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# Natural Resources and Green Spaces



## Synopsis

Through the thoughtful study and analysis that went into the creation of a variety of reports and plans, including the *Together Making Nashville Green Report*, the *Nashville Open Space Plan*, the *Parks and Greenways Master Plan*, *Managing Nashville's Urban Forests*, the *Low Impact Development Manual*, and the *Green Infrastructure Master Plan*, Nashville has already analyzed national best practices and created a variety of programs tailored for the city. This background report draws on these previous efforts and focuses on Nashville's natural resources and green spaces through a layman's discussion of watersheds and waterways; woodlands and trees; parks and greenways; food and farming; and wildlife habitat and viewing. The report includes programs underway and ideas for the future.

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### Role and Purpose of Background Reports



This background report was developed to provide input to the NashvilleNext planning process. It was researched and authored by community members interested, involved, and knowledgeable on the topic. The authors present best practices, an evaluation of the state of the topic in the Nashville community today, and recommendations for consideration during the planning process.

This report provides a *starting point* for broader community discussion and reflection based on the research and recommendations of the authors. Throughout the planning process, NashvilleNext will use this and other background reports, ongoing research, departmental involvement, community input and engagement to discuss, refine and formulate the policies and recommendations for the general plan.

The information and recommendations provided in this background report are solely those of the authors and contributors and are being provided at the beginning of the NashvilleNext process to start community discussion.

The NashvilleNext Steering Committee thanks and extends its sincere appreciation to the authors of and contributors to this background report for the time and effort to provide this report for community consideration and discussion. The Steering Committee looks forward to the ongoing dialogue on the issues and recommendations that the authors provide.

Any final policies and recommendations endorsed by the NashvilleNext Steering Committee for the consideration of the Metropolitan Planning Commission will be the result of the entire planning process and upcoming community engagement and discussion.

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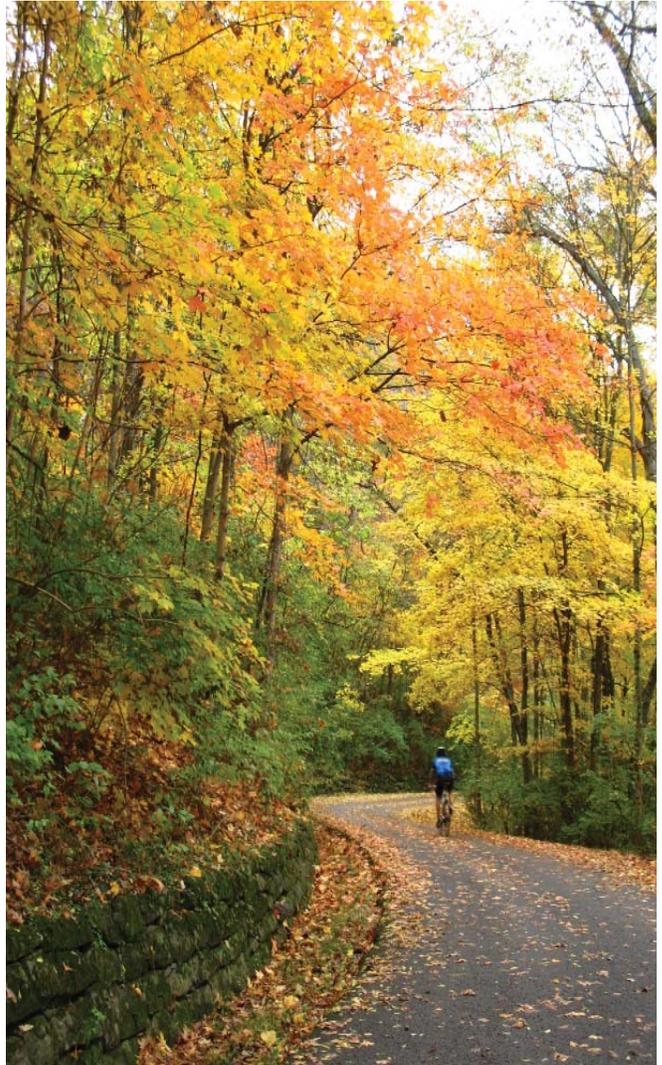
### Introduction

Nashville is a uniquely beautiful place, with a captivating natural environment that contributes greatly to the city's character and distinctiveness. The Cumberland River winds around numerous bends; forested hills are scattered throughout the city; hollows blanket the western area; unique cedar glades grow in the southeast; community gardens dot neighborhoods with fresh food; and parks and lakes, both big and small, are havens for wildlife and for people looking to escape the fast pace of the city.

### Nashville's Green Infrastructure

Nashville's natural character is distinguished by its varying topography of rolling hills, steep bluffs, gentle valleys, flat floodplains, thick forests, and numerous rivers and streams. Since becoming a Metropolitan Government in 1963, Nashville/Davidson County contains 526 square miles (336,640 acres). The city contains approximately 2,500 miles of waterways, primarily the Cumberland River which bisects the county, numerous other tributaries and streams, and three, large man-made lakes. In addition, over 38,000 acres of land are located in the floodplain. Nashville has 87 known caves, 30 species of breeding birds, and 108 rare terrestrial and aquatic species, including the Nashville Crayfish, an endangered species that is unique to the Mill Creek watershed. Nashville also had cedar glades that are not found anywhere else in the world.

Nashville's natural areas and green spaces provide places of scenic beauty and are important for recreation and socialization. Natural areas also provide habitat for plants and animals, land that absorbs and filters water before it enters our rivers, land that we farm, and land that is forested. Green infrastructure refers to the services provided by open spaces, including tree-lined streets, community gardens, parks, greenways, pocket parks, farmland, forestland, gardens, meadows, waterways, and bluffs. (Please refer to the Open Space Plan Vision Map later in the report that includes Nashville's Green Infrastructure.)



### Green Ribbon Committee on Environmental Sustainability

In June 2008, Mayor Karl Dean appointed the Green Ribbon Committee, comprised of 27 community members with broad experience, expertise, and interest in environmental and sustainability issues. This effort produced a shared vision of how to protect and enhance Nashville's distinctive environmental quality and livability and provided a means for Nashville to harness community interest in environmental leadership and to initiate environmental policies, structures, and processes to address environmental and livability issues. The resulting *Together Making Nashville Green Report* presented 16 goals and 71 recommended actions. Goals and recommendations were organized around the topics of Greenhouse Gases; Education and Outreach; Energy and Building; Mobility; and Natural Resources. The Green Ribbon Committee's report provided goals and recommended actions. A number of the report's actions have been accomplished and will be discussed throughout this report.

### Purpose of this Background Report

Through the thoughtful study and analysis that went into the creation of a variety of reports and plans, including the *Together Making Nashville Green Report*, the *Nashville Open Space Plan*, the *Parks and Greenways Master Plan*, *Managing Nashville's Urban Forests*, the *Low Impact Development Manual*, and the *Green Infrastructure Master Plan*, the city has already looked at best practices from around the country and created a variety of programs tailored for Nashville. This background report draws on these previous efforts and focuses on Nashville's natural resources and green spaces through a layman's discussion of Nashville's watersheds and waterways; woodlands and trees; parks and greenways; food and farming; and wildlife habitat and viewing. It includes programs underway and ideas for the future. Note that wildlife, including wildlife habitat and wildlife corridors, is woven into the first four sections, so its individual section is shorter than oth-

ers. References, resources, web page links, and additional information are found at the end of the report.

This background report is by no means comprehensive, and some topics of natural resources are addressed in other background papers. For example, clean air is discussed in sections of this paper as it is tied to other resources such as trees and forests. However, since one of the biggest contributors to air pollution is our automobiles, clean air is discussed in more detail in the *Livability, Health and the Built Environment* background report, which emphasizes the need for more choices in our transportation system. The *Livability, Health and the Built Environment* background report also discusses the importance of "smart growth," which means building communities with housing and transportation choices near jobs, shops, and schools; this approach supports local economies and protects the environment. Meanwhile, sustainable energy is also discussed in the *Livability, Health and the Built Environment* background report and in the *Adaptation and Sustainability* background report.

There are topics related to natural resources that are not discussed in detail in this report, such as greenhouse gases, green jobs, climate change, green energy, waste reduction and recycling, clean technology vehicles, and green building. Readers with interest in these topics are encouraged to delve into the resources listed at the end of the paper and reference the *Adaptation and Sustainability* background report.

### Part 1 – Nashville’s Watersheds and Waterways

Rivers, streams, lakes, and wetlands are all water resources. Rivers and streams carry flowing water, while lakes and reservoirs store water. Wetlands, lands which are permanently or periodically saturated with water, hold water, assist with flood control, and help filter out pollutants. These water features are all surface-water resources that are replenished by precipitation. Nashville’s interconnected water network contributes to the city’s clean air and water, as well as recreation and additional environmental, social and economic benefits for people and nature. These water bodies supply our drinking water, water for agriculture, and water for industry. When looking at waterways, it is necessary to think beyond the water itself and consider areas adjacent to waterways (floodplains and wetlands) as well as the larger watershed area (headwater area).

A watershed is an area of land that drains rain water into one location, such as a stream, lake, or wetland. Watersheds are catchment basins, covering a specific area where rain, snow, springs, and waterways converge at a single meeting point. Smaller waterways, such as creeks, feed into larger tributaries, and then into even larger tributaries. Each watershed is separated from others by ridges and hills, and size ranges from large-scale to mini-watersheds.

Watersheds sustain life, in more ways than one. Watersheds offer opportunities for recreation and provide habitats for numerous plants and animals. According to the U.S. Environmental Protection Agency in their watersheds approach, more than \$450 billion in foods, fiber, manufactured goods, and tourism depend on clean, healthy watersheds. Unfortunately, various forms of pollution, including water runoff and erosion, can interfere with the health of watersheds. Watershed protection means protecting a lake, river, or stream by managing the entire watershed that drains into it. By looking at the larger watershed area, many water quality problems can be better controlled; drinking water sources can be better protected; activities and programs can be coordinated with other

agencies and jurisdictions; aquatic habitats and systems can be comprehensively protected and restored; public participation opportunities can be increased; common priorities and strategies can be formulated; and success can be monitored through combined data gathering.

Rivers and streams are natural watercourses that flow from headwater areas to meet another waterway (stream, river, or ocean). Rivers and streams convey excess water from precipitation or from a spring to a point where the water is taken up again as vapor through evaporation. In the next phase of the hydrologic cycle, the water returns to earth as rain or snow.

In Nashville, rivers range from the large Cumberland River to smaller rivers, such as the Harpeth River. Creeks are the principal tributary streams of rivers, and tend to be smaller in scale. Most creeks are perennial (meaning they always have water), but some are intermittent (only holding water at certain times). Creeks have tributaries also. In our region, these smaller and often intermittent waterways are often called branches, but elsewhere may be called brooks.

Floodways are the channels of rivers of other watercourses that carry the deepest, fastest water downstream. Floodplains are areas where flooding is common. Mostly, floodplains are areas adjacent to rivers, creeks, lakes, streams, and other waterways that are subject to flooding when there are significant rainfall events. Floodplains play a multi-faceted role in providing beneficial functions to waterways, especially when they are undisturbed or have been restored to a natural state. These benefits include providing open space, filtering impurities and nutrients from water runoff, providing flood and erosion control, recharging groundwater, creating/enhancing wildlife habitat areas, providing agricultural lands with rich soil, and preserving archeological sites. Floodplains require careful management in order to preserve their value as scenic resources and also to prevent damage that results from water overflow. Land preservation

along rivers and streams has been identified as the least costly and most effective way to improve water quality. Conserved floodplains can provide significant areas of open space, such as greenways (discussed in the Parks and Greenways section), and perform certain invaluable ecological functions. Floodplain areas provide productive and critical habitat for a variety of wildlife and plant species.

Floodplains appear to be prime lands for development because they are generally flat. The risk of periodical flooding, however, poses a constant threat to development. At the same time, development can increase the frequency and intensity of flooding elsewhere. Buildings and pavement can obstruct the flow of water, especially stormwater. Development in floodplains and/or in the watersheds above them can also increase the magnitude and frequency of floods and the size of the area inundated.

Wetlands, lands which are permanently or periodically saturated with water, contain plants and animals specifically adapted for life in these conditions. Wetlands were once viewed by many as wasted areas that limited development. However, today their benefits are recognized. Wetlands help reduce flooding by storing water and help maintain other water flow in drier times. In addition, wetlands help to filter pollutants and reduce erosion. These areas are some of the most productive wildlife habitat and are important to outdoor enthusiasts including hunters and birdwatchers.

Protecting headwater areas – tributary streams, intermittent streams, and springs that are protected by tree cover, vegetation, and undisturbed soils – are essential to preserving a healthy water ecosystem and protecting vital water resources. Healthy, undisturbed headwater areas supply organic matter that contributes to the growth, productivity, and biodiversity of plants and wildlife, including mammals, insects, amphibians, reptiles and fish. Forested areas protect headwaters from pollution by filtering pollutants out of the stream system and slow erosion from flooding, thereby minimizing sediments in the water. Water

absorbed by deep tree roots and stable soils enters cracks in the bedrock, slowly moves down slopes, and exits near streams and from springs. Vegetated areas along streams provide shade, which serves to benefit water quality by preventing the heating of shallow streams and related thermal impacts. Preserving and planting native vegetation plays a key role, as native plants typically have deeper roots to prevent erosion and capture contaminants. Protecting headwater areas also impacts road and building location decisions. Roads above steep slopes can contribute to landslides, by collecting water and channeling it into an already unstable hillside. Houses and buildings at the base of steep slopes can be flooded in heavy rainfall events. Additionally, rainfall can trigger landslides on unstable slopes that destroy houses and buildings.

Please refer to Graphic 1 on the following page.

Population growth and development in the Middle Tennessee region has the potential to be the greatest risk to water resources, and other natural resources. With growth, there is an increased chance of pollution because more residents are undertaking activities that generate pollution. Growth decisions that are made without considering the impacts to the natural environment also risk harming Nashville's natural resources. As woodland areas are developed, there is also an increased chance of negatively impacting stormwater runoff, water storage, slope stability, and riparian zones. Water has the potential to run at higher velocities and volumes in these areas. Shortages are also possible as more demand causes strain on the existing infrastructure, and utility districts may not be able to sustain their current systems, upgrade systems where there are issues, and expand systems as needed.

### Nashville's Watersheds

Nashville contains portions of four watersheds. Each of these watersheds is rich in environmental and cultural history and extends beyond the county line. A useful tool in understanding a watershed is to refer-

Graphic 1: Example of Watershed



Source: U.S. Environmental Protection Agency

ence its ecoregion, a defined area of similar geography, topography, climate, natural vegetation, hydrology, and soils that support similar plant and animal life. Using ecoregions as a framework allows assessment, management, and monitoring of each ecoregion and its diverse and inter-related components, including the watershed area.

In addition to water resources and geology, each watershed contains plants and animals. The Tennessee Department of Environment and Conservation (TDEC) maintains a database of rare species that is shared by partners at the Nature Conservancy, the Tennessee Wildlife Resources Agency, the U.S. Fish and Wildlife Service, the Tennessee Valley Authority, and local municipalities. The database information is used to track the occurrence of rare species in order to accomplish the goals of site conservation and protection of biological diversity; identify the need for, and status of, recovery plans; and conduct en-

vironmental reviews in compliance with the Federal Endangered Species Act.

### Nashville's Ecoregion – Interior Plateau

According to the U.S. Geological Survey, Nashville is located within the Interior Plateau, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Elevations are lower than the Appalachian ecoregions to the east, and higher than elevations to the west. Rock types include limestone, chert, sandstone, siltstone, and shale. The natural vegetation is primarily oak-hickory forest, with some areas of cedar glades. In addition, the ecoregion has a diversity of fish, wildlife, and plants.

The Tennessee Department of Environment and Conservation (TDEC) splits the Interior Plateau into sub-ecoregions in its study of watersheds. For Nashville, sub-ecoregions are the Western Highland Rim,

the Outer Nashville Basin, and the Inner Nashville Basin. These are discussed below as they relate to each watershed area.

Nashville is comprised of four watersheds, the primary one being the Cheatham Lake Watershed. Please refer to the map of watersheds on the following page.

### Cheatham Lake Watershed

The Cheatham Lake Watershed is approximately 647 square miles and is part of the Cumberland River drainage basin. It includes parts of six counties and has 773 stream miles and 7,507 lake acres. Nashville comprises 60 percent of the Cheatham Lake Watershed area. Other cities and towns in the watershed include Goodlettsville, Ashland City, Nolensville, and Pleasant View.

One designated wildlife management area is located in the watershed. Sixty rare plant and animal species have been documented in the watershed, including five rare fish species, one rare crayfish species, one rare mussel species, seven rare bird species, and 38 rare plant species. This area includes Mill Creek and is the home of the Nashville Crayfish, the only known species of its kind and listed as federally endangered. Since it only resides in Mill Creek, the Nashville Crayfish's habitat is severely threatened by intense development and water pollution.

In Nashville, the Cheatham Lake Watershed contains three sub-ecoregions (areas of similar geography, topography, climate, and soils that support similar plant and animal life): the Western Highland Rim, the Outer Nashville Basin, and the Inner Nashville Basin.

The *Western Highland Rim* has rolling hills with elevations of 400 to 1,000 feet. Rock types include limestone, chert, and shale, covered by soils that tend to be acidic and low to moderate in fertility. Streams have coarse chert gravel and sand with areas of bedrock and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late

1800s, but now the region is again heavily forested. Some agriculture, mostly hay, pasture, cattle, corn and tobacco, occurs on the flatter areas between streams and in the stream and river valleys.

The *Outer Nashville Basin* has rolling, hilly topography and slightly higher elevations than the Inner Nashville Basin. Rocks types are mainly limestone bedrock, and the higher hills are capped by more cherty shale. The region's limestone rocks and soils are high in phosphorus. Deciduous forests with pasture and cropland are the dominant land covers. Streams have productive, nutrient-rich waters, with algae, vegetation, and occasionally high densities of fish. The Nashville Basin, as a whole, has distinctive types of fish.

The *Inner Nashville Basin* is less hilly and lower in elevation than the Outer Nashville Basin. Outcrops of limestone are common, and shallow soils are redder and lower in phosphorus than those of the Outer Basin. Streams often flow over large expanses of limestone bedrock. The most characteristic hardwoods within the Inner Basin are maple, oak, hickory, and ash. This area includes the limestone cedar glades of Tennessee, a unique mixed grassland/forest/cedar glade vegetation type with many endemic species found nowhere else in the world. The open nature and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species.

