nashvillenext

NATURAL RESOURCES & HAZARD ADAPTATION

APRIL REVIEW DRAFT

This is the review draft of the Natural Resources & Hazard Adaptation element of NashvilleNext. It is part of Volume II (Elements) of the draft General Plan.

We appreciate that you are giving time to reviewing this work.This chapter is the result of three years of effort on NashvilleNext, combining public visioning and community engagement with topical experts to create a plan for Nashville and Davidson County over the next 25 years.

Comments

The public review period is during April 2015. We are eager to hear your thoughts on the plan. Here's how to provide input:

- Online: www.NashvilleNext.net
- Email: info@nashvillenext.net
- At public meetings
  - April 18: Tennessee State University (Downtown Campus), 10am - 1:30 pm
  - April 20: 5 - 7pm at both the North Nashville Police Precinct and the Edmondson Pike Branch Library
  - April 27: 5 - 7pm at both the Madison Police Precinct and the Bellevue Branch Library
- Phone: 615-862-NEXT (615-862-6398)
- Mail: Metro Nashville Planning Department, P.O. Box 196300, Nashville TN 37219-6300

We ask that you include contact information with your comments. We also request that you be as specific as possible in your requests. Referring to a specific page or section is greatly appreciated.

Next steps

The most up to date information is always available at www.NashvilleNext.net. Here is our tentative adoption schedule:

- Mid-May: Post static draft of plan in advance of public hearing
- June 10: First public hearing at Planning Commission (tentative; special date)
- June 15: Second public hearing at Planning Commission (tentative; special date)

NATURAL RESOURCES & HAZARD ADAPTATION

Nashville is a uniquely beautiful place with a natural character distinguished by rolling hills, steep bluffs, gentle valleys, flat floodplains, thick forests, and numerous rivers and streams. Parks and lakes, both big and small, are havens for wildlife and for people looking to escape the fast pace of the city. Nashville includes over 2,500 miles of waterways, three large lakes, and over 38,000 acres of floodplains. It 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. Nashvillians want to maintain and enhance the natural resources that make the region so livable.

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, help clean our air and water, provide our drinking water, slow down and absorb stormwater runoff, help decrease air temperatures on extremely hot days, grow our food, stabilize steep hillsides, and mitigate the negative effects of natural disasters and extreme weather events. In recent years, Nashville has experienced record-setting weather, which has threatened businesses, residences, and the health and well-being of our residents. These events include the record-setting rainfall that led to the 2010 flood. The damage caused to life and property by the 2010 flood and related landslides was enormous, yet the city's natural features – such as floodplains and tree cover, ensured that the damage and loss of life and property was not worse. In the aftermath of the flood, Nashville has come to value its natural areas even more for the protections they provide to the city from hazards such as extreme weather events.

On a day-to-day basis, having quality natural areas betters the quality of life for people, plants, and animals. Nashville's projected population growth could degrade the current quality of life and jeopardize Nashville's natural and built environment. In addition to the pressure of sheer growth, demographic changes – the growth of Baby Boomer and Millennials seeking more compact, walkable communities; the increase of single-person households; etc. – will also drive new locations and forms of development in our communities. Climate change will impact our natural resources and understanding our contribution to this change will need to be monitored through a regular greenhouse inventory. A renewed emphasis on public

2,500 miles of waterways
Three large lakes
38,000 acres of floodplains

outreach, education, and personal responsibility will activate new stewardship to conserve energy, eliminate and reduce waste, preserve land, build high performance buildings, and create a culture of sustainability. Meanwhile, public policies, incentives, and private decision making must provide a clear direction on what to preserve and how to build and grow our city in a more sustainable fashion than we do today. This will enable us to secure the best Nashville for current and future generations.

Key ideas shaping this chapter

<No intersecting link>

Water

It has been said that water is life. 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. Floodways are the channels of rivers of other watercourses that carry the deepest, fastest water downstream. Floodplains are areas adjacent to rivers, creeks, lakes, streams, and other waterways where flooding is common. Floodplain and wetland areas are critical to the health of waterways and to protection for life and property in the case of flooding.

Nashville's interconnected water network contributes to the city's clean air and water, is critical to our economy, and provides recreational and other social and emotional benefits. 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, wetlands and forested areas) as well as the larger watershed area (headwater area) to protect and enhance water resources.

Rivers and creeks

Rivers and streams are natural watercourses that flow from origin (headwater) areas to meet another waterway. The Cumberland River is one of Nashville's greatest resources. It has long been critical to industry and business in Nashville, and more recently, it has become a celebrated feature to play in and around. The river, which flows for a total 688 miles, is an abundant source of drinking water; a destination for recreation, leisure and entertainment; and a magnet for economic investment. Smaller rivers

