, 1980. Bibliographies
Non-fiction.
Francis, Doris, Leonie Kellaher, and Georgina Neophytou. 2000. "Sustaining cemeteries: the user perspective." *Mortality* 5 (1):35-52.
Jacobs, Sander, Nicolas Dendoncker, and Hans Keune. 2014. *Ecosystem services : global issues, local practices*: Boston : Elsevier, 2014. Non-fiction
Electronic document.
Jernigan, Scarlet. 2015. "'Why Should a Christian Desire to Sleep Here?': The Unitarian Rural Cemetery Movement and Its Adoption in Macon, Georgia." 290.
Johnson, Christopher Jay, and Marsha G. McGee. 1998. *How different religions view death & afterlife*: Philadelphia, PA : Charles Press, ©1998.
2nd ed. Bibliographies

Non-fiction.
Kowarik, Ingo, Sascha Buchholz, Moritz von der Lippe, and Birgit Seitz. 2016. "Biodiversity functions of urban cemeteries: Evidence from one of the largest Jewish cemeteries in Europe." *Urban Forestry & Urban Greening* 19:68-78. doi: 10.1016/j.ufug.2016.06.023.
Lee, Tom. 2015. "Place and identity: What can we learn from the dead?" *Craft Plus Design Enquiry* (7):99-112.
Menke, Bill. 1996. North Country Scenic Trail: a Handbook for for Trail Design, Construction, and Maintenance. edited by National Park Service United States Department of the Interior.
Parry, Joan K., and Angela Shen Ryan. 1995. *A cross-cultural look at death, dying, and religion*, *The Nelson-Hall series in social work*: Chicago : Nelson-Hall Publishers, ©1995. Bibliographies
Non-fiction.
Pattison, William D. 1955. "The Cemeteries of Chicago: A Phase of Land Utilization." *Annals of the Association of American Geographers* 45 (3):245-257.
Rugg, J. 2000. "Defining the place of burial: what makes a cemetery a cemetery?", 259.
Sloane, David Charles. 1991. *The last great necessity : cemeteries in American history*, *Creating the North American landscape*: Baltimore : Johns Hopkins University Press, ©1991. Bibliographies
Non-fiction.
Watts, Ronnie. 2018. Greenhaven Preserve Interview. edited by Mary Mathis.
Webster, Lee. 2015. Opening, Closing, and Maintenance of a Green Burial Grave. 1-6. Accessed December 2, 2018.
Webster, Lee. 2016. The Science Behind Green and Conventional Burial. 1-12. Accessed November 10, 2018.
Weidner, Emily, Robert Deal, Lisa Fong, and Erin Phelps. 2016. *Integrating ecosystem services into national forest service policy and operations / Robert Deal, Lisa Fong, and Erin Phelps, technical editors*, *General technical report PNW: 943*. Monograph.
Whittaker, Joe. 2018. Honey Creek Woodlands Interview. edited by Mary Mathis.
Woodthorpe, Kate. 2011. "Sustaining the contemporary cemetery: Implementing policy alongside conflicting perspectives and purpose." *Mortality* 16 (3):259. doi: 10.1080/13576275.2011.586125.
Worpole, Ken. 2003. *Last landscapes : the architecture of the cemetery in the West*: London : Reaktion, 2003. Bibliographies
Non-fiction.