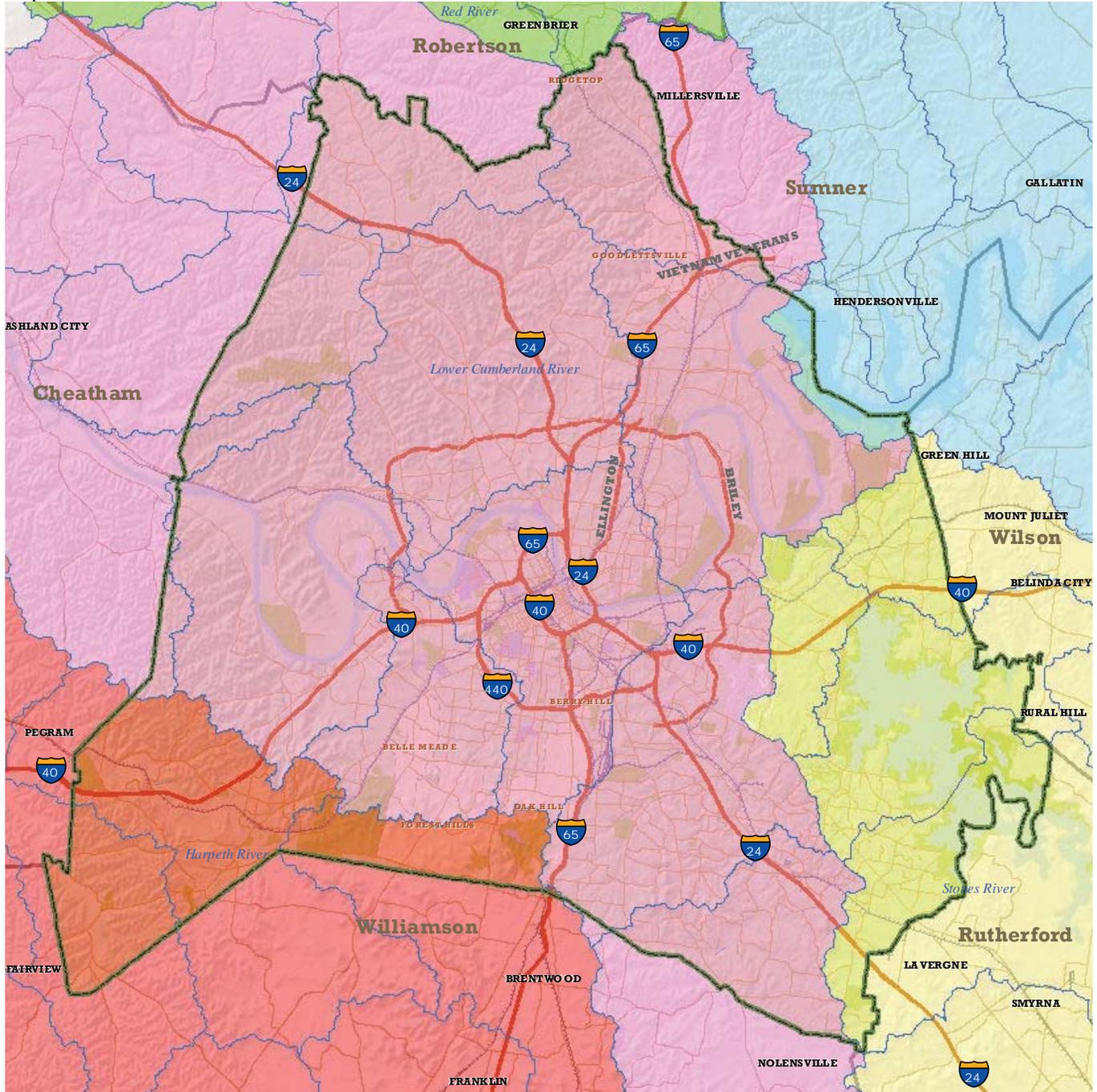
### Stones River Watershed

The Stones River Watershed is approximately 921 square miles and drains to the Cumberland River. It includes parts of four counties and has 1,031 stream miles and 22,691 lake acres. Nashville comprises eight percent of the Stones River Watershed area. Other cities in the watershed include Murfreesboro, LaVergne, Smyrna, and Mount Juliet.

Five designated state natural areas are located in the watershed, including three cedar glade areas. Sixty-nine rare plant and animal species have been documented in the watershed, including eight rare fish

# NATURAL RESOURCES AND GREEN SPACES

Map 1: Nashville Area Watersheds



-  Old Hickory Lake Watershed Management Group
-  Cheatham Lake Watershed Management Group
-  Stones River Watershed Management Group
-  Harpeth River Watershed Management Group
-  Red River Watershed Management Group
-  Hydrologic Watershed Units



Produced by the Metropolitan Nashville Planning Department  
March 2013  
Datum: NAD 1983 Projection: State Plane, Tenn. Units: Feet



species, one rare snail species, three rare mussel species, one rare crustacean species, six rare bird species, and 44 rare plant species. The watershed contains J. Percy Priest Reservoir, which is popular for recreational boating, fishing, swimming, and camping.

In Nashville, the Stones River Watershed contains two sub-ecoregions (areas of similar geography, topography, climate, and soils that support similar plant and animal life): the Outer Nashville Basin, and the Inner Nashville Basin. Both of these are discussed above.

### **Harpeth River Watershed**

The Harpeth River Watershed is approximately 863 square miles and drains to the Cumberland River. It includes parts of six counties and has 1,314 stream miles and 655 lake acres. Nashville comprises six percent of the Harpeth River Watershed area. Other cities and towns in the watershed include Franklin, Brentwood, Dickson, Fairview, White Bluff, Kingston Springs, Pegram, Burns, Charlotte, and Thompsons Station.

A portion of the Harpeth River that is in Nashville is designated a State Scenic River. Scenic rivers are significant for their aesthetic and ecological importance and are also popular with canoe and kayak paddlers. Three designated state natural areas are located in the watershed, including Radnor Lake. The Radnor Lake State Natural Area is a 1,100-acre area featuring an 85-acre lake. This area contains some of the highest hills in the Nashville Basin. Forty-nine rare plant and animal species have been documented in the watershed, including three rare mussel species, three rare fish species, six rare bird species, and 28 rare plant species.

In Nashville, the Harpeth River Watershed contains two sub-ecoregions (areas of similar geography, topography, climate, and soils that support similar plant and animal life): the Western Highland Rim, and the Outer Nashville Basin. Both of these are discussed above.

### **Old Hickory Lake Watershed**

The Old Hickory Lake Watershed is approximately 983 square miles and is part of the Cumberland River basin. It includes parts of seven counties and has 1,164 stream miles and 27,439 lake acres. Nashville comprises only half of one percent of the Old Hickory Lake Watershed area. Cities and towns in the watershed include Hendersonville, Carthage, Hartsville, and Watertown.

One designated state natural area, one state historic area, one state park, and two wildlife management areas are located in the watershed. Fifty-three rare plant and animal species have been documented in the watershed, including six rare fish species, one rare amphibian species, nine rare mussel species, and 25 rare plant species. The watershed also contains Old Hickory Lake, a major recreational area.

In Nashville, the Old Hickory Lake Watershed contains one sub-ecoregion (an area of similar geography, topography, climate, and soils that supports similar plant and animal life): the Outer Nashville Basin. It is discussed above.

### **Nashville's Main Waterway – The Cumberland River**

The Cumberland River, 688 miles long, flows from Harlan, Kentucky through Tennessee and back to Paducah, Kentucky where it empties into the Ohio River. The Cumberland River's drainage area includes approximately 18,000 square miles of north-central Tennessee and southern Kentucky. Significant growth has occurred along the river through the Middle Tennessee region. Major population centers on the Cumberland River include Nashville, Hendersonville, Clarksville, and Ashland City, Tennessee.

The Cumberland River is one of Nashville's greatest resources and a special ingredient in the city's quality of life. The river is an abundant source of drinking water; a destination for recreation, leisure and entertainment; and a magnet for economic investment.

The Cumberland River Compact, a Nashville-based, non-profit organization, addresses issues and works with local governments regarding the environmental stewardship of the watershed. The Compact has taken on the mission of educating residents and local officials in the watershed about the importance of the Cumberland River to the many communities located within the watershed.

While efforts to protect and clean up the Cumberland River, and improve its water quality, are underway, there is more work to do and additional programs are needed to remain diligent. A comprehensive program should include stream buffers, floodplain limitations on development, stream bank restoration, reforestation, impervious surface reduction, and floodplain easement programs.

### **Middle Tennessee Flood of 2010**

The Cumberland River was a key waterway in the flooding events of May 2010. It was this river and many of its tributaries that overflowed into downtown Nashville and impacted communities to the west, including Cheatham County, Dickson County, and Clarksville-Montgomery County.

Over May 1-2, 2010, the Nashville International Airport recorded 13.57 inches of rain. This amount of rain shattered records that were set in the late 1970s by the remnants of Hurricane Frederic. On both days of that 2010 weekend, heavy rain started in early morning and continued with waves of intense rainfall that did not stop for ten or so hours. This event caused massive flooding beyond what would be expected in a 100-year flood event.

A 100-year flood is an event that statistically has a one percent chance of occurring in any given year. A 500-year flood has a 0.2 percent chance of occurring, and a 1000-year flood has a 0.1 percent chance of occurring in any given year. Many experts have said that the 2010 event was at least a 500-year flood event, al-

though a final determination has not been concluded.

The Cumberland River crested at almost 52 feet; 12 feet above flood stage. After the floodwaters subsided, damage assessments were conducted throughout the county. Initial reports indicated that approximately 11,000 properties were directly damaged by flooding. An indication of the amount of flooding that occurred is illustrated by the fact that approximately 5,850 of these reported properties are located outside of the designated 100-year floodplain. More than 10,000 people were displaced from their homes and lives were lost. The Nashville Long Term Recovery Plan states that 2,800 businesses sustained damage; 13,000 jobs were temporarily lost; 1,500 jobs were permanently lost; \$3.6 billion in business disruption; and 115 roads were closed for up to a week. Overall, the flood resulted in \$2 billion in total damages.

As the crisis unfolded, Nashvillians rose to the occasion, first to help safeguard lives, and then to cleanup and help rebuild neighborhoods and the community. In the years following the flood, over 29,000 volunteers gave more than 375,000 service hours to recovery and rebuilding efforts.

In 2010-2011, Nashville produced the Nashville Long Term Recovery Plan that identified a variety of projects that can be implemented by the public and private sectors. These projects are not necessarily related directly to repairing the physical impacts of the flood. Rather, the goal is to bring broad-based recovery results to the community as a whole to make the city even more sustainable in the future. Ideas include projects in the areas of housing, economic development, education, social services, urban design, open space, and healthy food production. A United Flood Preparedness Plan was also prepared. It identified and evaluated flood-damage reduction measures on the Cumberland River and its five major tributaries: the Harpeth River, Whites Creek, Browns Creek, Mill Creek, and Richland Creek.

### Nashville's Watershed Management

In Nashville, the Cumberland River falls under the authority of the U.S. Army Corps of Engineers, the Tennessee Department of the Environment and Conservation, and the U.S. Environmental Protection Agency. Metro Water Services is responsible for ensuring the city's quality drinking water, treating wastewater, managing stormwater issues, and ensuring that Nashville stays in compliance with federal and state laws regarding water quality – all important aspects of managing our watersheds. The Clean Water Act established the laws and standards that regulate water quality, discharges and withdrawals from the Cumberland River.

At the U.S. Army Corps of Engineers, engineers, scientists and technicians provide services to states and local governments on how to minimize flooding damage to their infrastructure. The Corps maintains and monitors a hydrological data collection system and mapping system to assist in making water control decisions. The Corps also manages the flow of the Cumberland River to satisfy a diverse group of stakeholders including recreational users and the transportation industry operating tows and barges. In addition, the Corps manages the water quality to support a sustainable ecosystem, so we all can continue to enjoy the region's many natural resources. With the region's growth and the many demands placed on our

hydrological resources, the Corps fully expects conflicts related to water supply. The Corps performs water supply studies to insure the many stakeholders are provided with this critical resource.

The flows of the Cumberland River and its main tributary, the Stones River, are largely controlled by the U.S. Army Corps of Engineers' dam system. Within Nashville, the Cumberland River's flow and level are controlled by two dams. The dams have also created two reservoirs, J. Percy Priest and Old Hickory, used for navigation, energy, flood control, and recreation. Meanwhile, the flow of the Cumberland's smaller tributaries is largely a direct consequence of rainfall.

### Water Quality Management

Water quality plays a critical role in the environmental and economic health of the Cumberland Region. According to the Nature Conservancy, 70 percent of the earth is covered by water. However, 40 to 50 percent of our nation's waters are impaired or threatened. When water is considered *impaired*, it means that the waterbody does not support one or more of its intended uses. This can mean that the water is not suitable to drink, to swim in, or to consume the fish caught there.

Under section 303(d) of the 1972 Clean Water Act, states are required to develop lists of impaired waters,



those that do not meet water quality standards. The standards and criteria might be numeric and specify concentration, duration, and recurrence intervals for various parameters, or they might be narrative and describe required conditions such as the absence of scum, sludge, odors, or toxic substances. If the waterway is impaired, it is placed on the respective jurisdiction's "303(d)" list. For each pollutant listed, the state must develop a restoration target called a *Total Maximum Daily Load*.

The Tennessee Department of Environment and Conservation (TDEC) creates and maintains the 303(d) list of impaired streams in Nashville and issues the updated list to Metro Stormwater biennially. One of the primary objectives of Metro's *Stormwater Management Program* is to implement specific pollution prevention programs to improve the quality of Nashville's water resources. An overall goal of the program is to improve water quality, by programs to reduce and minimize pollutants from entering streams, to the extent that each impaired stream will be removed from TDEC's 303(d) list.

There are approximately 2,500 miles of streams within the jurisdiction of Nashville, of which, 330 miles have been determined impaired and placed on the Clean Water Act's 303(d) list by TDEC. Over 90 percent of 303(d)-listed streams within the county are deemed impaired by one or more of the following contaminants: pathogens, sediment, habitat alteration, nutrients, oil and grease, and low dissolved oxygen. Through monitoring, illicit discharge detection and water quality protection activities, over 90 miles of streams have shown improvement and have been in part or fully removed from the 303(d) list.

Long-term monitoring of all impaired streams is essential to insuring continued protection and improvement of our water resources. Metro Water Services utilizes a five-year rotating watershed approach that focuses most of its monitoring resources within predetermined sub-watersheds each year. This monitor-

ing program provides background data that can be used in making management decisions for infrastructure projects, modeling to prioritize restoration efforts, and measuring the effectiveness that projects and restoration efforts have on water quality. Once a sub-watershed has been monitored for a year, data are analyzed and management plans are written.

The detection and elimination of illicit discharges has an almost immediate effect on improving water quality. To accomplish this, Metro Water Services initiated five major programs which include water quality complaint investigations, field screening, stream walks and assessments, thermograph investigations, and fecal source tracking. Complaint investigations generally are initiated by the public and are inspected immediately. Field screening involves staff inspecting stormwater outfalls for unapproved discharges in areas of high pollutant risk. Stream walks and assessments involve physically walking and surveying all impaired streams in the county. This program has been effective in finding small- to mid-sized pollutant sources that could not have been detected by any other means. The thermograph program involves flying all large streams and rivers in a helicopter fitted with an infrared camera to detect heat signatures of broken water and sewer lines or other large illicit discharges. This program has been very effective in that it quickly finds discharges in remote areas that the stream walk program may not be operating in at that time. Finally, the fecal source tracking program utilizes DNA technology to differentiate between human and non-human fecal contamination. The usefulness of this technology can best be illustrated by investigations completed in Bosley Springs. Routine E. coli monitoring of this stream consistently showed elevated levels of fecal contamination. However, these values were thought to be in part due to a large wildlife population in the watershed. Once the DNA laboratory was established and samples analyzed, results indicated the fecal source to be human. Additional investigations in the watershed isolated the source and it was eliminated. Following elimination,

fecal values in this stream decreased significantly.

Although pollution hotspots still exist in Nashville, overall water quality is good. Measures to detect and remove contaminants are ever growing and systematically improving. Likewise, improvements and upgrades to the sewer collection system are ongoing. However, with continued growth comes increased risk to our water resources. Therefore, it is important that procedures already in place remain and, in some cases, expand.

Additionally, continued monitoring and modeling resulting in the development of watershed management plans which incorporate best management practices for development and water quality protection should be considered. Since these plans would require the input from numerous stakeholders, a committee should be developed and headed by a strong leader to insure the process moves forward. These plans would act as a blueprint for future planners in deciding how and where to grow the city responsibly.

Wetlands are protected through a permit process, managed by the U.S. Army Corps of Engineers. In most cases, avoidance or mitigation is required before wetland areas can be modified or developed. While these requirements provide a base level of protection, often local requirements are used to provide additional restrictions, such as additional buffer areas and planting natural vegetation.

### Water Quantity Management

The management of stormwater is directly tied to the incidence of flooding. After a rainfall, water must either be absorbed into the ground (percolation) or flow into waterways (runoff). Often, structures associated with development, such as streets, parking lots and rooftops, are impervious surfaces that do not allow rainwater to percolate into the soil and increase the rate and amount of runoff. Over the years, increasing runoff may cause stream pollution, flooding issues downstream, and other negative consequences. Veg-

etation and natural drainage features which encourage water absorption and slow the velocity of runoff are often obstructed or removed by construction. It is critical to control stormwater runoff through natural and on-site methods. The preservation of vegetation and other natural drainage features is perhaps the most cost-effective form of stormwater management, in addition to the aesthetic contributions these features provide to the landscape.