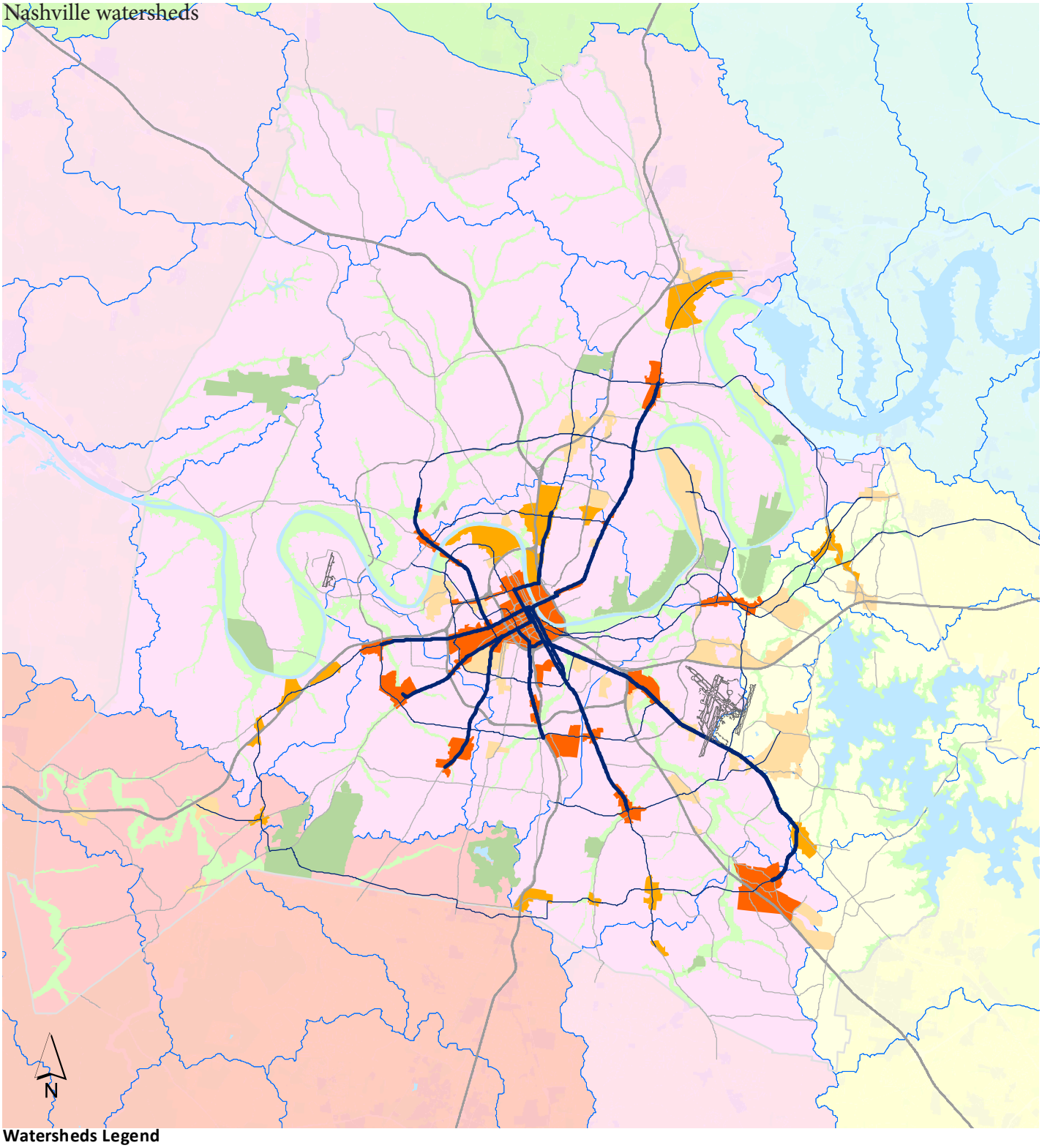
include the Harpeth River and Stones River. Creeks, such as Mill Creek and Browns Creek, are the principal tributary streams of rivers, and tend to be smaller in scale. Most creeks are perennial (meaning they always have water), but some are intermittent (only holding water at certain times such as during heavy rain events). Creeks have tributaries also. These smaller and often intermittent waterways are often called branches.

Watersheds, headwater areas, and impaired waterways

A watershed is an area of land that drains rain water into one location, such as a stream, lake, or wetland. Watersheds sustain life, in more ways than one. Watershed protection means protecting a lake, river, or stream and adjacent riparian buffers 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 and wildlife habitats and forested 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.

Protecting headwater areas – places where waterways originate, such as streams and springs that are protected by tree cover, vegetation, undisturbed soils and, in some cases, steep slopes – 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. Forested areas protect headwaters from pollution by filtering pollutants out of the stream system and slow erosion from flooding, thereby minimizing debris and 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 can impact the location of infrastructure and the design of development. In the case of headwaters on steep slopes, roads that are built above steep slopes can contribute to landslides, by collecting water and channeling it into an already unstable hillside. Rainfall can then trigger landslides on unstable slopes that destroy houses and buildings. Additionally, buildings at the base of steep slopes can be flooded



Watersheds Legend

- Water Bodies
- Anchor Parks
- Floodplain Areas
- Hydrologic Watershed Units

Tennessee Watershed Management Groups

- Old Hickory Lake
- Cheatham Lake
- Stones River
- Harpeth River
- Red River

in heavy rainfall events. Instead, more appropriate building techniques can be used in some areas with sensitive natural features – since there are natural areas that should be left undisturbed – to balance development with preservation. These techniques include clustering development to fit site terrain; building roadways parallel to slope contour lines; clustering development to preserve porous soils and natural slopes; leaving undisturbed stream buffers along both sides of natural streams; avoiding mass clearing and grading; and limiting the clearing and grading of land to the minimum needed to construct development and associated infrastructure.

Water is considered "impaired" when the waterway 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.

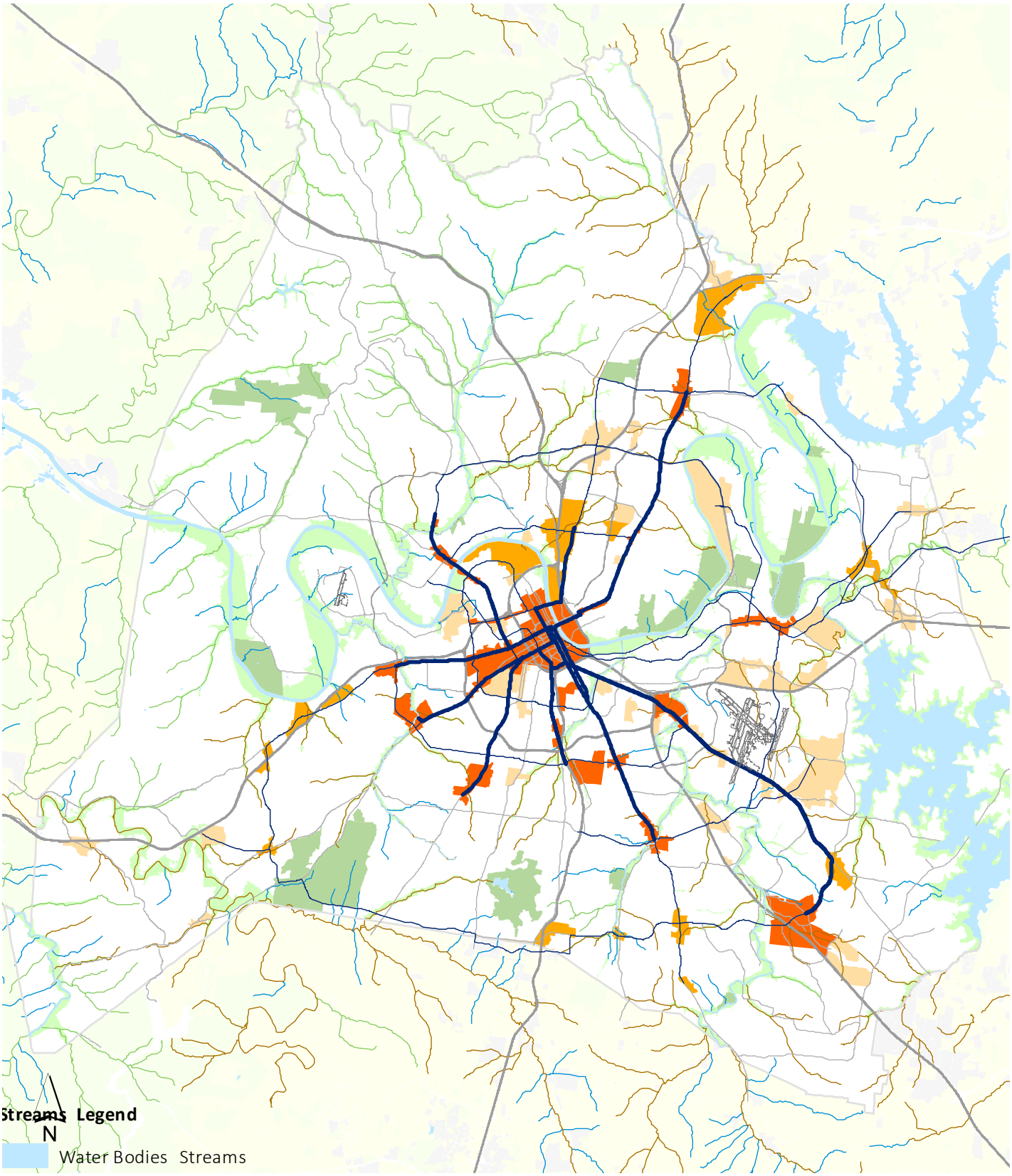
Water quality plays a critical role in the environmental and economic health of the Cumberland Region. According to the Nature Conservancy, 70 percent of the earth is covered by water. However, 40 to 50 percent of our nation's waters are impaired or threatened.[1] Water is considered "impaired" when the waterway does not fully support one or more of its intended uses. This can mean that the water is not suitable to treat for drinking, to swim in, or to consume the fish caught there. It also does not support healthy fish and acquatic life.

330 miles of Nashville's 2,500 miles of waterway are considered impaired.

Under section 303(d) of the 1972 Clean Water Act, states are required to develop lists of impaired waters, meaning those that are threatened or 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. 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, the public, and the U.S. Environmental Protection Agency 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, to the extent that each impaired stream will be removed from TDEC's 303(d) list. This is accomplished through programs to reduce and minimize pollutants from entering streams. 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. Through monitoring, illicit discharge detection and water quality protection activities, in the last few years over 90 miles of streams have shown improvement and have been in part or fully removed from the 303(d) list.

1 The Nature Conservancy; http://www.nature.org/ourinitiatives/habitats/riverslakes/threatsimpacts/

Nashville stream quality



Good Quality

Not Assessed

Impaired

In addition to their work with impaired streams, Metro Water Services created the Low Impact Development (LID) Manual, which provides incentives for developers to use green infrastructure to meet stormwater runoff water quality requirements. The creation of the Low Impact Development (LID) Manual continues the evolution of 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, the LID Manual is a design strategy that attempts to mimic a site's natural hydrology by managing stormwater close to its source and 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, urban forests, conservation areas, and stormwater harvesting.

(Add photos/graphics from Natural Resources Background Report and Map of Impaired Streams)

Green street in Portland utilizes landscaped stormwater planters to capture and infiltrate street runoff.

LID is a departure from traditional stormwater methods. Traditional stormwater designs are highly impervious and immediately route rainwater offsite 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 with development. Incentives include the waver 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. Metro also recently instituted additional requirements for residential infill developments which requires the treatment of the first inch of rain and preserving trees. In addition, the Metro Water Services Department, in conjunction with area non-profits, works to keep existing waterways free of debris that could exacerbate flooding. This includes holding clean-up events in area waterways.