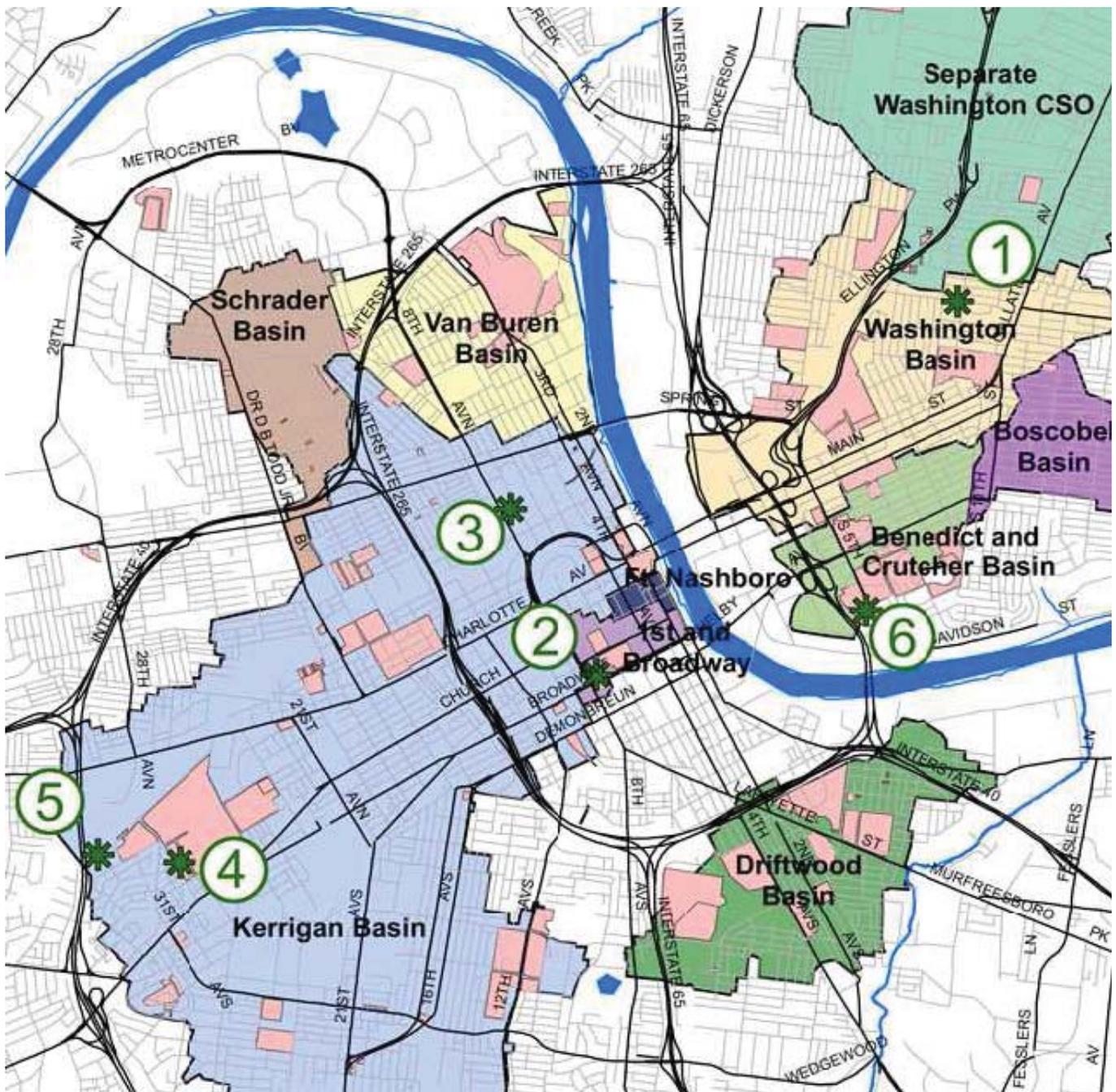
Much of Nashville's sewer system is old and lacks the capacity to handle the current volume of sewage and stormwater, especially in the older city area where the combined sewer systems date to the late 1800s. The *Clean Water Nashville Overflow Abatement Program* is an initiative led by Metro Water Services in coordination with partner agencies, including the U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) for the purpose of meeting the Clean Water Act requirements and, in the process, ensuring the environmental health of the Cumberland River for future generations. Over time, this program will update infrastructure to reduce sewer overflows, reduce health risks associated with exposure to bacteria and contaminants, and improve water quality in the Cumberland River and Nashville's extensive network of streams, creeks and tributaries. Metro also created a *Green Infrastructure Master Plan* to assess the potential impact of green infrastructure in the combined sewer system, including the identification of possible green infrastructure sites and pilot projects. This plan may be expanded to other watersheds in the future. Please refer to the map from the *Green Infrastructure Master Plan* of Selected Projects.

Please refer to the map of selected projects from the *Green Infrastructure Master Plan* on the following page.

Since 1998, Metro has required water quality buffers on streams, ponds, lakes, and wetlands in or adjacent to development. Buffers extend along floodways (channels of waterways that carry the deepest, fast-

# NATURAL RESOURCES AND GREEN SPACES

**Map 2:** Green Infrastructure Plan Selected Projects



Source: Nashville Green Infrastructure Master Plan

#	Location	Measures
1	West Eastland Avenue	Bioswales, pervious concrete and pavers, infiltration trench, tree plantings
2	Hume-Fogg High School	Green roof and rainwater harvesting
3	Nashville Farmer's Market	Rainwater harvesting and pervious concrete and pavers
4	Parthenon Towers	Green roof, bioswales, and pervious concrete.
5	Metro Parks Administration	Rainwater harvesting, green roof, bioswales, pervious pavers and concrete
6	Metro Public Works	Rainwater harvesting, infiltration trench

## NATURAL RESOURCES AND GREEN SPACES

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est water downstream), which serves to also protect much of the floodplain (area adjacent to waterways that is subject to flooding). The application of the buffer on redevelopment sites helps to reestablish riparian areas that were lost during the early development of Nashville. As we move towards the future, Metro needs not only to reclaim lost buffer areas, but will need to restore these areas with native vegetation. Special attention should also be given to the preservation of headwater streams. Some of these waterways flow intermittently and are not always protected during development. The combination of protecting existing vegetation, restoring degraded riparian areas, and preserving the source of surface waters will protect and improve water quality in Metro into the future.

Metro first started controlling stormwater runoff from development sites as a means to mitigate flooding. The current program ensures that the rate that water flows off a development site is the same before and after development. In 2000, this program expanded to include requiring post-construction water quality. This has resulted in cleaner water leaving impervious surfaces and entering the stormwater system. Metro's construction oversight also includes preventing soil loss from sites during the construction pro-

cess. For years, Nashville's streams were choked with sediment generated from soil exposed during construction. Now, these aquatic habitats are getting the chance to recover and developments are benefiting from the retention of topsoil. The final piece of development oversight follows projects into the future to make sure their water quality controls continue to work. These strategies have resulted in cleaner water leaving all stages of development. As stormwater oversight continues, Metro should explore limits to impervious surfaces on properties, encouraging the use of pervious or porous materials; encourage the removal of existing unused impervious material; and the retrofit older sites with water quality strategies.

The creation of the *Low Impact Development Manual* continues the evolution Metro's stormwater quality program. Current development patterns and traditional stormwater management techniques have resulted in large amounts of impervious surfaces in cities across the country, including Nashville. Conventional development approaches to stormwater management often use practices to quickly and efficiently convey water away from developed areas, resulting in large volumes of runoff, and any pollutants, flowing directly to streams, rivers and combined sewer systems. In contrast, *Low Impact Development*



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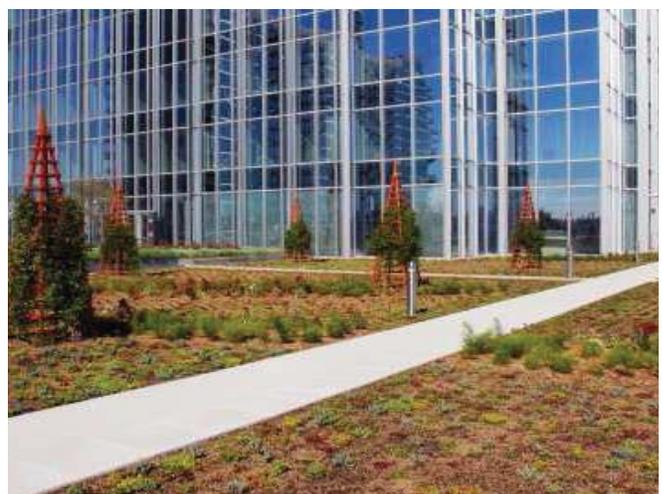
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(LID) is a design strategy that attempts to mimic a site's natural hydrology by managing stormwater close to its source by allowing water to infiltrate or be used onsite. This includes the preservation of the ecological functions of natural areas and green infrastructure strategies such as bioretention, green roofs, permeable paving, vegetated swales, conservation areas, and stormwater harvesting. LID is a departure from traditional stormwater methods. Traditional stormwater designs are highly impervious and immediately route rainwater offsite or to a central location. As a result, volumes of stormwater, along with pollutants, reach streams. In contrast, LID reduces the pollutants reaching our streams by reducing the volume of water leaving a site. This also helps reduce the flooding impacts of small storms or the amount of water entering the combined sewer and contributing

to overflows. Metro is currently offering incentives to encourage the utilization of LID on developments. Incentives include the waiver of plan review fees, the reduction of stormwater fees, the application of runoff reduction credits, and the application of bonus green roof credits. It is expected that new federal and state requirements will require LID techniques, and using the LID Manual will become mandatory in 2016.

LID techniques can offer numerous benefits to Metro, property developers, and the environment, including to:

- Preserve trees and natural vegetation
- Preserve integrity of ecological and biological systems
- Protect site and regional water quality by reducing sediment, nutrient, and pollutant



- loads to water bodies
- Reduce impacts to terrestrial and aquatic plants and animals
- Mitigate the heat island effect and reduce energy use
- Balance growth needs with environmental protection
- Reduce municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewers)
- Encourage private sector participation in green stormwater infrastructure at residential, commercial, and industrial facilities
- Decrease flooding risks from small storms
- Create attractive natural and multi-functional public spaces
- Reduce land clearing and grading costs
- Reduce stormwater management costs
- Increase lot and community marketability

### Priority Areas and Proposed Actions

In Nashville, when prioritizing stream and water quality projects, *Total Maximum Daily Loads* (TMDL) and 303(d) list impairments are considered in order to optimize proposed projects outcomes. There are currently TMDL's for pathogens, habitat alteration, and siltation. TMDL's for nutrient levels, often caused by fertilizer runoff, are being written and are anticipated within the near future. Installations of best management practices and restoration projects are optimal in situations where they enhance the quality of the stream or region in multiple ways. Currently, there are TMDL's and 303(d)-listed streams in these sub-watersheds: Stones River, Mill Creek, Manskers Creek, Browns Creek, Richland Creek, Whites Creek, Cooper Creek, Gibson Creek, Dry Creek, Love's Branch, Davidson Branch, Harpeth River, and the Cheatham Reservoir.

Currently, the watershed monitoring program samples these watersheds intensively for one year out of every five-year permit cycle with the goal of show-

ing improvement of water quality over time. There is a *Streamwalk Program* currently in place that visually assesses each stream and scores it based on the principles used by Maryland's Protocol. The program has also been very valuable for identifying chronic trash/debris sites, severe erosion problems, stream channelization, insufficient buffers, and illicit discharges to streams. In the future, it will be used for assessing stream improvements or degradations. There is significant value in ground-truthing the severity of stream impairments. Additionally, streamwalks significantly assist with project selection and planning.

### Watershed Public Education Programs

The main goals of stormwater education activities are increasing public awareness for purposes of eliminating illicit discharges and improper disposals, reducing nonpoint source pollutants through better land management practices (i.e. fertilizer, sediment, and oil), reducing overall runoff quantities through innovative development strategies, and ultimately improving water quality of receiving streams. In some of Nashville's sub-watersheds, public education will be the primary best management practice implemented for improving stormwater runoff quality, therefore, improving receiving water quality. Public education efforts target a number of different groups based on land uses including, but not limited to, residential neighborhoods, high density industrial/commercial areas, and golf courses. Geographic *hot areas* have been identified within certain watersheds based on land uses within the 303(d) impairment listing. Various targeted education campaigns will be deployed within the "hot areas" to raise awareness of water quality issues within the occupant's watershed. Likely methods of public education to be utilized in the *hot areas* include mail-outs to residents, site visits by Metro Stormwater staff, storm drain stenciling, and door hangers. Additional public education tools will be developed. The *Adopt-a-Stream* program, which began nearly a decade ago within the Metro Water Services' Public Relations Department, helps increase water pollution awareness and public involvement opportu-

nities by creating a sense of ownership within a particular watershed. When a group or individual adopts a stream, they must conduct one clean-up of the adopted segment each year and stencil storm drains within the drainage area, indicating that water from the surface runs into the creek.

The National Pollutant Discharge Elimination System group at Metro Stormwater has also incorporated watershed-specific education components into their overall school outreach program. Currently, there is a program available to both public and private schools that addresses stormwater pollutants associated with runoff and watershed management activities. The program has been in place for several years and is currently reaching approximately 150 schools a year. In addition to the targeted watershed-specific education campaign, Metro promotes general water quality education through various methods, such as attending large civic events, airing educational materials on the local public service station, and posting a diverse collection of water quality educational materials on the website. Metro Stormwater provides general water quality education at such events as the Earth Day Celebration, Cumberland River Compact's Catfish Rodeo and Dragon Boat Race, and the Lawn and Garden Show to name a few.

### Watersheds and Waterways Conclusion

Nashville's watersheds and waterways not only contribute to our health but also our quality of life. In addition to government services and programs, each of us plays a role in keeping our waterways and watersheds clean and healthy. According to the U.S. Environmental Protection Agency, some ways individuals can contribute include:

- Conserve water every day. Fix leaks, turn off the water when not in use, and take shorter showers every day.
- Use hardy and/or native plants that require little or no watering, fertilizers, or pesticides in your yard.

- Use surfaces like wood, brick, or gravel for decks and walkways that allows rain to soak in and not run off.
- Drive less and walk or bike more. Many pollutants in our water and air come from car exhausts and car leaks.
- Recycle yard waste in a compost pile.
- Do not pour toxic household chemicals down the drain. Instead, take them to a hazardous waste center.
- Pick up after your dog, and dispose of the waste in the toilet or the trash.

### Ideas and Recommendations for Additional Discussion

Numerous initiatives to protect and improve Nashville's watersheds and waterways have already occurred, while others are being planned. The following are ideas and recommendations for further discussion.

- Continue to Increase Public Education and Awareness
  - Although regulations may have an immediate impact on behaviors, most people react begrudgingly to mandates. Changing one's mindset generally has a far greater impact on behavior that can last for generations. Therefore, a collective effort by all stakeholders to change or improve people's understanding of water pollution and protection is a long-term goal.
- Continue to Improve Water Quality.
  - Initiatives are underway and regulations are in place which cover some of these elements along certain waterways. In other areas, additional efforts may be needed to expand programs and to detect and remove contaminants. Comprehensive programs include stream buffers, floodplain limitations on development, stream bank restoration, reforestation, impervious surface reduction,

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and floodplain easement programs. Impaired stream areas should continue to receive priority status with projects and ideas in efforts to better water quality and thus be removed from the impaired list.

- Continue to Highlight the Importance of Using Low Impact Development Techniques and Green Infrastructure.
  - Both these approaches contain extremely useful techniques for containing and filtering water runoff on site and reducing the amount of water runoff to waterways and the city's water infrastructure.
- Continue to Use a Watershed Approach.
  - Using a comprehensive watershed approach allows discussion and consideration of the larger area, including headwater areas, and more comprehensive strategies for protection and improvement.

- Develop Watershed Management Plans.
  - Watershed management plans build on monitoring and modeling by incorporating best management practices for development and water quality protection. Since these plans would require the input from numerous stakeholders, a committee should be developed and headed by a strong leader to insure the process moves forward. These plans would act as a blueprint for future planners in deciding how and where to grow the city responsibly.

A vital component of watersheds is the headwater areas, often covered by woodlands that assist in managing water quality and quantity. Nashville's woodlands and trees are discussed in the next section.



### Part 2 – Nashville’s Woodlands and Trees

Tree covered areas provide key corridors for wildlife and recreation as well as areas of scenic beauty. Air quality is improved and air temperatures are moderated by forest cover. Nashville’s ecological landscape is home to mature forests, ridgetops covered in a variety of trees and shrubs, and five kinds of forest habitat, including rocky cedar glades (unique to Middle Tennessee and found nowhere else in the world), river marshes, and the extensive river and stream network. The western part of the county currently contains large forest areas that provide excellent plant and animal habitat, provide income to landowners who manage forests for timber, and clean the surrounding air and water. The southeastern portion of the county contains the unique cedar glades. Other areas of trees, including street trees, private gardens, and woodlands are found throughout the city.

As discussed in the previous section, woodlands play a key role in watershed health, serving as headwater areas that are protected by tree cover, vegetation, and undisturbed soils. Headwater areas, especially due to deep tree roots, absorb water, slow water runoff, and filter water, thereby providing both water quality and quantity services. Loss of trees anywhere in a watershed leads to increases in local temperatures, energy use, and the volume of rainwater runoff.

Forest or tree cover refers to the portion of a forest that is above ground, formed by tree crowns. Forest cover areas are also important habitat zones and can include, in addition to the tree crowns themselves, plants, lichens and mosses that grow on trees, along with woody vines. Woodlands also shelter and benefit wildlife. As more development occurs, forest fragmentation and the fragmentation of wildlife habitat is a serious issue. As forests, especially ecologically mature forests, are changed by human activities, such as construction and development, canopy areas can be damaged, understory layers may be removed, and non-native invasive species may be introduced. Roads, clearing, and construction destroy

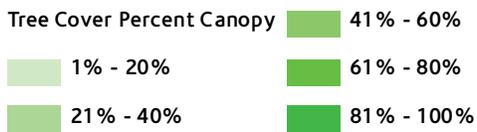
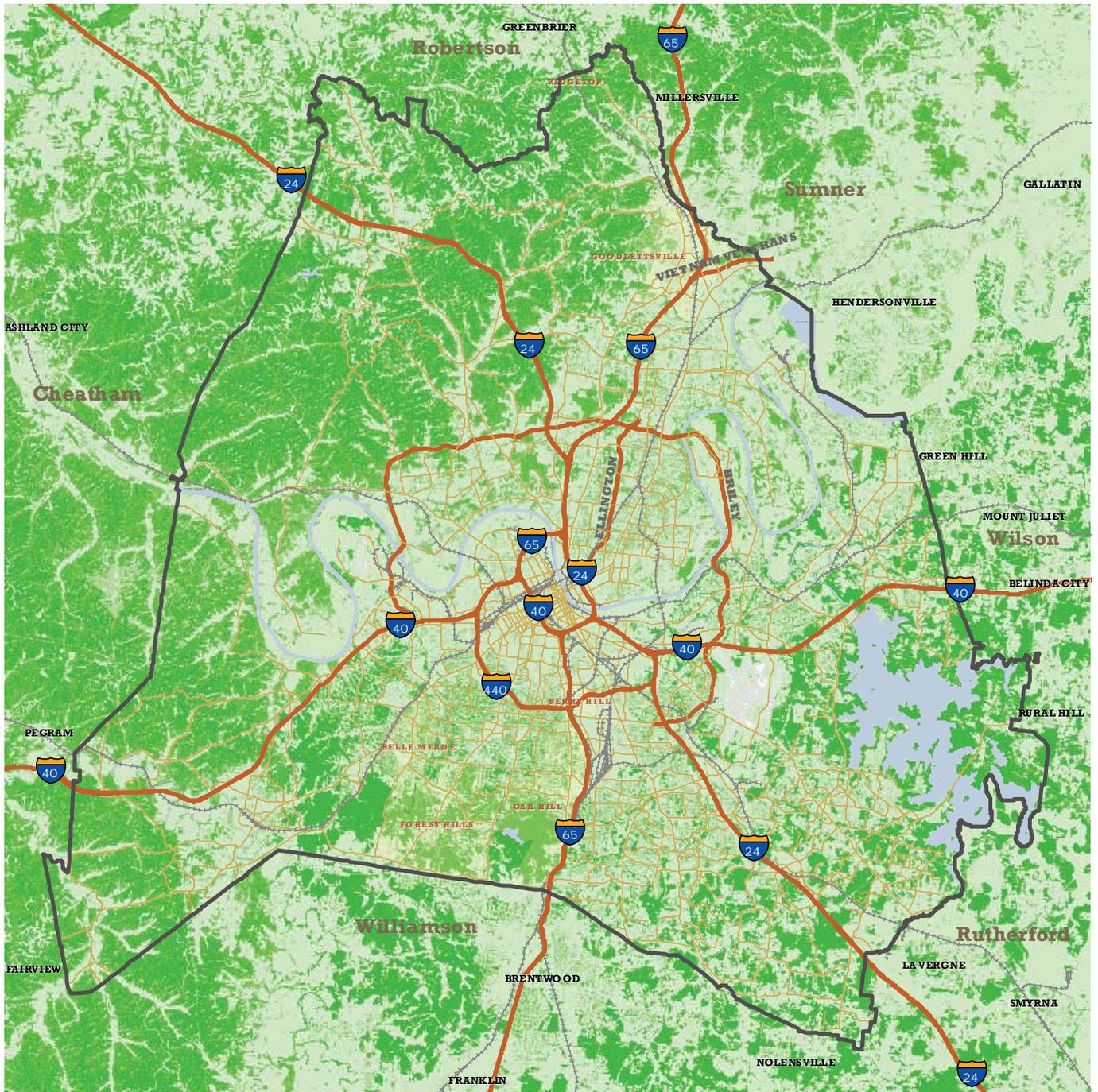
habitats and hinder wildlife movement. This can negatively affect wildlife, including mammals, birds, reptiles, amphibians, and insects, by removing habitat and food sources and destroying wildlife corridors. Some species, such as many songbirds, require hundreds or thousands of acres of contiguous habitat, and some species do not do well near areas of human activity.