Green roof at the Pinnacle at Symphony Place enables rainfall infiltration

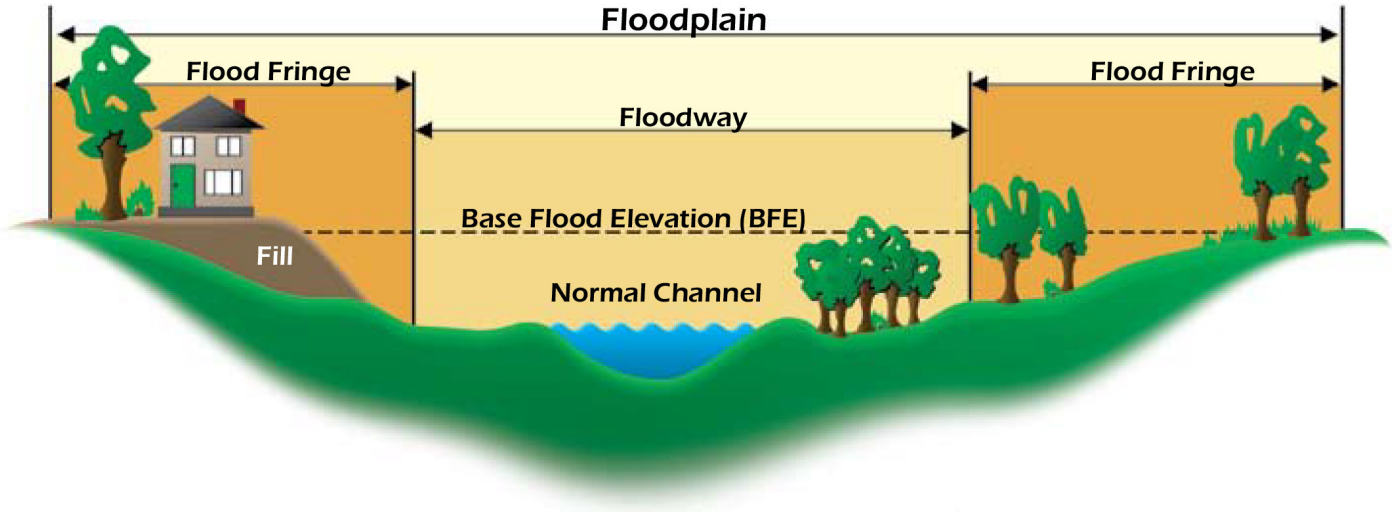
Floodways, floodplains and wetlands

Floodways are the channels of rivers or other watercourses that carry the deepest, fastest water downstream. 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 from water runoff, providing flood and erosion control, recharging groundwater, creating/enhancing wildlife habitat areas, providing agricultural lands with rich soil, protecting urban forests, 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. 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 Nashville's neighborhoods. Conserved floodplains can provide significant areas of open space, such as greenways, and perform certain invaluable ecological functions. Floodplain areas provide productive and critical habitat for a variety of wildlife and plant species.

On the other hand, 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 pollution and reduce erosion. These areas are some of the most productive wildlife and forested habitats and are important to outdoor enthusiasts, including hunters and birdwatchers.



Characteristics of a Floodplain

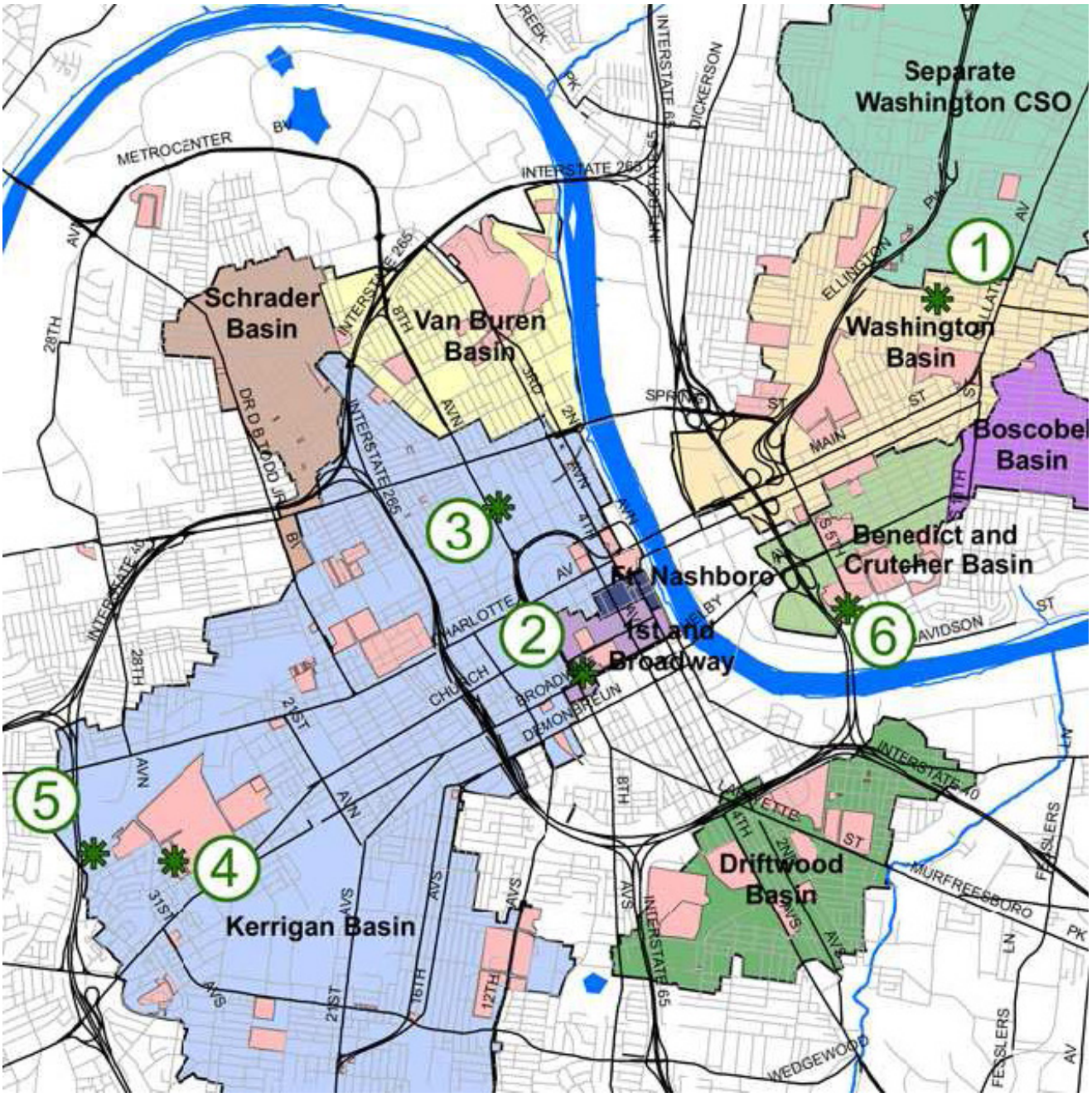
Wetlands help reduce flooding by storing water and help maintain other water flow in drier times.

The Nashville 2010 Flood further emphasized the need for natural infrastructure. Floodplains have little water storage capacity below the surface due to the close proximity of the underground water table. Most of the water storage capacity available below the surface occurs in the driest and widest portions of hillsides, typically occupied by forests. Wetlands, natural vegetation buffers and urban trees, and floodplains (not just floodways) are critical for above surface water storage and are also the last line of defense from storm event hazards.

Since 1998, Metro Government 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, fastest, water downstream), which also serve to protect much of the floodplain (areas adjacent to waterways that are subject to flooding). The application of the buffer on redevelopment sites helps to reestablish wetlands and natural vegetation 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 measures. 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 process. 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 benefitting 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.

Green Infrastructure Map



Selected projects from the Green Infrastructure Plan

Number	Location	Measures
1	West Eastland Avenue	Bioswales, pervious concrete and pavers, infi litration 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

Over the years, Metro Water Services Stormwater Division's floodplain buyout program has worked to restore floodplain areas and riparian habitat in various watersheds within the county. Since the department began participating in the Federal Emergency Management Agency's home buyout program, Metro has purchased more than 300 properties in the floodplain. On those purchased properties, any buildings and impervious surfaces, such as driveways, have been removed, and Metro has ceased mowing areas adjacent to streams allowing buffers to naturally reestablish. The Stormwater division has also coordinated, along with other Metro departments and area non-profits, the planting of hundreds of native trees and shrubs within many of these floodplain properties. Many of the buyout sites adjoin parcels within the same floodplain, resulting in the restoration of large contiguous tracks of floodplain areas. Many of these floodplain properties also provide recreation opportunities as part of the city's park and greenway system.

Active and passive recreation from Metro Parks

Land and green spaces

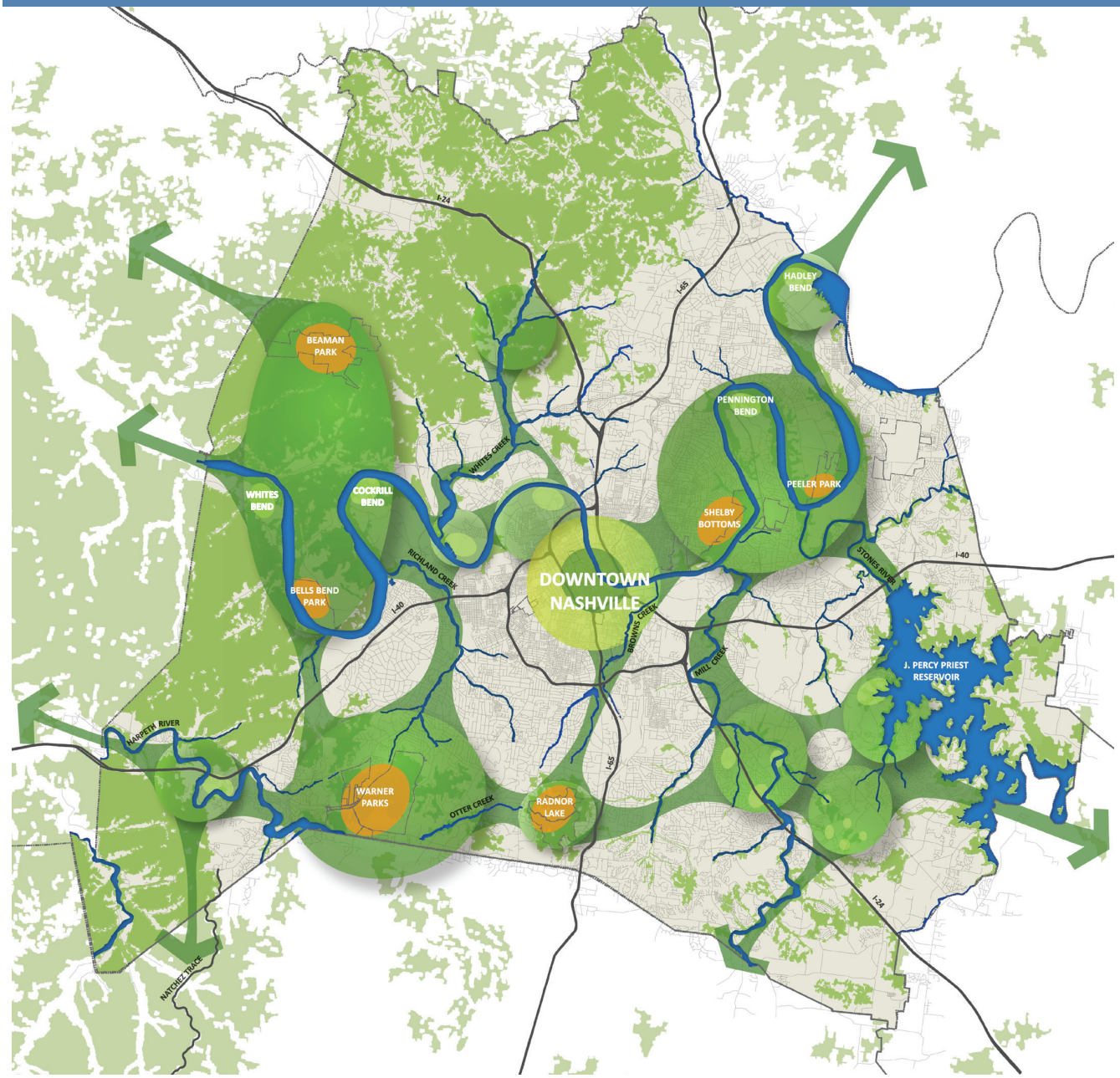
Nashville and the surrounding region boast a variety of public lands, including state and local parks, greenways, state natural areas, and wildlife management areas, as well as public and private forests with numerous species of trees, shrubs and plants that showcase the diversity of Tennessee's natural resources. These areas protect natural resources and sensitive environmental areas; provide recreation opportunities that promote healthy, active lifestyles for people of all ages; and clean our air and water. In addition to preserving natural features and other environmental benefits, natural areas can provide economic benefits as well. Many people are interested in living or working near places they can exercise or enjoy outdoor activities and scenic beauty. Several studies have shown that land values in close proximity to open space – parks, natural land, farms, and land protected by conservation easements – tend to be higher than average. One study in suburban Dallas, Texas found that homes facing parks were worth 22 percent more than homes located a half-mile away from parks.[2]

Parks and greenways

Nashville/Davidson County's 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 14,000 acres of park land, including 122 parks. This excludes, state, federal and private

2 Land Trust Alliance; http://www.landtrustalliance.org/conservation/documents/the-economic-and-tax-base-benefits-of-land-conservation

OPEN SPACE VISION



LEGEND

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

Nashville Open Space Plan 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.