Local governments play a key role in preserving trees and woodlands, particularly dealing with the conversion of land to more intense development uses. Residential and commercial development can significantly alter the natural relationships between water, woodlands, and climate. The removal of trees impacts the amount of water that is stored in a forested area and the amount of carbon in the atmosphere. Both impacts alter the relationship by generating more stormwater runoff with less local storage of water. Growing, living trees generally absorb substantial amounts of carbon dioxide, and the destruction of existing trees releases carbon dioxide back into the atmosphere. A preliminary assessment several years ago that used the American Forests’ Rapid Ecosystems Analysis indicates that the value of Nashville’s trees may be as much as \$3.6 billion a year.

Please refer to Map 3 of Nashville’s tree canopy on the following page.

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Map 3: Nashville's Tree Canopy



Produced by the Metropolitan Nashville Planning Department  
 March 2013  
 Datum: NAD 1983 Projection: State Plane, Tenn. Units: Feet



### Nashville's Metro Tree Advisory Committee

Nashville's urban forestry initiative has been the focus of the Metro Beautification Commission's Metro Tree Advisory Committee. Nashville has continued its focus on planning, planting, and maintaining trees with the 2008 publication of Metro Tree Advisory Committee's report, *Managing Nashville's Urban Forest*, and its 2009 endorsement by the Mayor's Green Ribbon Committee. The report calls for comprehensive, detailed policies to guide the protection, maintenance, and restoration of trees and native woodlands throughout the county.

*Managing Nashville's Urban Forest* (MNUF) recommends *short-term goals*, including (1) an urban forester position in the Metro Public Works Department, recognizing that while several Metro departments worked on tree issues, no one in city government had overall responsibility for the city's urban forest; (2) an updated inventory of downtown street trees (within the inner loop) that includes the number, species, location and health; and (3) a tree canopy assessment.

Since the MNUF report was released in 2008, these goals have been accomplished. In 2010, Nashville completed its first tree canopy assessment that identified not only where the city's trees are currently located but also where additional trees could be planted. In 2012, Mayor Karl Dean established the Metro Landscape Coordination program, and Public Works created the position of city horticulturist to manage the program. Under the direction of the new Metro Landscape Coordination program and the guidance of Metro Tree Advisory Committee, an inventory of street trees in the downtown inner loop will be completed in 2013. Trees will be identified by species, size, condition, and GIS location. Accomplishing these three goals provides tools Metro needs to be proactive in managing the city's trees.

Two additional short-term goals, beyond the three listed above, will be met in 2013, including the creation of a downtown tree master plan; and the setting of tree canopy goals. The downtown tree master plan

will use the completed tree inventory to determine where trees may be planted and to identify appropriate tree species for specific locations. The master plan will also specify a schedule for planting, maintaining, and replacing trees as well as detailing budget needs.

Nashville needs a robust program of planting new trees and replacing those lost to development, diseases, insects, and old age. The urban areas of Nashville average 30 percent coverage of tree canopy, while the American Forests recommend 40 to 50 percent. The rural northwest and southwest portions of Nashville currently have healthy tree coverage, but face population growth and development pressure. The city should continue to define a Tree Canopy Campaign with short-, medium-, and long-term objectives to meet the city's canopy goals.

MNUF recommends *medium-term goals* (2013-2020), including additional support, planning, planting, education, and protection efforts.

*Support.* Sustainable funding needs to be in place. Planting, protecting, and maintaining Nashville's trees are investments that return many economic and social benefits. The report suggests researching a stable funding model from other cities to develop funding mechanisms with the goals of developing sustainable funds for planting and maintaining Nashville's tree canopy. Another recommendation is to continue to coordinate efforts between relevant Metro agencies, non-profits and private industry for all tree-related activities including planting, maintaining, and removing trees.

A third recommendation is to create and promote incentives for tree planting by the city, private industry, non-profits and homeowners to reduce stormwater run-off, save energy, and cool the city. Metro's current incentives include utilizing Metro Water Services' new *Low Impact Development (LID) Manual* and the *Encourage a Cool City* program through the Nashville Electric Service. Several non-profit groups, such as Cumberland River Compact and watershed associations, have tree planting and rain garden initiatives.

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*Plan.* The MNUF report recommends that Nashville create an urban forest management plan to coordinate tree management on Metro property that offers comprehensive management strategies to maximize the services a healthy urban forest can provide. The plan should include landscaping guidelines, best management practices, and street tree standards for tree box design, species selection, planting, pruning, removal, and tree protection during construction and utility work.

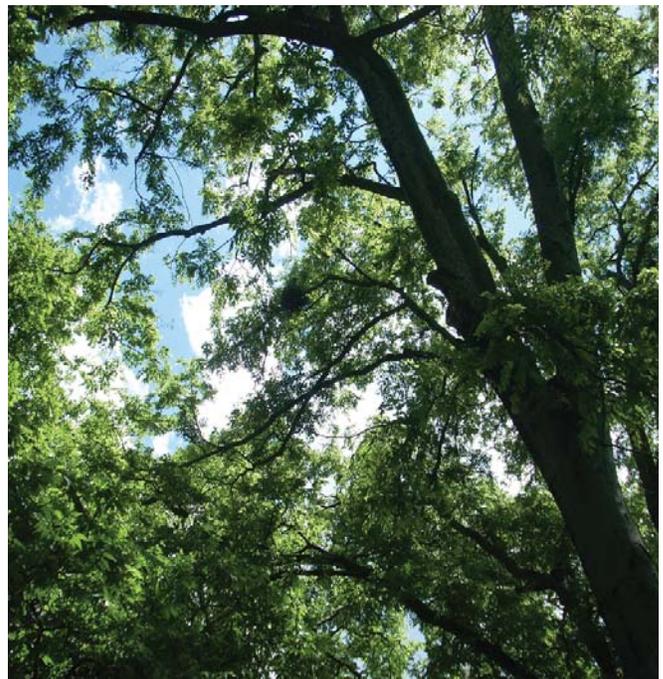
In 2013, a tree management plan is being developed as part of the downtown tree inventory. In addition, these standards are being finalized: landscaping guidelines and best management practices; landscape notes and planting diagrams for site plans (both in collaboration with Metro General Services); and a right-of-way maintenance memo of understanding. Other recommendations in the report include updating and expanding the tree inventory to include more streets and trees on Metro properties; and developing a database to plan and manage tree planting and maintenance as well as to track changes in city trees over time.

*Plant.* The MNUF report also recommends that the city continue to plant, maintain, and restore trees, with a focus on downtown. The canopy tree cover downtown (inner loop) is less than seven percent. American Forests recommends 10 percent coverage for downtown areas. The *Nashville Open Space Plan*, discussed in the *Parks and Greenways* section, calls for doubling the downtown tree coverage and stresses the importance of maintenance after planting.

*Educate.* Another recommendation is to provide programs for adults and children through the Metro Beautification Commission, the Metro Tree Advisory Committee, and the Metro Landscape Coordination Program. Programs – presented at schools, neighborhood and civic organizations, churches, and businesses – would discuss the benefits of trees and encourage tree planting and tree care on public and private land.

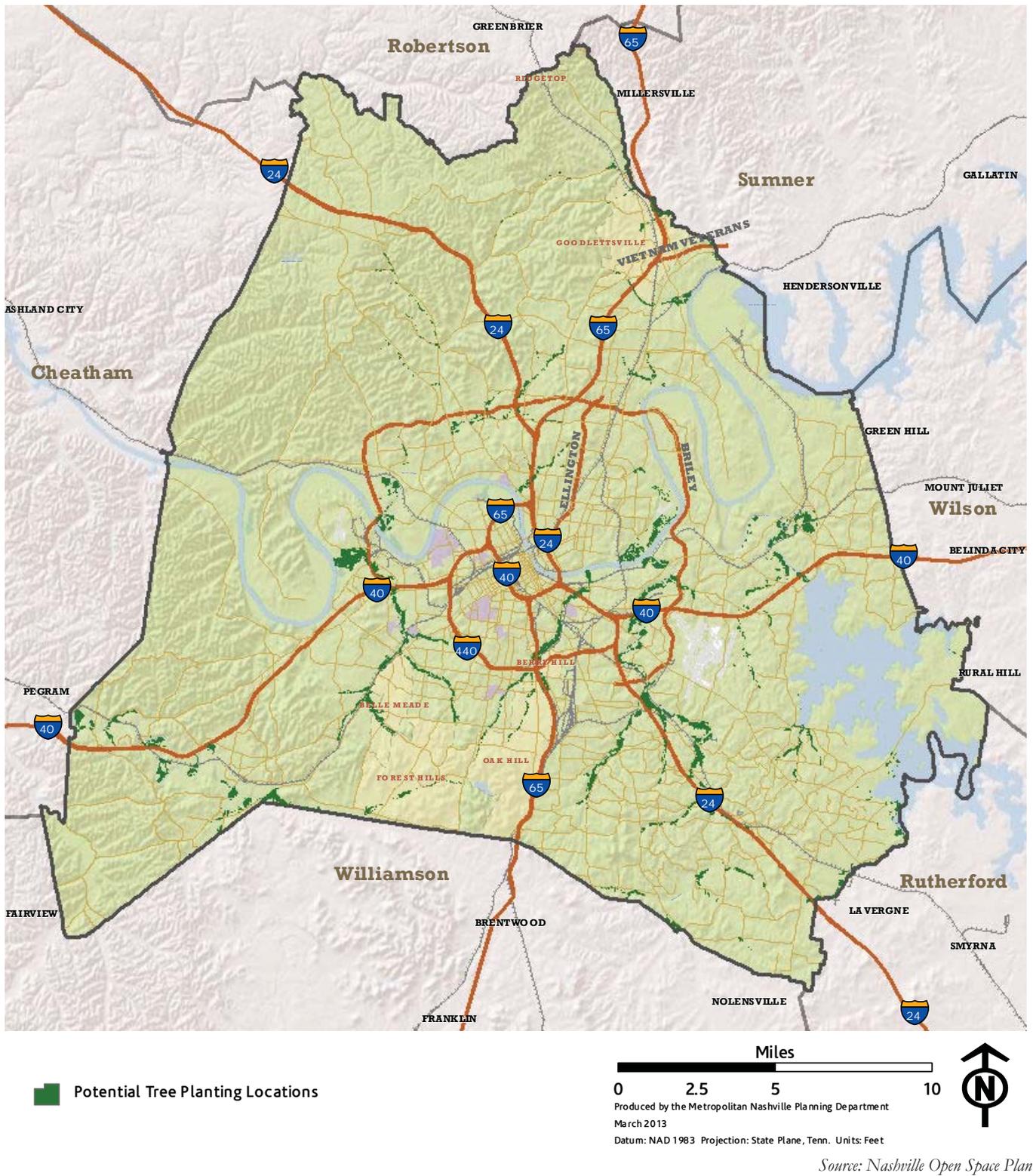
*Protect.* The Metro Tree and Landscape Ordinance will be reviewed in 2013. The current Metro Tree Ordinance, established in 1998, only protects trees on commercial developments. Part of the review process is to consider including private land in the ordinance and the protection of large tree-canopy trees.

The *Nashville Open Space Plan* identified specific areas for tree planting, particularly along stream banks. As part of the protection of natural areas, the tree-canopy assessment will be reviewed and its information merged into overlays with the *Open Space Plan* and the *Parks and Greenways Master Plan*. Another recommendation from the MNUF report is to encourage development with trees in mind. Encourage commercial and residential developers to first redevelop existing sites, rather than develop areas with significant trees and forests. Please refer to Map 4 of potential tree planting areas on the following page.



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Map 4: Nashville's Potential Riparian Tree Planting Locations



MNUF recommends *long-term goals* (2013-2040) that continue efforts to plant and maintain trees. The report recommends updating the tree canopy assessment every ten years to measure canopy increases and, more importantly, to monitor any canopy loss.

The tree canopy assessment shows that Nashville has 119,000 acres of land where trees could be planted. Planting 750,000 trees in the urban areas of the county would raise that area's canopy coverage to 40 percent (up from 30 percent), and raise the county's overall coverage to 50 percent (up from 47 percent). In addition, more trees will need to be planted to balance land lost to development in coming years.

### Woodlands and Trees Conclusion

Nashville has many of the tools it needs to be proactive in its urban forestry program. The completed tree inventory and canopy assessment describe our forest assets and provide a baseline for future measurements of progress. Trees are a good investment – the U.S.D.A. Forest Service Urban Ecosystems and Processes research found in 2010 that for every dollar spent on tree management, residents receive \$4.56 in benefits.

### Ideas and Recommendations for Additional Discussion

Numerous initiatives to protect and improve Nashville's trees and woodlands have already occurred, while others are being planned. The following are ideas and recommendations for further discussion.

- Continue to Preserve, Plant, and Maintain Trees.
  - Explore creating a stable funding program, used in other cities, for planting and maintaining Nashville's tree canopy.
- Continue to Increase Public Education and Awareness.
  - Continue a collective effort by all stakeholders to improve or change people's under-

standing of the benefits of trees and woodlands – reducing stormwater runoff, cooling the heat-island effect, cleaning the air and water, saving energy, providing natural beauty, providing wildlife habitat, and making us all healthier.

- Utilize the Metro Landscape Coordination program.
  - This program calls for all Metro departments to work together for the city's trees and promotes partnerships with nonprofits and private industries.
  - Continue to coordinate efforts between relevant Metro agencies, non-profits and private industries for planting, maintaining, and removing trees.
- Explore Using Additional Incentives for Tree Planting.
  - Metro's current incentives include utilizing Metro Water Services' new *Low Impact Development (LID) Manual* and the *Encourage a Cool City* program through the Nashville Electric Service. Several non-profit groups, such as Cumberland River Compact and watershed associations, have tree planting and rain garden initiatives. Additional incentives could be used to encourage even more tree planting programs.

### Part 3 – Nashville’s Parks and Greenways

The Cumberland Region has a good mixture of public lands, including state and local parks, greenways, state natural areas, and wildlife management areas that showcase the diversity of Tennessee’s natural resources. These areas provide recreation opportunities that promote healthy, active lifestyles for people of all ages. In addition to preserving natural features and other environmental benefits, public lands can provide economic benefits as well. Many people are interested in living or working near places they can exercise or enjoy outdoor activities. Land values in close proximity to parks and open spaces tend to be higher than average.

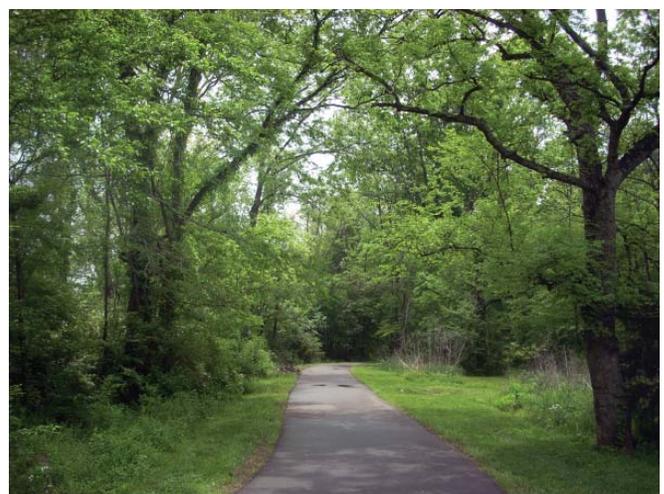
The *Nashville Open Space Plan* (2011) found that Nashville needs more public lands. Over half the area in Nashville is already developed. The majority of undeveloped land is in the western portion of the county where the steep hills make development difficult. As of 2012, only three percent of Nashville’s land is Metro-owned parkland, and an additional four percent is protected by conservation easements or by state or federal programs. This low level of land conservation will not support the future recreation, agriculture and habitat needs of the city. In recent years, a greater emphasis has been placed on acquiring and preserving more of our city’s land for these various purposes. In 2010, the public sector and private sector came together to work on a vision for Nashville’s green spaces.



### Nashville’s Open Space Plan

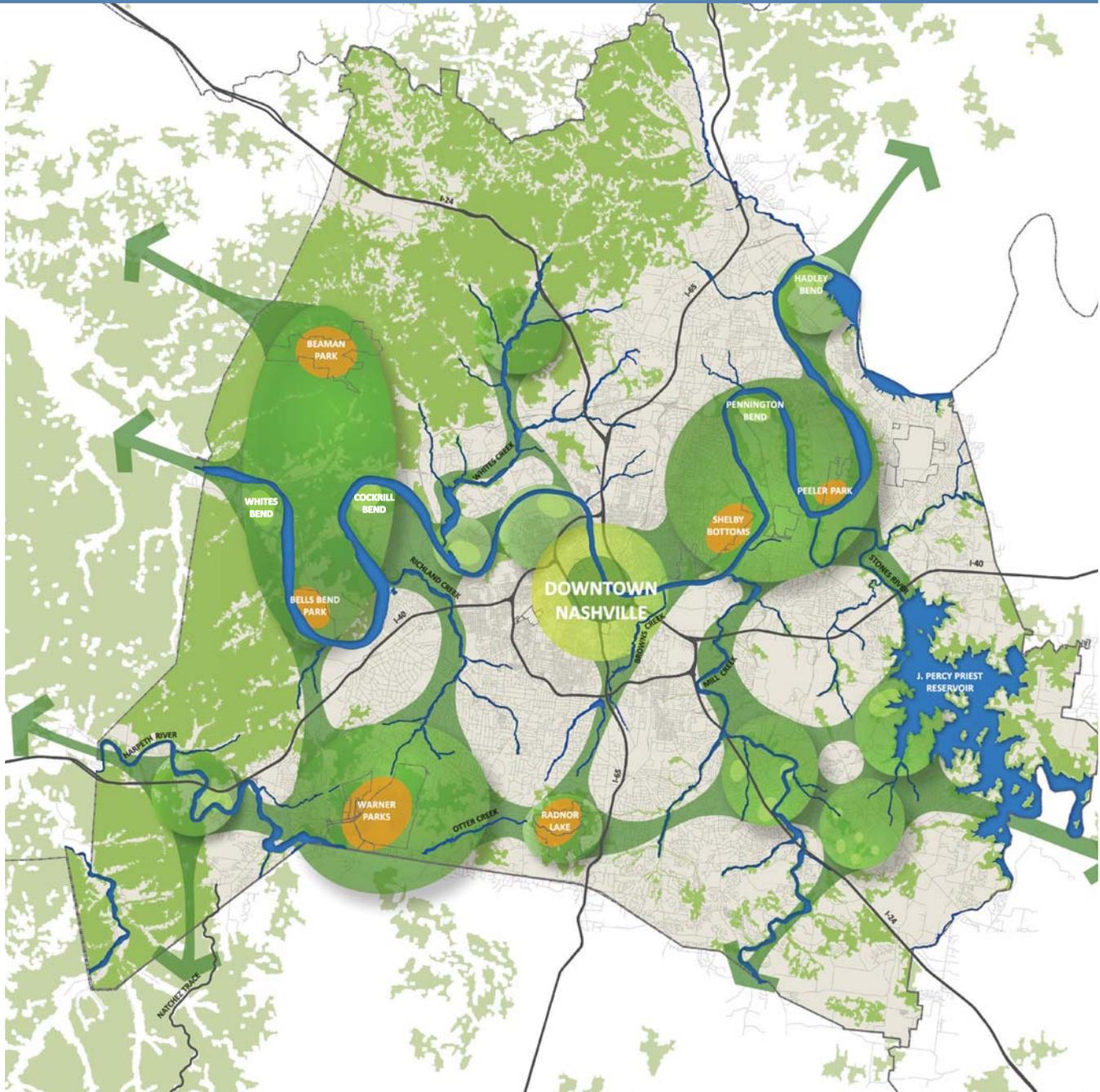
The *Nashville Open Space Plan*, released in April 2011, focuses on protecting various types of open space throughout Nashville. The plan maps every protected open space in Nashville and charts a clear vision for how to protect and connect the city’s *green infrastructure* – the interconnected network of open spaces and natural areas, such as parks, greenways, trails, wetlands, woodlands, and native plant vegetation, that provide wildlife habitat, preserve ecosystems, and help sustain clean air and water, as well as offer recreational opportunities and other benefits.

This effort is an ongoing partnership between the Land Trust for Tennessee, the Office of the Mayor, Metro Parks and several other Metro departments. The *Nashville Open Space Plan* puts forth the vision of “*Four Corners, Nine Bends, and a Heart of Green: an anchor park in each quadrant of the city, preserves in each of the nine bends of the Cumberland River, and a greener more pedestrian friendly downtown that includes trees, parks, greenways, and a revitalized riverfront area.*” Please refer to the Vision Map from the *Nashville Open Space Plan* on the following page.



Map 5: Nashville Open Space Plan Vision

# OPEN SPACE VISION



Source: Nashville Open Space Plan

LEGEND

- Green Infrastructure Network
- Open Water
- Interstate
- Existing Open Space Anchor
- Potential Open Space Anchor
- Open Space Network Vision

*The conceptual map above illustrates Nashville's open space vision. It represents public priorities expressed during public forums, and is based on the latest peer-reviewed science, GIS research and analysis.*

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The *Open Space Plan* contains four main themes: connect wildlife and water networks; connect people to the green infrastructure network; support urban and rural farming; and preserve historic and iconic resources. The plan provides a roadmap for the strategic conservation and creation of green spaces, by both the public and private sectors and includes opportunities in urban areas such as the creation of neighborhood parks and gardens, and protecting the hillsides and private parks, as well as opportunities outside of the urban core such as conserving farms and forests and protecting river corridors. Goals focus on acquiring and protecting green space during the next ten years. Mayor Dean has dedicated \$15 million dollars toward parkland acquisition to support this plan.

The *Open Space Plan's* goals for the city's green space include:

- Conserve 22,000 additional acres by 2035. (155,776 acres were identified that contribute to the green infrastructure network. Of which, 97,133 acres have no level of protection.)
  - Preserve large reserves in each of the four corners of Davidson County that serve as anchors for the open space network (Note: As of March, 2013, the southeast quadrant remains in need of an anchor park/land reserve).
- Protect land in each of the nine Cumberland River bends. (Note: As of March 2013, Pennington Bend, Whites Bend, Cockrill Bend, and Hadley Bend remain in need of protected land.)
- Add 6,000 acres of parkland (Note: As of March 2013, 940 acres have been added, including Cornelia Fort, Ravenwood, Stones River Park, and Smith Springs Road properties).
- Privately conserve 6,000 acres (Note: As of March 2013, 98 acres have been added. The Land Trust as of March 2013 has 1,303 acres of land in Nashville under conservation easements).
- Protect an additional 10,000 acres of floodplain (Note: As of March 2013, 200 acres have been made parkland due to the flood buyout program).
- Add 25 miles of greenways by 2015 (Note: In 2011 when the Nashville Open Space Plan was completed, there were 45 miles of greenways. As of March 2013, Nashville has 52.5 miles of paved off-street, multi-use paths. Additionally, there are over 150 miles of hiking and walking trails throughout the city's public parks.)
- Double the downtown tree canopy (As of 2011 when the *Open Space Plan* was created, there were 85 acres).
- Transition 110 acres of paved area downtown to pervious area.



### Nashville's Parks and Greenways

Nashville's city park system was established in 1901 and has a long history of providing recreational and cultural activities. The Metro Parks and Recreation Department offers a variety of facilities and programs throughout Nashville. Currently, there are over 12,000 acres of open space, including 108 parks and 19 greenways. To broaden their appeal, these facilities include passive and active recreation activities as well as community centers and nature centers. The department also offers senior programs, special population programs, cultural arts classes, dog parks, trails, nature programs, sports leagues, and art galleries. Parks range from large natural areas such as Beaman Park, to large parks with trail systems such as Warner Parks, to smaller neighborhood parks, such as Richland Park, Red Caboose Park, and Watkins Park.

The Metro Parks and Recreation Department adopted a *Countywide Parks and Greenways Master Plan* in 2002 and updated it in 2008. The *Master Plan* recommended more than \$260 million dollars in improvements to the park system, including new initiatives. Many of the plan's recommendations have been funded and implemented, with new community centers, greenways, nature centers, and playgrounds.

The Trust for Public Lands *2012 City Parks Facts Report* shows Nashville remaining in the middle when compared to cities of similar competitive class. Nashville spends \$56 per resident compared with \$68 for Austin and \$64 for Charlotte. Nashville has 38 acres of parkland per 1,000 residents compared with 37 acres for Austin and 20 acres for Charlotte. Regarding park access, 49 percent of Nashville residents have access to a park by walking, compared to 49 percent of Austin's population and 26 percent of Charlotte's population (Note: 68 percent was the median overall). The Trust for Public Lands report looks at cities based on size and density, so there is no defined national standard.

Currently, Metro Parks operates 16 neighborhood recreation centers, four nature centers, seven public golf courses, six indoor swimming pools, seven outdoor swimming pools, and two ice skating rinks. New parks are underway in several areas. Recent significant additions to Metro parkland include the old growth forest adjacent to Warner Parks, the opening of Cumberland Park on the East Bank, adding the historic Cornelia Fort Airpark land to Shelby Bottoms, and purchasing a large farm in Donelson. The city also has public access to rivers and creeks for boats, canoes, kayaks, and fishing and is working to add additional mountain biking trails and outdoor rock climbing activities.

Nashville's park spaces come in a variety of sizes to meet various open space needs. Within the city's park system, parks are categorized as follows:

- *Mini-Parks/Pocket Parks* are generally located in denser urban settings where there is limited acreage for park or open space development. These types of parks are typically less than five acres and may include urban plazas, playgrounds, and other small-scale open spaces.
- *Neighborhood Parks* are generally designed to serve the immediate surrounding neighborhoods and are between five and 20 acres. These types of parks typically include playgrounds, tennis or basketball courts, ballfields, and sitting areas for passive recreation.
- *Community Parks* are designed to serve several neighborhoods and typically focus on providing intense active recreational facilities. They are typically between 20 and 50 acres and may include tennis and basketball courts, soccer or football fields, and community centers that include indoor gyms.
- *Regional Parks* provide large, undisturbed tracts of land that are important for the protection of wildlife habitats and ecological communities. They

## NATURAL RESOURCES AND GREEN SPACES

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also provide active and passive use recreation experiences, including hiking, cycling, horseback riding, and picnicking.

- *Metro School Parks* utilize the open space that is park of existing elementary school properties. This partnership is a cost efficient method to improve community access to parks in underserved areas.

The *Nashville Open Space Plan* reinforced the need for additional parkland, especially in key underserved areas such as Antioch and Priest Lake. In addition, each major park has a “friends of” group that supports programming and master planning initiatives, and, in some cases, helps raise funds for additional parkland acquisition.

In addition to park spaces, Nashville continues to place a high importance on the city’s greenway system, which provides a network of trails linking activity centers such as neighborhoods, schools, parks and commercial areas. The majority of Nashville’s planned greenway systems are based on existing networks of rivers, lakes and streams. By locating greenway corridors along these water features, communities may utilize land that would otherwise be unused because of flooding hazards. Greenways provide a vegetative buffer that protects water quality and conserves open space and, in many cases, creates wildlife habitat and corridors. The increased networks of greenways in Nashville also offer both recreational and transportation opportunities by providing bicycle and pedestrian friendly routes between schools, homes, shopping, employment, and other destinations. Adding greenways or other trails can improve an area’s quality of life as residential, commercial, employment, and recreational uses develop. Greenways add value to a neighborhood by providing residents with alternative transportation and recreational options as greenways encourage healthier and more active lifestyles.

The Greenways Commission, the advisors to the

Metro Board of Parks and Recreation, plans and oversees development of the city’s greenway system. In addition to Metro Greenways staff, greenway efforts are guided by a master plan framework, led by the Greenways Commission and supported by the non-profit friends group, Greenways for Nashville. The goal is to have a greenway trail within two miles of every neighborhood, providing both recreation and transportation as well as conserving green space, particularly floodplains and scenic viewsheds, along the county’s waterways. Greenway segments are continually being added to the existing network and, as of February 2013, they are 63 percent of way towards this goal (a greenway trail within two miles of every resident). In Nashville, there are currently 52 miles of paved greenways (as compared to 36 miles in 2008) and 25 miles of primitive trails.

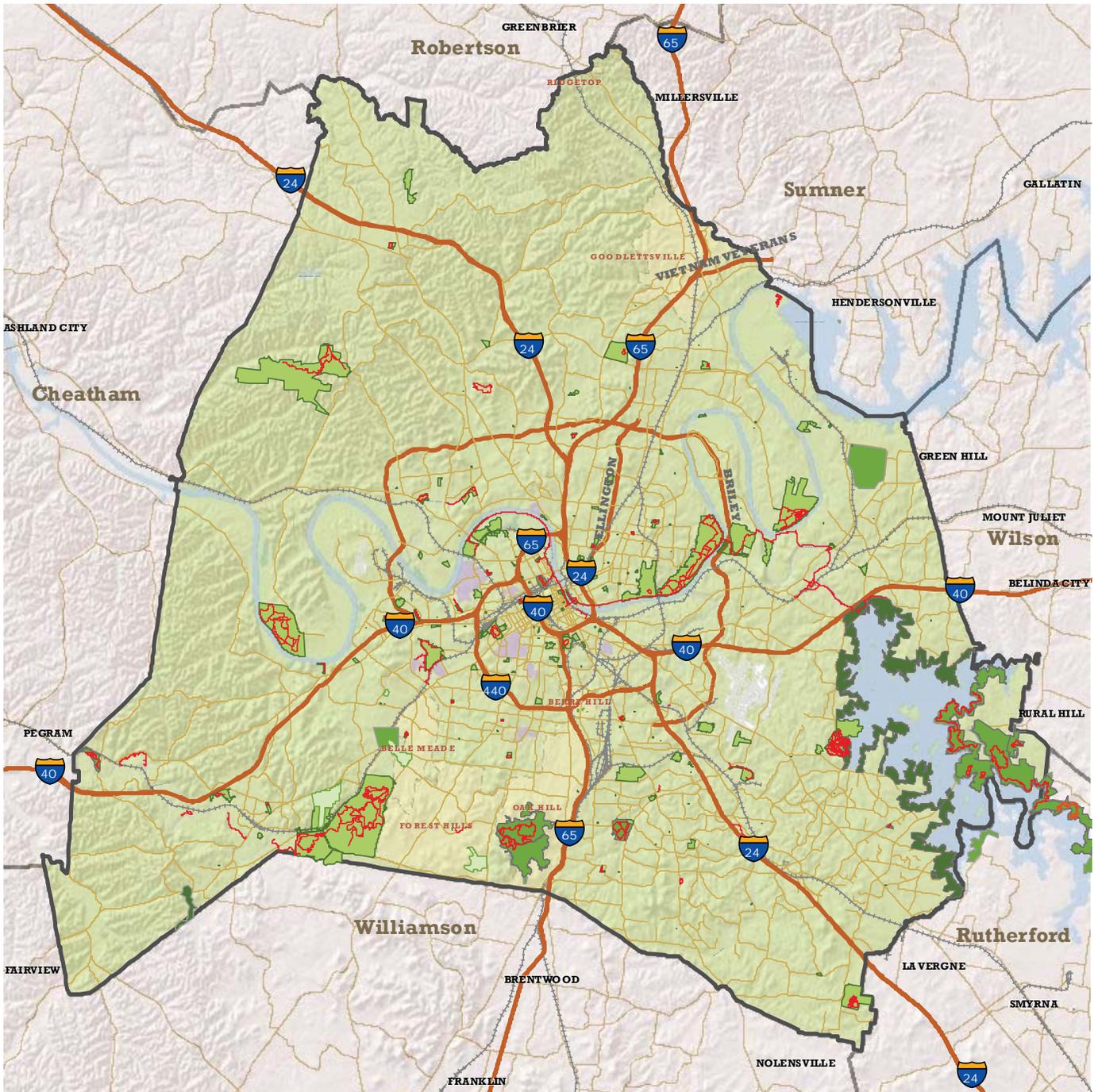
Greenways are funded by Metro capital improvement funds, federal transportation funds (primarily through the Metropolitan Planning Organization), and federal and state grants through the Tennessee Department of Environment and Conservation. The non-profit Greenways for Nashville provides grant funds for greenway enhancements through private fundraising.

Nashville residents are also partnering with Metro Greenways and working on additional trail systems. One project is in the Beaman Park to Bells Bend Corridor, which would connect Beaman Park in Scottsboro to Bells Bend Park adjacent to the Cumberland River. Another project is the Radnor to River Trail, which would connect to various greenway segments and connect Radnor Lake to the Cumberland River.

Please refer to the map of Nashville’s parks and greenways on the following page. You can also find information about Nashville and its park system on the Trust for Public Lands ParkScore Maps at: <http://parkscore.tpl.org/city.php?city=Nashville>

# NATURAL RESOURCES AND GREEN SPACES

Map 6: Nashville's Parks and Greenways



-  Existing Trails
-  Federal Parks
-  State Parks
-  Metro Parks
-  Private Parks and Golf Courses



Produced by the Metropolitan Nashville Planning Department  
 March 2013  
 Datum: NAD 1983 Projection: State Plane, Tenn. Units: Feet



### Tennessee's State Park System

In addition to the city's park system, the State of Tennessee oversees state parks, state natural areas, state forests, wildlife management areas, and public fishing lakes. The Tennessee State Parks, a division of the Tennessee Department of Environment and Conservation (TDEC), manages 53 state parks. Another division of TDEC, the Resource Management Division, oversees the state's 82 designated natural areas. Together, state parks and natural areas encompass more than 185,000 acres across the state. Facilities range from natural, rustic, and historic sites to resort parks with inns, restaurants, and marinas. Tennessee parks and natural areas offer more than 200 trails with approximately 1,200 miles of hiking, biking, and horseback riding opportunities. The state natural areas protect unique natural communities with the goal of conserving Tennessee's rare, threatened, and endangered plant and animal life. In 2012, the Tennessee State Parks system celebrated its 75<sup>th</sup> Anniversary. TDEC is also responsible for conserving and promoting the state's historical, natural, and archeological heritage as well as providing support to local governments.

State parks and natural areas in Nashville include Radnor Lake, Long Hunter, parks along the Harpeth River, the Hermitage, the Belle Meade Mansion, Bicentennial Mall, and two cedar glade areas.

An especially popular Nashville park is the Radnor Lake State Natural Area, located in Oak Hill. This park is over 1,100 acres and is classified as a natural area, meaning it allows only hiking and walking on designated trails (no biking, dog walking, or sporting activities). Radnor Lake was Tennessee's first natural area and protected ecosystem. The park has six miles of trails, including easy, moderate and strenuous hikes, and is home to numerous wildlife, including songbirds, waterfowl, turtles, otters, beavers, and deer. Radnor Lake is one of the most visited parks in the state system receiving over 850,000 visitors last year.

Downtown Nashville has the Bicentennial Mall State Park, near Tennessee's State Capitol building. The 19-acre park provides visitors with a taste of Tennessee's history and environment. This park preserves the view south towards the Capitol and serves as a commemoration of Tennessee's 200<sup>th</sup> Anniversary of statehood. In addition to Tennessee's geology, the park includes a fountain area with 31 fountains that represent Tennessee's major waterways and a *Pathway of History*, a 1,400 foot wall engraved with historic events spanning over 200 years.

Long Hunter State Park is located along the shore of J. Percy Priest Lake. It consists of 2,600 acres in four segments: Couchville, Baker's Grove, Bryant Grove and Sellars Farm. Picnicking, hiking, swimming, boating, fishing, nature photography, and wildlife observation are among the activities available to park visitors. Other activities include recreation programs for the public and environmental education programs for school groups.

In addition to state parks and natural areas, the Tennessee Wildlife Resources Agency (TWRA) works to preserve, conserve, manage, protect, and enhance the state's fish and wildlife. TWRA manages state habitats for the use and enjoyment of residents and visitors and fosters safe use of the state's waterways. Activities and programs include wildlife education, protecting wetlands, monitoring water quality, boating, fishing, hunting, outdoor sports, and preserving the state's disappearing wildlife species. In Nashville, TWRA-managed lands are located around J. Percy Priest Lake. TWRA also manages public fishing opportunities, including Marrowbone Lake in the northwest area.

### Tennessee's Federal Parks and Lands

The U.S. National Park Service has cared for the country's national parks since 1916. With the assistance of volunteers and park partners, the National Park Service cares for nearly 400 places, including environmental stewardship and historical preservation, which have more than 275 million visitors each year.

Nashville's only federal park is a section of the Natchez Trace Parkway that terminates in the southwest corner of Nashville, near the historic Loveless Cafe. It is a linear park with the federal government owning only a small area beyond the roadway itself. While very important for tourism, the parkway should be buffered to the extent possible with privately conserved lands to protect its numerous benefits. The National Park Service also administers the Trail of Tears National Historical Trail, though this trail is by designation only and does not include park-owned land.

Other federal public lands are the U.S. Army Corps of Engineers' lands and reservoirs, including surrounding sections of Cheatham and Old Hickory Lakes on the Cumberland River and J. Percy Priest Lake on the Stones River. In addition to the reservoir dams, these public lands include picnic grounds, campgrounds, trails, and marinas. The Nashville District of the U.S. Army Corps of Engineers partners with other agencies on public infrastructure management, water resources engineering, environmental stewardship, and disaster response for the Cumberland-Tennessee River systems.