Progress toward open space goals

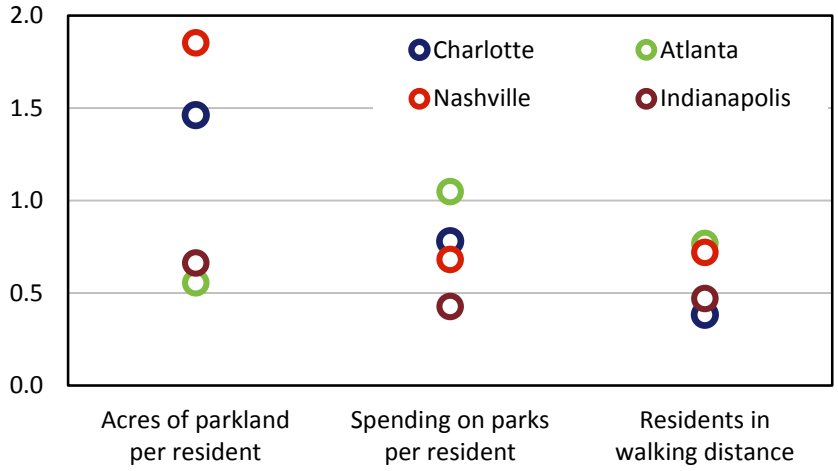
The 2011 Open Space Master Plan set ambitious goals for conservation, parkland, and greenways. Metro is already pursuing those goals.

Source: Metro Parks & Greenways

conservation lands. In addition to traditional parks, Metro Parks offers a popular, expanding greenway system. To broaden their appeal, park facilities include passive and active recreation activities as well as community centers and nature centers. The Parks department also offers senior programs, special population programs, cultural arts classes, dog parks, trails, nature programs, sports leagues, waterway events, and art galleries. Parks range from regional natural areas such as Beaman Park, to regional parks with trail systems such as Warner Parks, to community parks such as Coleman Park and Hadley Park, to smaller neighborhood parks, such as Richland Park, Red Caboose Park, and Watkins Park.

The Nashville Open Space Plan, April 2011, focuses on protecting various types of open space throughout Nashville and adding to the overall open space network. 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 parks and green spaces, by both the public and private sectors. The plan recommends new opportunities for parks and open space in urban areas such as the creation of neighborhood parks and gardens as well as opportunities outside of the urban core such as conserving farms and forests and protecting river corridors. Goals focus on acquiring park space and protecting green space during the next ten years. Nashville's Open Space Plan has set a goal of acquiring an additional 6,000 acres of parkland by 2035. For comparison, the Trust for Public Lands 2012 City Parks Facts Report shows that Nashville has 38 acres of parkland per 1,000 residents compared with 37 acres for Austin, Texas and 20 acres for Charlotte, North

Nashville parkland compared with peer cities and the national average



Source: Trust for Public Land, ParkScore report (2012)

Greenway along the river

Carolina. Priorities for acquiring additional park land include a large park in the southeast quadrant of the county, creating additional neighborhood-scale parks, and acquiring parks within each of the city's growth centers.

In addition to park spaces, Nashville has a popular, expanding greenway system, which provides a network of trails linking activity centers such as neighborhoods, schools, parks and commercial areas. Nashville's envisioned greenway system is largely based on locating greenways along existing networks of rivers, lakes and streams. By locating greenway corridors along these water features – generally in floodplains – communities 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, urban forests 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. Often, greenways are viewed as solely recreational, but greenways can also serve a transportation function as more direct connections between places.

Trees, woodlands and habitat

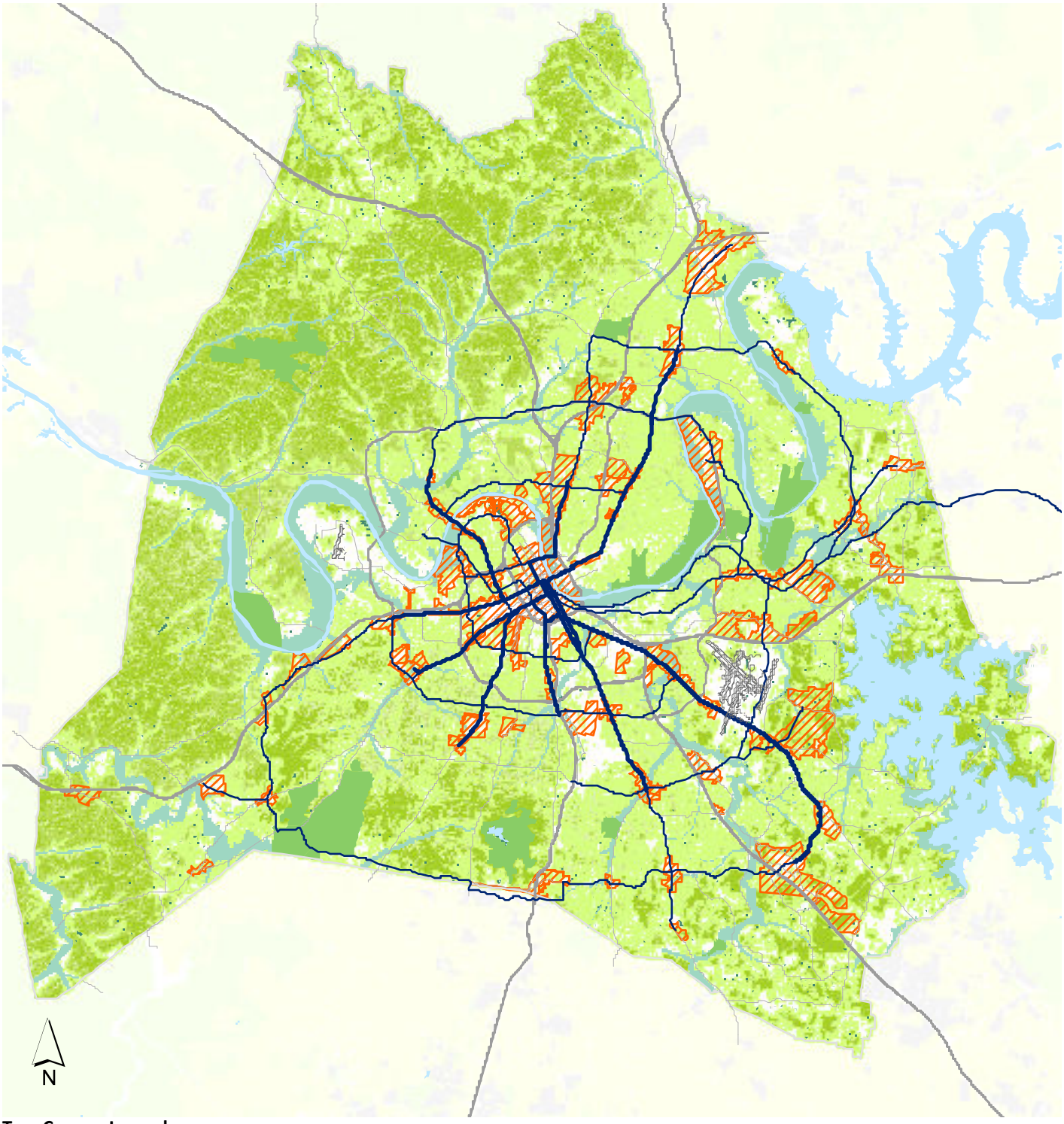
Tree covered areas provide key corridors for wildlife and recreation as well as areas of scenic beauty. Air quality is improved and air temperatures are moderated by forest cover. Nashville's ecological landscape is home to mature urban and traditional forests, ridgetops covered in a variety of trees 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 Davidson 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 unique cedar glades. Other areas of trees, including street trees, private gardens, and woodlands, are found throughout the city's urban, suburban, and rural areas.