### Private Conserved Lands

In recent years, additional tools have emerged to help preserve open space. One of these tools is *conservation easements*, voluntary legal agreements where a landowner transfers development rights for a property to a not-for-profit land protection agency in order to protect resources such as agricultural lands, historic places, open space, and wildlife habitat. The property

owner retains full ownership of the land and can sell, transfer, or pass it on to heirs. However, development of the property is restricted under the specific terms of the easement, and the conservation restrictions remain in effect. The transfer of development rights in this manner is considered a charitable donation, and land owners may qualify for tax deductions. According to the Land Trust for Tennessee, conservation easements are protecting 1,303 acres in Davidson County and 12,869 acres of farmland and open space throughout the Middle Tennessee region.

There are a number of land conservation organizations working in partnership to protect important lands across Nashville, including the Land Trust for Tennessee, the Parks and Greenways Foundation, Greenways for Nashville, the Conservation Fund, the Nature Conservancy, and Cumberland River Compact. There are also a number of localized groups that focus on defined geographies, such as watershed associations. All of these groups look to master plans such as the *Cumberland River Master Plan*, the *Nashville Open Space Plan*, the *Metro Parks and Greenways Master Plan*, and Metro's 14 Community Plans to guide their work.



### Parks and Greenways Conclusion

The *Together Making Nashville Green Report* emphasizes that: “Open space is not empty, purposeless land. It has intrinsic value that is environmentally essential, economically significant and measurable. Open space provides direct benefits to human society through ground water storage, climate moderation, flood control, storm damage prevention, erosion control, and air and water pollution abatement . . . . When these benefits are not provided by open space, the public sector must pay for the man-made infrastructure to replace the functions of natural systems.”

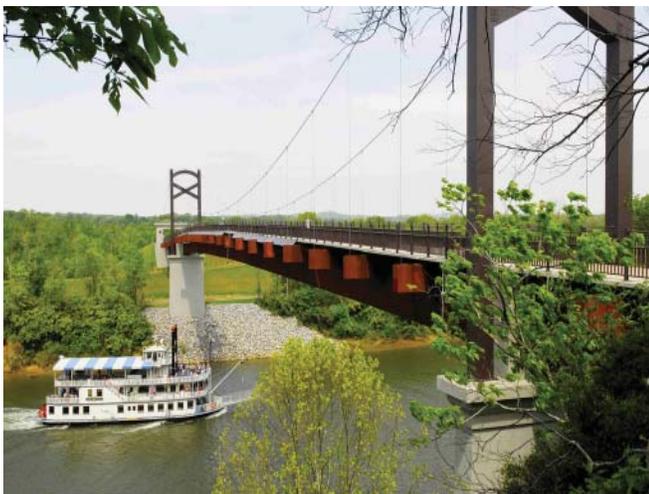
Nashville is on the right path to protecting additional open space and creating a complete green infrastructure system. Through cooperation, open space goals contained in the Nashville Open Space Plan, the Parks and Greenways Master Plan, and the city’s 14 Community Plans (which analyze each community’s open space system to determine additional needs) can be attained for Nashville. Each and every one of us has a stake in our city’s green spaces, and by working together we can enjoy even more open spaces throughout Nashville.

### Ideas and Recommendations for Additional Discussion

Numerous initiatives to protect, improve, and expand Nashville’s parks and greenways and woodlands have already occurred, while others are being planned. The

following are ideas and recommendations for further discussion.

- Continue to Conserve and Add to Nashville’s Open Space and Green Infrastructure Network.
  - The *Nashville Open Space Plan* and the *County-wide Parks and Greenways Master Plan* provide detailed guidance, recommendations, and partnerships for achieving this.
- Continue to Increase Public Education and Awareness.
  - Continue a collective effort by all stakeholders to improve or change people’s understanding of the benefits of green infrastructure – preserving ecosystems, helping sustain clean air and water, offering recreational opportunities, providing natural beauty, providing wildlife habitat, and making us all healthier.
- Continue to Encourage Private Land Conservation.
  - Private property conservation is a useful tool for permanently protection land while ownership is retained by the property owner. Continue to education people about this useful tool that complements public open space and contributes to green infrastructure.



### Part 4 – Nashville's Food and Farming

Across the nation, land has been inventoried by soil type, which highlights land that is good for agricultural production. *Prime farmland* in Nashville is often associated with the rich soils in floodplain areas that are ideal for growing food crops. Across Nashville farming happens at both large and small scales.

An important component of a greener, more livable Nashville is the development of a locally-based, sustainable food system. A local food system promotes environmental stewardship and renewal, fosters a local economy through the purchase and promotion of locally grown and raised foods, actively supports farmland and working farm preservation, enhances the health of residents, strengthens the cultural ties between our rural and urban residents, and provides a secure and reliable source of food.

#### Food Systems

A *food system* is the map of the journey a food takes – from planting, growing, processing, distributing, and consuming (the fun part!), to disposal – and the environmental and human resources needed for the journey. Historically, the majority of our food was grown and raised locally or regionally, with specialty foods (such as spices and citrus fruit) shipped in by boat or train. One could literally look at a map and see where the food they ate came from, and often knew the farmer and the piece of land that produced the food. This food also had very few preservatives; the fresh food was ‘put up’ at home either through canning, drying, or smoking, or placing in a root cellar.

Today, a simple walk through the grocery store shows that food travels thousands of miles, not just coffee and bananas, but meat, cereal, and other items most families consider staples. You would need a globe to see the map of where the food in your grocery cart came from. There is also food that our great-grandparents would find unrecognizable, such as the processed food that occupies most interior aisles of the grocery store. This globalization and processing of food products has made some food less expensive to

purchase, but at a cost to the local producer and often also to the health of the consumer.

Consumers, businesses, producers, and governments all make decisions about food and the food economy. Farmers make choices about using fertilizers and pesticides. Restaurants and families alike make choices about where to buy ingredients and how to dispose of their waste. City governments especially make choices every day: about what type of food to buy and from where, about infrastructure improvements, and about investments in our food economy. And municipalities enact building, tax, and administrative policies that affect the lives and food systems of communities and businesses. Across the country, including Nashville, there is an increasing interest in choices that support *community* food systems, and that improve the local economic, social, and nutritional health of a neighborhood, city, or region.

Community food systems typically distinguish themselves from the globalized food system by two characteristics: *self-reliance* and *sustainability*.

- *Self-reliance* measures to the extent an entity can meet its own food needs: it can be a family's ability to provide food; a community's resilience in meeting its food needs in case of emergency; or the security of the food supply from contamination.
- *Sustainability* deals with environmental, economic and social/cultural factors. Are growers using sustainable farming practices, leaving the land as fertile as before the harvest? Are the soil, air and water degraded or improved? Can farmers sustain themselves and provide a living wage for their workers? Is food accessible and affordable to all? Does money spent on food remain in the community? Is food connecting growers and consumers? Are farms producing the desired variety of foods for the diverse cultures of a community?

Metropolitan governments have long addressed sev-

eral of the essentials of life: air quality, water quality, and housing. However, planning and protecting food systems has remained largely off the radar until recently. Growing awareness about the impact of the food system on climate change, local and regional economies, fossil fuel resources, community health, changing consumer preferences and land use are bringing food issues to the forefront. The intersections between the food economy and government action are more visible now than ever before.

### Farming and Changes in Land Use

Nashville is the commercial and infrastructural hub of Middle Tennessee's food economy. This is due to the city's geographically central location, the confluences of major interstates and rail lines that it hosts, and its status as the region's largest population center. Food processing, consumption, and transport are important components of Nashville's economy and cultural identity, and those industries help to define the city's relationship with the larger region around it. Of course, that relationship of food supply and demand travels both ways – into and out of Nashville – and, like all food, it begins in the ground.

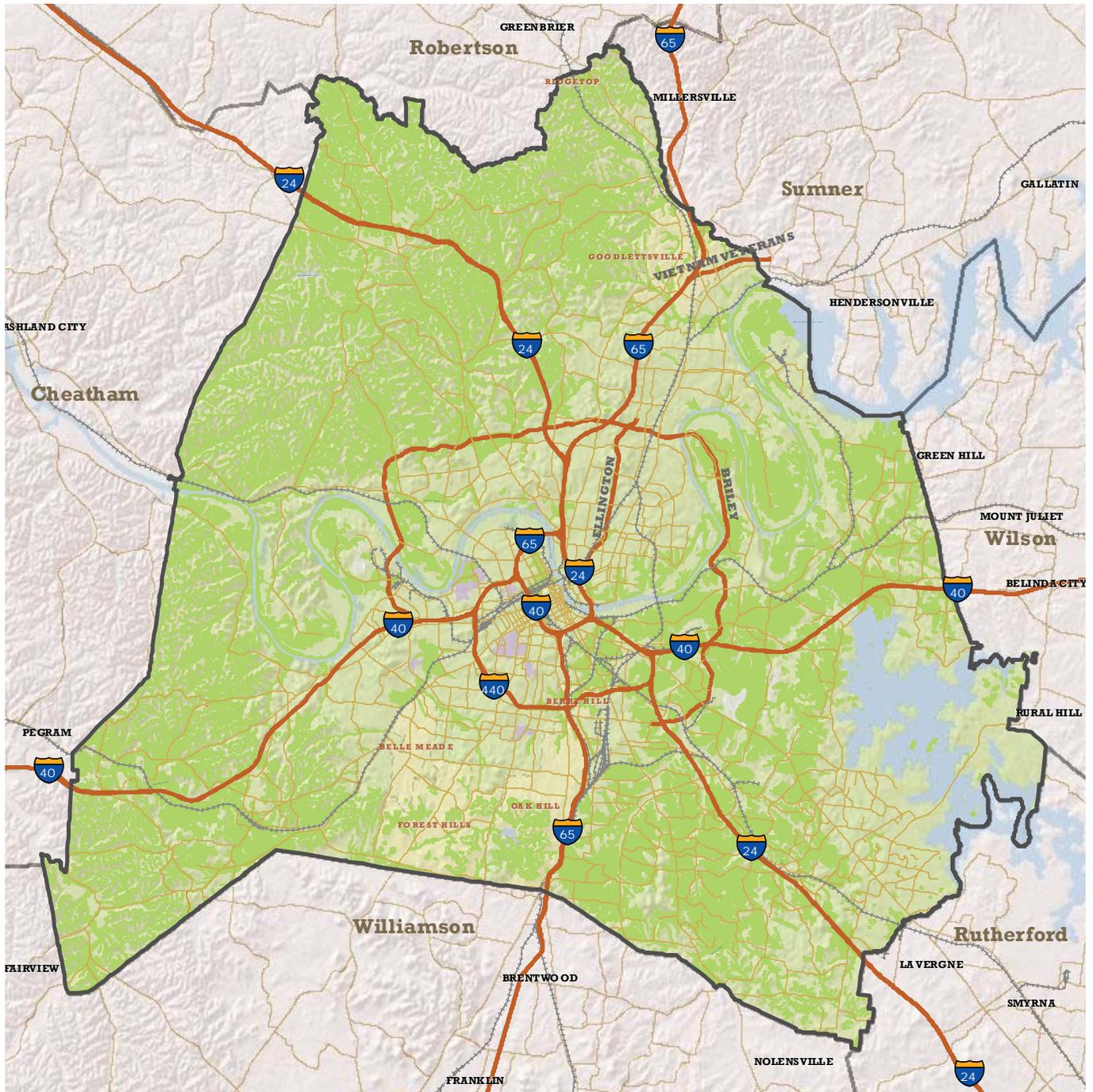
Agricultural production in our region and across the nation faces several critical issues: loss of farmland, increasingly concentrated operations, economic vulnerability, and environmental degradation. Nashville, like many Middle Tennessee counties, has a strong history of farming. The Cumberland River's bends and other water courses provide fertile bottomland soil excellent for crop production. However, the prime agricultural lands nearest the city have mostly been developed for suburban residential housing, industrial production, or commercial purposes. Despite the increased urbanization and suburbanization of land, Nashville still has a number of farms, and is seeing an increase in urban farming.

Please refer to Map 7 of prime agricultural soils on the following page.



# NATURAL RESOURCES AND GREEN SPACES

Map 7: Nashville's Prime Agricultural Soils



 USDA-NRCS Classified 'Best' Soils



Produced by the Metropolitan Nashville Planning Department  
March 2013  
Datum: NAD 1983 Projection: State Plane, Tenn. Units: Feet



**Table 1:** Loss of Farmland

County	Loss of Farmland (2002 to 2007)		Average Size of Farm (acres)	
	(acres)	(%)	2002	2007
Davidson	9,172	18%	90	80
Williamson	40,379	20%	118	112
Sumner	9,967	5%	99	110
Robertson	6,019	3%	144	161
Wilson	42,031	18%	110	111

Source: U.S. Agricultural Census

Nashville has less than 40,000 acres currently being farmed as defined by the U.S. Department of Agriculture, which includes hay, sod, nursery trees, and other commodities for non-human consumption. We do not have a current accurate inventory of acres in human food production alone. The average size of a farm is also decreasing in Nashville, possibly because of the high price of land (and pressure to sell for development) and possibly because of movement to smaller-scale farming. More study is needed on how and why farming is changing in Nashville.

The *U.S. Agricultural Census* shows the average farm size and loss of farmland acres for Nashville and the surrounding counties. Percentages are shown as the percentage of all farm land for each county. Refer to Table 1.

## Food Access and Local Food

*Food access* is a term that refers to the ability to obtain healthful, affordable food. Access can be compromised because there are no grocery stores in particular areas; stores that are present might be difficult to reach using the existing transportation network; food might not be affordable; or grocery/convenience stores might have limited options of healthful foods. *Food deserts* is the term used to describe those areas that lack access to food, and Nashville has a handful of these areas, such as Edgehill and parts of North Nashville.

Nashville ranks low within Tennessee, but high nationally for obesity and obesity-related diseases. Evi-

dence indicates that both food consumption choices and levels of physical activity can be impacted by the urban environment. Food access and obesity are interlinked. More about the issue is discussed in the *Livability and Health* background report.

*Re/Storing Nashville*, a program funded by the Robert Wood Johnson Foundation, is a faith-based movement for food justice in Nashville that advocates for increased access to affordable, healthy food for all of Nashville. *Re/Storing Nashville* is a program of *Community Food Advocates*, which brings people together to create and sustain a secure and healthy food system for the region, from production to consumption.

The majority of food purchased by households in Nashville comes from national chain supermarket stores, and these stores typically do not stock local foods. Specialty markets, including Whole Foods and the Turnip Truck, do prioritize local foods. However, in general, product prices in these stores are higher. Nashville needs to find a way to negotiate with chain supermarkets to source locally and work with specialty markets to try to make products more affordable.

Besides going to the supermarket, Nashvillians are obtaining food from farmers (directly on the farm, at the farmers market, or indirectly via purchasing shares of the farm known as Community Supported Agriculture (CSA), or they are growing food themselves in their backyard or at a community garden. The line between farms, community gardens, and wholesale produce providers is blurred in Nashville. At the time of this report (March 2013), an accurate

listing of active human food producing farms could not be found. The Tennessee Department of Agriculture's *PickTN Products* lists seven farms (excluding specialty crop such as mushrooms and honey), while *Local Table* magazine lists ten farms. Thus, it is difficult to understand how much food (and what type of food) is produced locally and what is sold locally. This inventory is needed and should be part of the food system analysis.

*Community Supported Agriculture* (CSA) is a locally-based model of agriculture and food distribution where individuals pledge to support one or more local farms, with growers and consumers sharing the risks and benefits of food production. CSA members, or subscribers, pay at the onset of the growing season for a share of the anticipated harvest. Once harvesting begins, they receive weekly shares of vegetables and fruit, and sometimes herbs, cut flowers, honey, eggs, dairy products and meat. Some CSAs provide for contributions of labor in lieu of a portion of subscription costs. CSAs seem to be the most popular model for farmers growing vegetables on a smaller-scale to follow in Middle Tennessee.

Within the last five years, there has been a surge of local *farmers markets* around the Nashville. These markets came to be for a few reasons. The Nashville Farmers Market, located in Bicentennial Mall State Park, has only recently been re-programmed to support local foods. Many of its vendors are wholesalers who do not source local products. Also, for many people the Nashville Farmers Market is not easily accessible. Another reason is that as the number of local farms continues to increase, CSA programs needed centralized locations to distribute their food. In addition, there has been an increased demand for specialty producers to partner with farmers to sell products, such as salsa, honey, jams, candles, and sauces, in a festive setting.

In addition to the Nashville Farmers Market, the following is a list of farmers markets in Nashville (ac-

ording to the Pick Tennessee Products webpage as of March 2013):

- 12 South Farmers Market at 3000 Granny White Pike, Nashville, TN, 37204
- Antioch – Farmers Market at the Crossings, 5255 Hickory Hollow Parkway, Antioch, TN, 37013
- East Nashville Farmers Market in the grass lot at 210 South 10<sup>th</sup> Street, Nashville, TN, 37206
- Forest Hills Farmers Market at the Forest Hills United Methodist Church, Brentwood, TN, 37215
- Hip Donelson Community Farmers Market at 108 Donelson Pike, Nashville, TN, 37214
- Nashville F.A.R.M. at five locations throughout Nashville
- West Nashville Farmers Market at Richland Park, 385 46<sup>th</sup> Avenue North, Nashville, TN, 37209

*Community gardens* exist in Nashville, but are not part of a formal government or nonprofit program like in many cities, such as NeighborSpace in Chicago or P-Patch in Seattle. While Metro permits community gardens on Metro land, these gardens have not been organized or supported in a meaningful way, partly due to lack of funding for programming.

The *school gardens* program shows the most promise in terms of gardening at a community level. These gardens help to educate children and families about growing and preparing food, providing an alternate food source for cafeterias, and integrating curricula into the garden. According to the Metro Public Schools website there are 47 school gardens (as of March 2013). A great example of reinforcing local food at the school level is the *Nashville School Garden Coalition*, a group of teachers, parents, community volunteers, and school garden advocates who work together to support school gardens in Nashville through a variety of programs and education.

## NATURAL RESOURCES AND GREEN SPACES

Nashville needs to conserve more land to create a sustainable, local food system that includes rural farms, neighborhood farms, community gardens, backyard gardens, and edible plantings on public land. The richest agricultural soils are in the bends of the Cumberland, Harpeth, and Stones Rivers. According to the *Nashville Open Space Plan*, some areas of rich, floodplain soils should be prioritized for agricultural uses. Farms can be found in nearly every non-urban area of Nashville, but many of these farms are disappearing or shrinking in size.

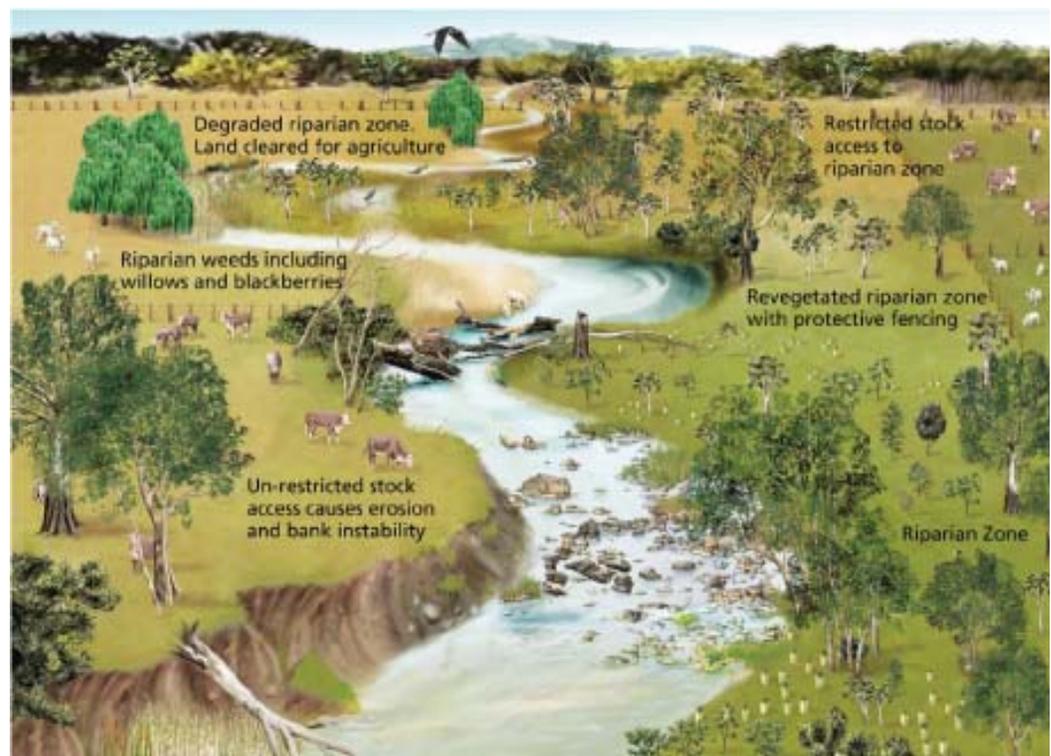
As previously mentioned, floodplains contribute to a variety of community goals in the green infrastructure network, including protection of natural drainage areas, water quality, groundwater supply, and natural habitat. Areas adjacent to waterways should remain undisturbed or replanted, if they have been previously disturbed. Beyond the environmental benefits, floodplains can be used for the development of paths, trails, and greenways for recreational purposes. Further away from waterways, floodplains can be used for agricultural uses, especially sustainable

agricultural practices that do not rely so heavily on pesticides, herbicides, and fertilizers that can damage watersheds. Please refer to the graphic below for an example of how this can work and the map of farms and community/school gardens on the next page.

### Food Policy and Planning/Zoning

The *urban agriculture* definition per the *Community Food Security Coalition's* Urban Agriculture Committee (2007) is the production, distribution, and marketing of food and other products within the cores of metropolitan areas and at their edges. Urban agriculture is a complex activity, addressing issues central to community food security, neighborhood development, environmental sustainability, land use planning, agricultural food systems, farmland preservation and other concerns. Operating in many different contexts includes several layers: purpose (production of plant or animals, revitalization, economic development, sale and produce); location; size and scale; production techniques; and end products.

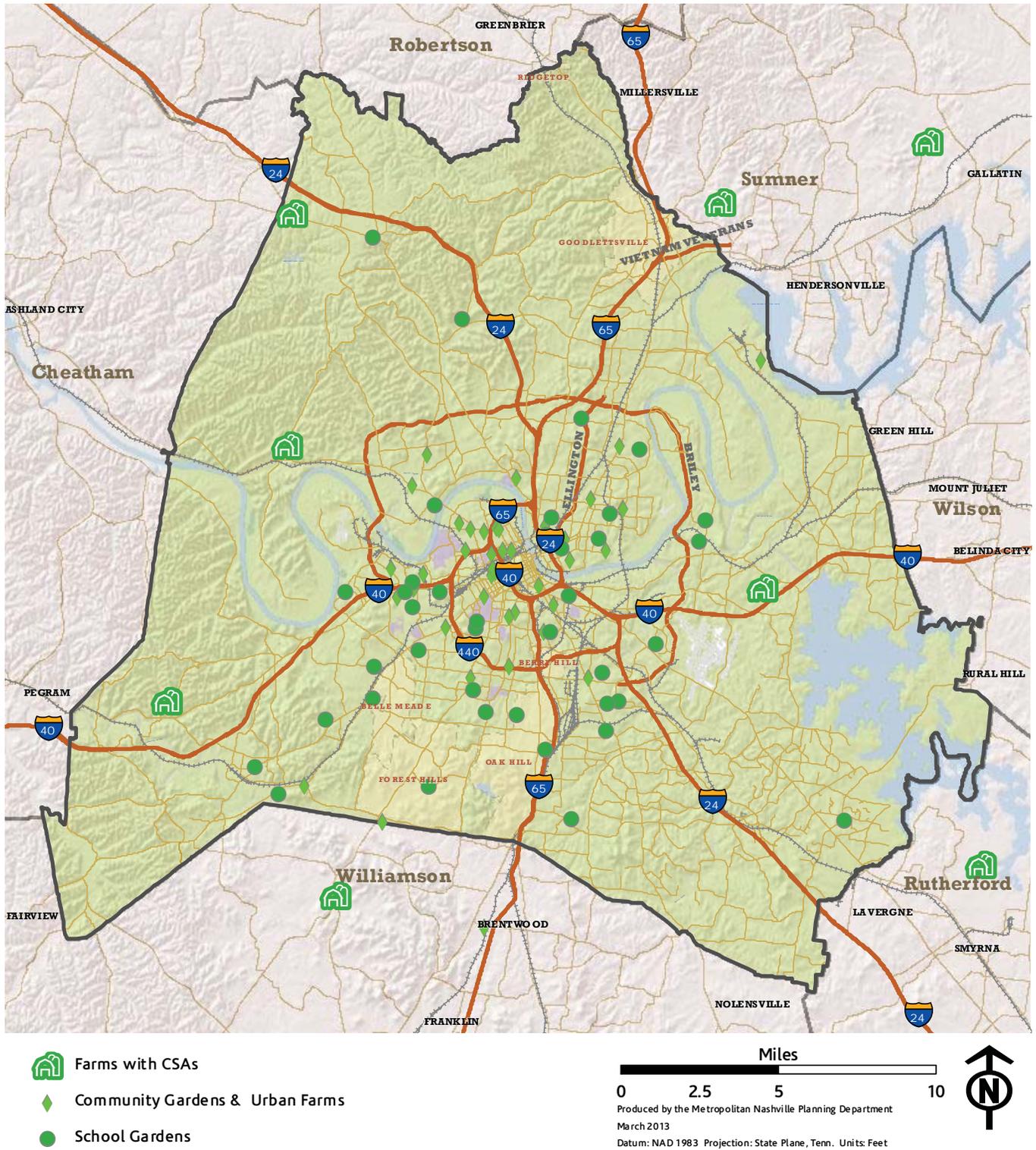
**Graphic 2:** Riparian Area Example



Source: Report Card, Victoria, Canada

# NATURAL RESOURCES AND GREEN SPACES

Map 8: Nashville's Community and School Gardens



While there are many benefits to urban agriculture (health, social, economic, environmental) there are also risks that need to be addressed. Those risks include availability of land and other growing space (including land tenure, location, and siting), natural resources (access to water, appropriate soils), operations (marketing, volume of sales, financial, and technical issues), and security and vandalism. While we recognize the need for more farms in our urban areas, there are important planning and zoning challenges associated with urban agriculture.

Nashville's Planning Department is placing more consideration on food related issues in the following ways:

- Urban agriculture and access to healthy food is now considered a component of livable communities. Food system issues have become a regular part of the livability conversation with regard to land use policy.
- The planning process in has made great strides with regard to food system planning:
  - The Nashville Metropolitan Planning Commission broadly considers food system issues through its 14 community plans. The community plans and land use policies seek to find balance between growth and preservation of land – growth for active living and employment and preservation for open space networks and agricultural uses. Some of the recently updated community plans contain specific policies pertaining to urban agriculture and agritourism. Those precedent setting community plans include the *North Nashville Community Plan* with its discussion of food deserts, special policies for grocery store development in food deserts, and mapped back-tax properties for consideration of community gardens. Another plan is the *Scottsboro/Bells Bend Detailed Neighborhood Design Plan* (part of the *Bordeaux/Whites Creek Community Plan*) which provides guidance for the preservation

and enhancement of a rural community that supports agricultural tourism and farming activities.

- Within the last three years, the Nashville Metropolitan Planning Commission recommended approval of two important pieces of legislation relating to urban agriculture efforts; the Chicken Bill (allowing private residences the ability to raise chickens) and the Community Gardening Bill (making the distinction between commercial and non-commercial gardens and recognizing community gardening as a land use separate from agricultural uses). It is important to note that eight Council Districts opted out of the Chicken Bill so chickens are not allowed in these districts.

There are still challenges, however. Nashville's zoning code is complex with regard to zoning for agricultural activities and proves confusing with its many layers. Some areas of town opted-out of the "chicken bill," which allows residents to keep hens for egg-laying. For the areas that opted-out, keeping chickens is not allowed. More education is needed on our city's food system and ways it can be improved.

The *Nashville Food Policy Council* (NFPC) was formed in 2010 to influence policy and regulations that may impact Nashville's food system. The NFPC includes members from various sectors of the community – farmers, restaurateurs, institutional representatives, non-profits, and representatives from Metropolitan Nashville Government departments. The NFPC's mission is to increase the availability of and access to healthy and affordable food and encourage its use by:

- Engaging and education the community to increase awareness on issues related to food security;
- Creating strategic partnerships with key stakeholders to specifically address the availability, access, and appropriate use of healthy and affordable food;

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- Cultivating and supporting local food resources; and
- Influencing policy and regulations that address issues related to food security and that promote a more sustainable food system.

The NFPC endorses a local food system that encourages local production and distribution of fresh local food to residents of Nashville, particularly to low-income communities where reducing hunger and improving health are critical policy goals. The NFPC shares information and knowledge about local food system issues and recommends policies that facilitate an increase in the production and distribution of fresh, healthy, locally grown food to Nashville residents.

### Food and Farming Conclusion

The local food movement is growing in Nashville, and positive changes are underway. Small-scale farming and community/school gardens are increasing and several restaurants pride themselves on using local foods. However, for some, food access remains a major issue. Through state and local support and continued commitment from private sector and non-profit organizations, Nashville can develop a regional food system.

### Ideas and Recommendations for Additional Discussion

The following are ideas and recommendations for further discussion.

- Assess Nashville's Current Food System
  - In order to fully understand the opportunities and constraints of Nashville's food system and its place in the regional food system, a thorough food assessment needs to be conducted. A partnership is underway between Nashville's Food Policy Council and the Metro Public Health Department, as part of their



citywide health assessment, to produce an assessment of the current system. It is anticipated that this assessment would show areas of strength and areas that need improvement.

- Explore Ways to Expand Nashville's Community Gardens.
  - While Nashville has some promising community and school gardens, the city could benefit from a more formal, funded community garden program. Several key departments to involve include Metro Parks, Public Works, the Mayor's Office of Neighborhoods, and the Metropolitan Development and Housing Agency (MDHA).
- Explore Ways to Increase the Use of Local Foods by Nashville's Largest Food Consumers.
  - More support for local foods is needed from the city's largest food consumers, such as public schools, hospitals, and universities.
- Explore Ways to Increase Local Food Production.
  - More actions are needed to preserve fertile, agricultural lands; encourage the development of urban farms; connect farming efforts to the regional food system; and to strengthen local food connections between producers and the urban market. Food policy initiatives, zoning regulations, and economic development incentives could include more ideas and tools to support and enhance the local food economy.
- Continue to Increase Public Education and Awareness.
  - Continue a collective effort by all stakeholders to improve or change people's understanding of the benefits of a local, healthy food system – increasing nutritional value, helping sustain local food producers, and making us all healthier.

### Part 5 – Environmental Justice

The U.S. Environmental Protection Agency (EPA) defines *environmental justice* as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” *Fair treatment* means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, commercial, or governmental operations and policies.

The environmental justice movement emerged in the 1980s when minority, tribal, and low income communities began to organize in response to excessive detrimental health and environmental impacts in their neighborhoods. Negative impacts found in their communities included air pollution, industrial contamination, overconcentration of hazardous facilities, lead poisoning, and water pollution. Communities also protested being excluded from the decision-making process. In 1982, residents of Warren County, North Carolina, a poor, predominantly African-American county, protested the siting of a landfill and focused national attention on these issues. After that, numerous studies showed that often these uses are overloaded in minority, low-income, and tribal communities. In the early 1990s, the movement was further strengthened by the establishment of the EPA’s Office and Environmental Justice and the signing of *Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*.

Over the years, the EPA and environmental justice organizations have expanded the fair treatment concept to consider not only how *burdens* are distributed across communities, but also how environmental and health *benefits* are shared. In other words, all people, regardless of race, ethnicity, or economic status, should have the same opportunity to enjoy the positive outcomes of environmental decisions and programs, such as cleaner air and water, improved health, and economic vitality. Both the Nashville Open Space

Plan and the Parks and Greenways Master Plan have goals to provide open space opportunities to everyone in Nashville. The goal is to have a park within a convenient walk and a greenway trail within two miles of every Nashvillian.

Recent research highlights that combining environmental justice with smart growth and equitable development strategies can be effective in promoting a clean and safe environment, a strong economy, and good quality of life for all residents. The EPA’s report *Creating Equitable, Healthy, and Sustainable Communities: Strategies for Advancing Smart Growth, Environmental Justice, and Equitable Development* discusses strategies overburdened communities are using to address health challenges, improve environmental conditions, and create new opportunities. The report highlights that while the principles of environmental justice, smart growth, and equitable development are often viewed separately, these principles indeed overlap. All three aim to create communities that are healthy, environmentally sustainable, and economically vibrant, and where residents are involved and shape development and preservation.

Common design principles include the following practices. Homes should be buffered from land uses with potential environmental concerns like landfills, heavy manufacturing uses, and interstates. Sites that have been contaminated by previous industrial uses should be cleaned up and redeveloped with safer uses. Buildings, streets, stormwater systems, and sewers, as well as other infrastructure, should be constructed in ways that reduce air and water contamination and improve the health of their users. Everyone should enjoy safe and clean places to live, work, learn, and play.

*(Note: Additional information related to sustainable and healthy communities is found in the Livability, Health, and the Built Environment background report. Additional information and strategies for alleviating poverty is discussed in the Poverty background report.)*

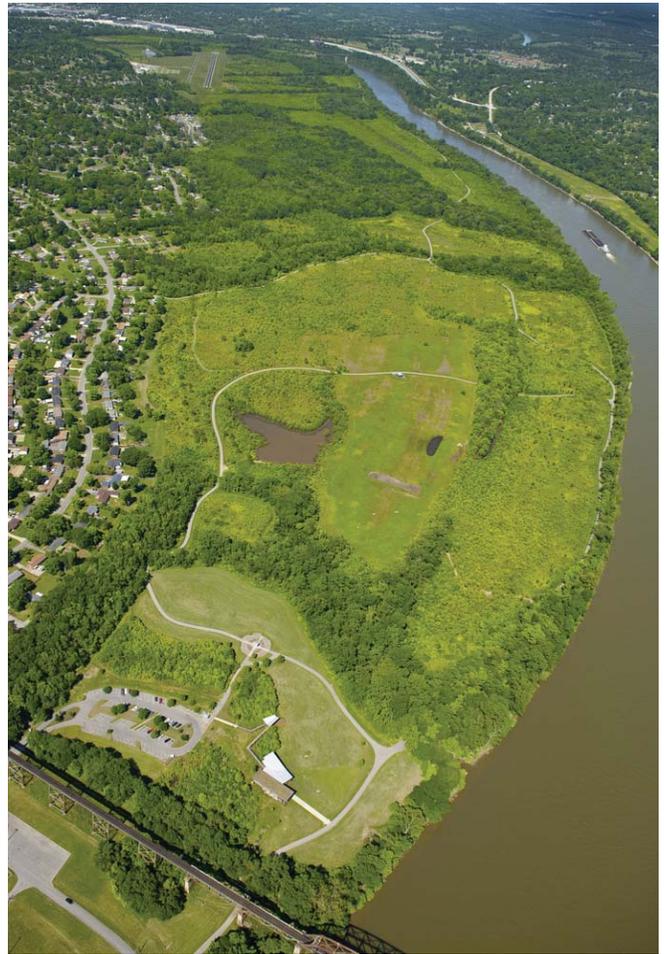
## NATURAL RESOURCES AND GREEN SPACES

### Environmental Justice in Tennessee and Nashville

The Tennessee Department of Environment and Conservation (TDEC), in addition to protecting the state's environmental quality and overseeing natural resources, also promotes environmental equity and justice, including equity in the administration of the Tennessee's environmental programs.

Local resources for environmental justice issues include the following. The *Healthy Nashville* website includes a page for local environmental justice topics and news. The local Sierra Club chapter has a committee that works on environmental justice issues for Middle Tennessee. The African American Cultural Alliance and Vanderbilt University's Service Training for Environmental Progress are also listed as Nashville environmental justice organizations.

*(Note: Resource information and web page links are provided at the end of the report in the Resources and Further Reading section.)*



*The Green Ribbon Committee envisions a city where every citizen of Davidson County has at least two modes of transportation available and accessible in order to reach food, work, school, worship and recreation, and the entire process of visiting Music City is green for tourists . . . . Ten years from now, we envision that Nashville will have developed and executed the most progressive open space plan in the Southeast to preserve its incredibly unique ecological, cultural, and historic landscape and enhance its reputation as a desirable location for people and businesses to locate. We look forward to the time, soon, when Nashville will have a locally-based sustainable food system, and all 2,500 miles of streams will be clean and healthy. We would like to plan for a Nashville that will have a robust tree canopy and significantly improved air quality – where energy use will be reduced and renewable energy use such as from solar power and geothermal will be increased. Waste will be reduced and we will be recycling more of the waste we generate, saving money and our natural systems.*

*- the Together Making Nashville Green Report*

### Part 6 – Wildlife Habitat and Viewing

While wildlife, wildlife habitat and connecting wildlife habitats have been discussed in prior sections, the subject merits mentioning again. In recent years, public interest in wildlife-oriented activities has grown beyond just hunting and fishing. Viewing and photographing wildlife have become increasingly popular.

Birdwatching is the most popular of these activities. Some 409 species of birds have been counted in Tennessee; about half of these are year-round residents. The Cumberland Region's lakes, reservoirs, and scenic rivers contribute to the greater Mississippi Flyway to the west and, to a lesser extent, to the Atlantic Flyway to the east. They also provide important habitat for overwintering waterfowl.

The region's agricultural areas also entice many species of birds. Doves, flycatchers, and swallows are common in pasture and field areas. Large forest areas, and even smaller wooded areas, provide habitat for forest birds, including those that are shy, such as the Scarlet Tanager and migrating warblers. The areas where fields and forest meet provide some of the best areas for wildlife habitat, as birds and other wildlife can feed in open lands, but find shelter in wooded areas. In addition to birders, others enjoy watching deer and other large wildlife, or seeing smaller mammals like rabbits and raccoons, or playful mammals like otters. Others look for salamanders, turtles, frogs, butterflies, and other insects.