Woodlands play a key role in watershed health as previously discussed, serving as headwater areas that are protected by tree cover, vegetation, and undisturbed soils. Native plants possess coping mechanisms shaped by time that are unique to Nashville's climate, soils, pests, diseases, predators, and other hazards and threats. Headwater areas, especially due to deep tree roots, absorb water, slow water runoff, and filter water, thereby providing both water quality and quantity services. Even if every roof, parking surface, yard and gutter could store runoff, it would still approximate only 60 to 70 percent of the water runoff removal provided by native forests.[3] This reinforces the approach of many communities who are adamant about preserving and restoring native landscapes and making every roof space green or parking space porous. The basic nature of water dictates that natural infrastructure is critical to a truly resilient community.

Woodlands also play a key role in protecting air quality. Trees and other plants utilize carbon dioxide in the atmosphere and in the process release oxygen for us to breathe. Loss of trees anywhere leads to increases in local temperatures, energy use, and the volume of rainwater runoff. Forests also provide habitats for plants and wildlife. As more development occurs, forest fragmentation and the fragmentation of wildlife habitat is a serious issue. As forests, especially ecologically mature forests,

3 United States Department of Agriculture Forest Service; http://www.fs.fed.us/publications/policy-analysis/water.pdf

Nashville's urban forest



Tree Canopy Legend

Water Bodies	Tree Canopy
Anchor Parks	1 - 20%
Floodplain Areas	21 - 40%
Wetlands	41 - 60%
	61 - 80%
	81 - 100%

are changed by human activities, such as construction and development, plants and animals are harmed, scattered, or destroyed.

As Davidson County's population has grown, its tree canopy has given way to development. The recommended average tree canopy for urban areas is 40 to 50 percent per the American Forest group.[4] The rural northwest and southwest portions of Davidson County currently have healthy tree coverage, but face population growth and development pressure. Meanwhile, in 2013, Nashville's urban areas averaged 30 percent tree canopy coverage, while downtown had only 5 percent coverage. In 2010, Nashville completed its first assessment of the city's tree canopy, which included both an understanding of where trees exist and recommendations on where trees could be planted. This was followed in 2012 by the creation of the Metro Landscape Coordination program, which is managed by a new city horticulturist. The program works to preserve, expand, and enhance Nashville's natural beauty by supporting ongoing and future projects, ranging from tree plantings to community beautification events. 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 *(Managing Nashville's Urban Forest Report*.[5]

Local Food

Consumer preferences have increased toward the production, marketing, and consumption of locally produced food. The proportion of local food sales is small but growing in the United States. Locally marketed food is more likely to occur on farms located in or near cities with regional farmers markets and direct from farm sales resurging among consumers.

Agriculture and farmland

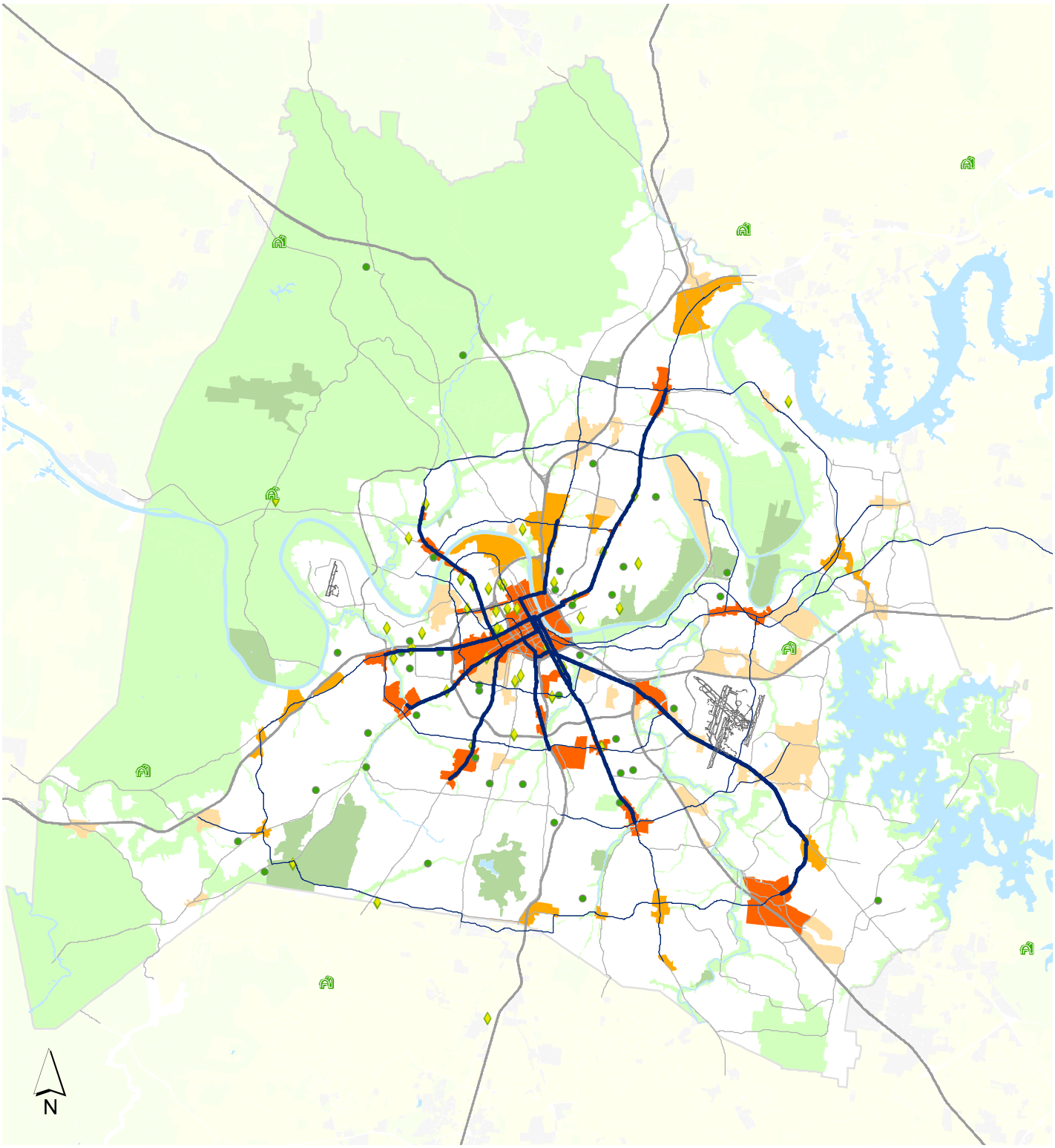
Agriculture occurs throughout Tennessee, but Nashville is the commercial and infrastructural hub of Middle Tennessee's food economy. This is due to the city's geographically central location, the confluences of major interstates and rail lines, and its status as the region's largest population center. Food processing, consumption, and transportation 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.