The Tennessee Wildlife Resources Agency and the Tennessee Wildlife Resources Foundation have partnered to create the *Tennessee Watchable Wildlife Program* in efforts to protect habitat and to provide information on activities for the public.

Areas that are important for wildlife habitat are also important for the health and quality of the city's watersheds, woodlands, open spaces, and agricultural lands. As such, the importance of preserving wildlife habitat, along with recommendations and ideas, has been presented as part of previous sections.



### Conclusion

Green spaces and green infrastructure help clean our water and air; create recreational opportunities for active, healthy living; provide gathering places; filter stormwater and mitigate flooding; and preserve community character. These places, great and small, add essential value to the community and, when connected, make a stronger network. Many of our natural resources extend across the county line, which emphasizes the need to look at these resources on a regional basis.

Nashville is a big city with a small town feel. The city also is blessed with spectacular natural beauty. Residents and businesses want to maintain and enhance these qualities that make Nashville such a great place – natural beauty, environmental quality, economic opportunities, quality growth, outdoor recreations, and unique neighborhoods. This background report provides an overview of Nashville’s natural resources, including water, trees, parks, farms, and wildlife. Natural resources are essential to human survival – clean water, clean air, nutritious food, building materials for shelter, habitat, and energy production. In addition to meeting our most basic needs, natural resources contribute to our quality of life – scenic beauty, outdoor recreation, and wildlife viewing. Nashville has many innovative programs in place or underway to best conserve and utilize our natural resources, but we need to accomplish even more.

The *Together Making Nashville Green Report* states: “*In order to achieve sustained economic prosperity and quality of life, we must change the way we think about our natural resources in Davidson County. We must plan for conservation in the way that we currently plan for development. Planning and economic development must align strongly with Nashville’s environmental sustainability goals. This does not mean we cannot grow; on the contrary, it provides a clearer picture of how to grow and where to grow. The accelerating culture of environmental sustainability in Nashville must include active stewardship of the natural gifts with which we have been endowed.*”

The city’s environmental resources extend beyond the Davidson County line and involve other communities and municipalities. By focusing on a regional approach like watershed management, the different components of our ecosystem – water, trees, soils, geology, woodlands, plants, animals – can be discussed comprehensively as they relate to our everyday lives by maintaining our health, offering outdoor recreation, and providing our food, and holistic strategies and solutions can be applied.

In his book *The Nature Principle: Human Restoration and the End of Nature-Deficit Disorder*, Richard Louv discusses how by tapping into the restorative powers of nature, we can boost creativity; promote health and wellness; build smarter and more sustainable communities, businesses, and economies; and ultimately strengthen human bonds. Louv makes a convincing case that we are entering the most creative period in history that is echoed in the *Together Making Nashville Green Report*. “*Nashville and Middle Tennessee is the beneficiary of population growth exactly because it is so different from other places. If we do not act now to protect our critical environmental assets and quality of life, we stand poised to lose exactly what we value most, what makes up not only unique, but what makes us who we are.*” (*Together Making Nashville Green Report*)

As such, let us continue to think of innovative ways that preserve, conserve, manage, and enhance our city’s abundant natural resources and continue to build upon the great work we have already accomplished.

## Resources and Further Reading

### Introduction

#### Nashville/Davidson County Resources:

- Green Infrastructure Master Plan. [http://www.seswa.org/Files/Services/Conference/2010%20presentations/06%20-%20Nashville's%20Green%20Infrastructure%20Master%20Plan%20\[Reese\].pdf](http://www.seswa.org/Files/Services/Conference/2010%20presentations/06%20-%20Nashville's%20Green%20Infrastructure%20Master%20Plan%20[Reese].pdf)
- Green Ribbon Committee – Together Making Nashville Green Report. <http://www.nashville.gov/Mayors-Office/Priorities/Environment-and-Sustainability/Green-Ribbon-Committee-Report.aspx>
- Low Impact Development Manual. [http://www.nashville.gov/portals/0/SiteContent/WaterServices/Stormwater/docs/SWMM/vol5/SWMM\\_Vol5LIDManual\\_2012.pdf](http://www.nashville.gov/portals/0/SiteContent/WaterServices/Stormwater/docs/SWMM/vol5/SWMM_Vol5LIDManual_2012.pdf)
- Managing Nashville's Urban Forest Report. [http://www.treesnashville.org/pdfs/MTACProposal\\_091708.pdf](http://www.treesnashville.org/pdfs/MTACProposal_091708.pdf)
- Nashville Open Space Plan. <http://www.nashville.gov/Portals/0/SiteContent/Parks/docs/planning/Master%20Plan/nashvilleopenspace-plan.pdf>
- Parks and Greenways Master Plan. <http://www.nashville.gov/Parks-and-Recreation/Planning-and-Development/Park-Plans-and-Projects.aspx>

#### Part 1 – Watersheds and Waterways:

##### Cumberland Region Tomorrow

<http://www.cumberlandregiontomorrow.org/>

- Greenprint Tools for Quality Growth. <http://www.cumberlandregiontomorrow.org/resources/gis-greenprint/>

##### Cumberland River Compact

<http://cumberlandrivercompact.org/>

- Maryland's Stream Assessment Protocol. <http://www.fws.gov/chesapeakebay/pdf/1new%20stream%20reports/S09-01.pdf>

#### Nashville/Davidson County Resources:

- Clean Water Nashville Program. <http://www.cleanwaternashville.org/>
- Green Infrastructure Master Plan. [http://www.seswa.org/Files/Services/Conference/2010%20presentations/06%20-%20Nashville's%20Green%20Infrastructure%20Master%20Plan%20\[Reese\].pdf](http://www.seswa.org/Files/Services/Conference/2010%20presentations/06%20-%20Nashville's%20Green%20Infrastructure%20Master%20Plan%20[Reese].pdf)
- Low Impact Development Manual. [http://www.nashville.gov/portals/0/SiteContent/WaterServices/Stormwater/docs/SWMM/vol5/SWMM\\_Vol5LIDManual\\_2012.pdf](http://www.nashville.gov/portals/0/SiteContent/WaterServices/Stormwater/docs/SWMM/vol5/SWMM_Vol5LIDManual_2012.pdf)
- Metro Stormwater Review. <http://www.nashville.gov/Water-Services/Developers/Stormwater-Review.aspx>
- Metro Water Services. <http://www.nashville.gov/Water-Services.aspx>
- Nashville 2010 Flood. <http://www.nashville.gov/Government/Nashville-Flood-May-2010.aspx>
- Nashville Long Term Recovery Plan. <http://www.bnim.com/work/nashville-davidson-county-long-term-recovery-plan>
- Office of the Mayor. <http://www.nashville.gov/Mayors-Office.aspx>
  - Mayor's Office of Emergency Management. <http://www.nashville.gov/Mayors-Office-of-Emergency-Management.aspx>
  - Mayor's Office of Environment and Sustainability. <http://www.nashville.gov/Mayors-Office/Priorities/Environment-and-Sustainability.aspx>
- United Flood Preparedness Plan. <http://www.nashville.gov/Government/Nashville-Flood-May-2010.aspx>

## Resources and Further Reading

### Nature Conservancy – Tennessee

<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/tennessee/index.htm>

### Tennessee Department of Environment and Conservation

<http://www.state.tn.us/environment/>

- TDEC Watershed Management. <http://www.tn.gov/environment/watersheds/>
- Tennessee Valley Authority. <http://www.tva.gov/>
- Tennessee Wildlife Resources Agency. <http://www.tn.gov/twra/>

### U.S. Army Corps of Engineers – Nashville District

<http://www.lrn.usace.army.mil/>

### U.S. Environmental Protection Agency

<http://www.epa.gov/>

- Clean Water Act. <http://www.epa.gov/lawsregs/laws/cwa.html>
- Watersheds Approach. <http://water.epa.gov/type/watersheds/approach.cfm>

### U.S. Fish and Wildlife Service

<http://www.fws.gov/>

### U.S. Geological Survey

<http://www.usgs.gov/>

## Part 2 – Woodlands and Trees:

### American Forests

<http://www.americanforests.org/>

- Rapid Ecosystem Analysis. <http://www.americanforests.org/our-programs/urbanforests/urban-forests-case-studies/>

American Forests' Rapid Ecosystems Analysis.

### Cumberland Region Tomorrow

Greenprint Tools for Quality Growth. <http://www.cumberlandregiontomorrow.org/resources/gis-greenprint/>

### Cumberland River Compact

<http://cumberlandrivercompact.org/>

### Nashville/Davidson County Resources

- Green Ribbon Committee – Together Making Nashville Green Report. <http://www.nashville.gov/Mayors-Office/Priorities/Environment-and-Sustainability/Green-Ribbon-Committee-Report.aspx>
- Low Impact Development Manual. [http://www.nashville.gov/portals/0/SiteContent/WaterServices/Stormwater/docs/SWMM/vol5/SWMM\\_Vol5LIDManual\\_2012.pdf](http://www.nashville.gov/portals/0/SiteContent/WaterServices/Stormwater/docs/SWMM/vol5/SWMM_Vol5LIDManual_2012.pdf)
- Metro Parks and Recreation. <http://www.nashville.gov/Parks-and-Recreation.aspx>
  - Parks and Greenways Master Plan. <http://www.nashville.gov/Parks-and-Recreation/Planning-and-Development/Park-Plans-and-Projects.aspx>
- Metro Public Works. <http://www.nashville.gov/Public-Works.aspx>
- Metro Tree Advisory Committee. <http://www.nashville.gov/Public-Works/Community-Beautification/Tree-Information/Tree-Advisory-Committee.aspx>
  - Managing Nashville's Urban Forest Report. [http://www.treesnashville.org/pdfs/MTACProposal\\_091708.pdf](http://www.treesnashville.org/pdfs/MTACProposal_091708.pdf)
  - Tree Canopy Assessment. <http://www.treesnashville.org/images/tca/pdfs/tcareport.pdf>
  - Tree Canopy Assessment Overview. <http://www.treesnashville.org/tca.html>

## NATURAL RESOURCES AND GREEN SPACES

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- Tree Canopy Map. <http://maps.nashville.gov/UTC/>
- Nashville Open Space Plan. <http://www.nashville.gov/Portals/0/SiteContent/Parks/docs/planning/Master%20Plan/nashvilleopenspaceplan.pdf>
- Office of the Mayor. <http://www.nashville.gov/Mayors-Office.aspx>
  - Mayor's Office of Environment and Sustainability. <http://www.nashville.gov/Mayors-Office/Priorities/Environment-and-Sustainability.aspx>

### Nashville Electric Service

<http://www.nespower.com/>

### Nashville Tree Foundation

<http://www.nashvilletreefoundation.org/>

### SoundForest

<http://www.soundforest.org>

### Tennessee Department of Agriculture – Division of Forestry

<http://www.tn.gov/agriculture/forestry/index.shtml>

### Tennessee Department of Environment and Conservation

<http://www.state.tn.us/environment/>

### Tennessee Urban Forestry Council

<http://www.tufc.com/>

### Trees Nashville

<http://www.treesnashville.org/about.html>

### U.S.D.A. Forest Service

<http://www.fs.fed.us/>

- Urban Ecosystems and Processes. <http://www.fs.fed.us/psw/programs/uesd/uep/>

[fs.fed.us/psw/programs/uesd/uep/](http://www.fs.fed.us/psw/programs/uesd/uep/)

### West Meade Conservancy

<http://westmeadeconservancy.org/>

## Part 3 – Parks and Greenways:

### Beaman Park to Bells Bend

<http://www.bellsbend.org/>

### Conservation Fund

<http://www.conservationfund.org/>

### Cumberland Region Tomorrow

Greenprint Tools for Quality Growth. <http://www.cumberlandregiontomorrow.org/resources/gis-greenprint/>

### Cumberland River Compact

<http://cumberlandrivercompact.org/>

### Land Trust of Tennessee

<http://www.landtrusttn.org/>

### Nashville/Davidson County Resources:

- Metro Parks and Recreation. <http://www.nashville.gov/Parks-and-Recreation.aspx>
  - Greenways and Trails. <http://www.nashville.gov/Parks-and-Recreation/Greenways-and-Trails.aspx>
  - Parks and Greenways Master Plan. <http://www.nashville.gov/Planning-and-Development/Park-Plans-and-Projects.aspx>
- Metro Planning – Community Plans. <http://www.nashville.gov/Planning-Department/Community-Planning-Design.aspx>
- Nashville Open Space Plan. <http://www.nashville.gov/Portals/0/SiteContent/Parks/docs/>

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planning/Master%20Plan/nashvilleopenspace-plan.pdf

- Office of the Mayor. <http://www.nashville.gov/Mayors-Office.aspx>

### Nashville Riverfront Redevelopment

<http://www.nashvilleriverfront.org/>

### Nature Conservancy – Tennessee

<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/tennessee/index.htm>

### Radnor to River Trail

<http://www.radnor2river.org/>

### Tennessee Department of Environment and Conservation

<http://www.state.tn.us/environment/>

- Tennessee State Parks. <http://www.tn.gov/environment/parks/>

### Tennessee Parks and Greenways Foundation

<http://www.tenngreen.org/website/>

### Tennessee Wildlife Resources Agency

<http://www.tn.gov/twra/>

### Trust for Public Land's 2012 City Parks Facts Report

<http://cloud.tpl.org/pubs/ccpe-cityparkfacts-2012.pdf>

### U.S. Army Corps of Engineers – Nashville District

<http://www.lrn.usace.army.mil/>

### U.S. National Park Service

<http://www.nps.gov/index.htm>

## Part 4 – Food and Farming:

### American Planning Association

Urban Agriculture: Growing Healthy Sustainable

Places, Planning Advisory Service (PAS) Report Number 563. <https://www.planning.org/>

### Chicago's NeighborSpace Program

<http://neighbor-space.org>

### Community Food Advocates

<http://www.communityfoodadvocates.org/>

### Community Food Security Coalition

<http://foodsecurity.org/category/home/>

### Local Table Magazine

<http://localtable.net/magazine.php>

- List of farms: [http://www.localtable.net/farm\\_guide/listing.php?county=Davidson](http://www.localtable.net/farm_guide/listing.php?county=Davidson)

### Nashville/Davidson County Resources:

- Metro Parks and Recreation. <http://www.nashville.gov/Parks-and-Recreation.aspx>
- Metro Planning. <http://www.nashville.gov/Planning-Department.aspx>
  - Community Plans. <http://www.nashville.gov/Planning-Department/Community-Planning-Design.aspx>
- Nashville Public Schools. <http://www.mnps.org/site234.aspx>
  - School Gardens. <http://www.mnps.org/Page85165.aspx>
- Nashville Open Space Plan. <http://www.nashville.gov/Portals/0/SiteContent/Parks/docs/planning/Master%20Plan/nashvilleopenspace-plan.pdf>
- Office of the Mayor. <http://www.nashville.gov/Mayors-Office.aspx>

### Nashville Farmers Market

<http://nashvillefarmersmarket.org/>

### Nashville Food Policy Council

<http://www.facebook.com/pages/Nashville-Food-Policy-Council/234046833321480>

### Nashville School Garden Coalition

<http://nashvilleschoolgardens.com/nsgc/about-us/>

### Re/Storing Nashville

<http://www.restoringnashville.org/>

### Robert Wood Johnson Foundation

<http://www.rwjf.org/>

### Seattle's P-Patch Program

<http://www.ci.seattle.wa.us/neighborhoods/ppatch/gardening.htm>

### Tennessee Department of Agriculture – PickTN Products

<http://www.agriculture.state.tn.us/Marketing.asp?QSTRING=FOU&DISPLAY=davidson>

### U.S. Department of Agriculture

<http://www.usda.gov/wps/portal/usda/usdahome>

- Census of Agriculture. <http://www.agcensus.usda.gov/>

## Part 5 – Environmental Justice:

### African American Cultural Organization

<http://www.aacanashville.org/#>

### Healthy Nashville – Environmental Justice

<http://www.healthynashville.org/modules.php?op=modload&name=Resources&file=index&topic=76>

### Sierra Club – Environmental Justice Committee of Middle Tennessee.

[http://connect.sierraclub.org/app/render/go.aspx?g=ea6246ee-4eb8-4456-9305-74933542644a&xsl=tp\\_So-](http://connect.sierraclub.org/app/render/go.aspx?g=ea6246ee-4eb8-4456-9305-74933542644a&xsl=tp_So-)

cialObjects\_ObjectType\_SIERRA\_CLUB\_ONLINE\_COMMUNITIES\_TEAM\_PUBLIC.

[xslt&id=EA6246EE-4EB8-4456-9305-](http://www.facebook.com/pages/Nashville-Food-Policy-Council/234046833321480)

[74933542644A&cons\\_id=&ts=1362600906&signature=a54e7110bc51c21b72d95130e16b3aa5](http://www.facebook.com/pages/Nashville-Food-Policy-Council/234046833321480)

### State of Tennessee

- Department of Environment and Conservation – Environmental Justice. <http://www.tn.gov/environment/policy/ej/>
- Title VI Implementation Plan Revision: [http://www.tn.gov/environment/policy/docs/ej\\_titlevi\\_plan.pdf](http://www.tn.gov/environment/policy/docs/ej_titlevi_plan.pdf)

### U.S. Environmental Protection Agency

- Environmental Justice. <http://www.epa.gov/environmentaljustice/>
- Creating Equitable, Healthy, and Sustainable Communities: Strategies for Advancing Smart Growth, Environmental Justice, and Equitable Development. [http://www.centerforabetterlife.com/eng/reports\\_studies/pdf/2013-EPA-equitable-development-report-508-011713b.pdf?session=user\\_pref:AABEC6BE077951D998hPjP391731](http://www.centerforabetterlife.com/eng/reports_studies/pdf/2013-EPA-equitable-development-report-508-011713b.pdf?session=user_pref:AABEC6BE077951D998hPjP391731)

### Vanderbilt University's Service Training for Environmental Progress

- <http://www.mc.vanderbilt.edu/root/vumc.php?site=step>

## Part 6 – Wildlife Habitat and Viewing:

### State of Tennessee

- Tennessee Wildlife Resources Agency. <http://www.tn.gov/twra/>

### Tennessee Wildlife Resources Foundation

<http://www.twrf.net/>

## Conclusion:

Cumberland Region Tomorrow

<http://www.cumberlandregiontomorrow.org/>

- Greenprint Tools for Quality Growth. <http://www.cumberlandregiontomorrow.org/resources/gis-greenprint/>

**Green Ribbon Committee – Together Making Nashville Green Report**

<http://www.nashville.gov/Mayors-Office/Priorities/Environment-and-Sustainability/Green-Ribbon-Committee-Report.aspx>

**Richard Louv**

The Nature Principle: Human Restoration and the End of Nature-Deficit Disorder. <http://richardlouv.com/>

**Tennessee Wildlife Resource Agency. Tennessee's Watchable Wildlife Program**

<http://www.tnwatchablewildlife.org/>

## Photo Credits

Cumberland Region Tomorrow  
Gary Layda, Metro Photographer  
Greenways for Nashville  
The Land Trust for Tennessee  
Metro Parks and Greenways  
Metro Planning Department  
Metro Stormwater  
Nashville Civic Design Center  
Sitephocus, LLC.