Davidson County, like many Middle Tennessee counties, has a strong history of farming. The Cumberland River's bends and other waterways provide fertile bottomland soil excellent for crop production. However, the prime agricultural lands nearest the city have mostly been developed for housing, industrial production, or commercial purposes. Despite the increased urbanization and suburbanization of land, Nashville still has

4 http://www.americanforests.org/

5 http://www.treesnashville.org/pdfs/MTACProposal_091708.pdf

Farms, gardens, and community-supported agriculture



Farms Legend

- Water Bodies
- Anchor Parks
- Floodplain Areas
- Farms with CSAs
- Community Gardens
- Community Gardens & Urban Farms
- School Gardens

a number of farms, many of them small farms, and is seeing an increase in urban farming. With over half of Davidson County already developed, farming in Nashville is threatened by growth. There are many reasons why Nashville should support and invest in local food production and its community-based growers. The development of a locally-based, sustainable food system promotes environmental renewal and fosters a local economy through the purchase of locally grown foods. Recent interest in and local government measures now encourage urban chickens, honey production and bees, and vegetable production. These are small but effective examples of local food trends that increase community and individual resiliency. Meanwhile, to local production of food allows area restaurants, grocery stores and individual consumers to have at least some of their food boast a smaller environmental footprint – local food does not have as far to travel (and as many environmental impacts from transportation) from farm to table.

Air Resources, air quality and climate change

Conventional air pollutants

With Nashville and Davidson County's years of poor air quality – and "non-attainment" of air quality standards – largely behind the city, it is easy to underestimate the importance of continuous vigilance about air quality. The quality of air varies from locality to locality. The differences in air quality depend on the location's population, activity of the people, activities in the neighboring regions, local weather patterns, and geographical features. In the United States, air quality is driven by six main pollutants: lead, carbon monoxide, ozone, sulfur dioxide, nitrogen oxide, and small particulates. Within Middle Tennessee, ozone and fine particulates are of most concern. The good news is that concentrations of these pollutants have fallen over the past two decades, largely due to the 1990 Clean Air Act Amendments that reduced industry emissions. Pollution reductions from mobile sources have also been substantially reduced, but the city and region must still work at maintaining and improving air quality.

The major sources of air pollution in Nashville and the region are not industrial smokestacks, but "mobile sources," i.e. the engines found in our automobiles, trucks, motorcycles, boats, and lawnmowers. Transportation is a major contributor to air pollution, especially greenhouse gas emissions. Added to that is the city's geographic location. Nashville is situated in a basin with hills to the south, west, and north, forming an amphitheater around the city that can trap poor quality air. Nashville and regional decision makers need to be aware of the affect that transportation has on air quality and other environmental systems and cultivate strategies for mitigating those negative effects.

The amount of pollution caused by transportation is directly related to the city's and region's patterns of growth and development. The increase in suburban neighborhoods at further and further distances from city centers, which necessitate more driving, has dictated the construction of ever-increasing numbers and capacities of roadways. In the Nashville area, an excess of 18,652,000 gallons of fuel was consumed in 2012 because of congestion-related delays. In that same year, Nashville ranked 7th worst in the nation in the amount of carbon dioxide produced because of congestion-related delays. Urban sprawl has led to longer commute distances, making cars the most practical means of transportation. Statistics show that drivers log over 34 million miles in and though Davidson County each day. In 2012, Nashville's daily average of 47 vehicles miles driven per person in was the 7th highest in the nation.[6]

Episodes of extreme heat and drought adversely affect air quality. Very simply, ozone is created by a chemical

6 2012 Urban Mobility Report Powered by INRIX Traffic Data. http://mobility.tamu.edu

Non-Attainment

Non-attainment is the designation given to a region when their air quality is worse than the National Ambient Air Quality Standards. There are increased costs to businesses and consumers due to special requirements for vehicles, fuels sold in the area, and for commercial and consumer products. As of 2014, the Nashville area is considered in compliance with the standards. If the standards are strengthened by EPA, it is likely the Nashville area may fall out of compliance.

The major sources of air pollution in Nashville and the region are not industrial smokestacks, but "mobile sources," i.e. the engines found in our automobiles, trucks, motorcycles, boats, and lawnmowers.

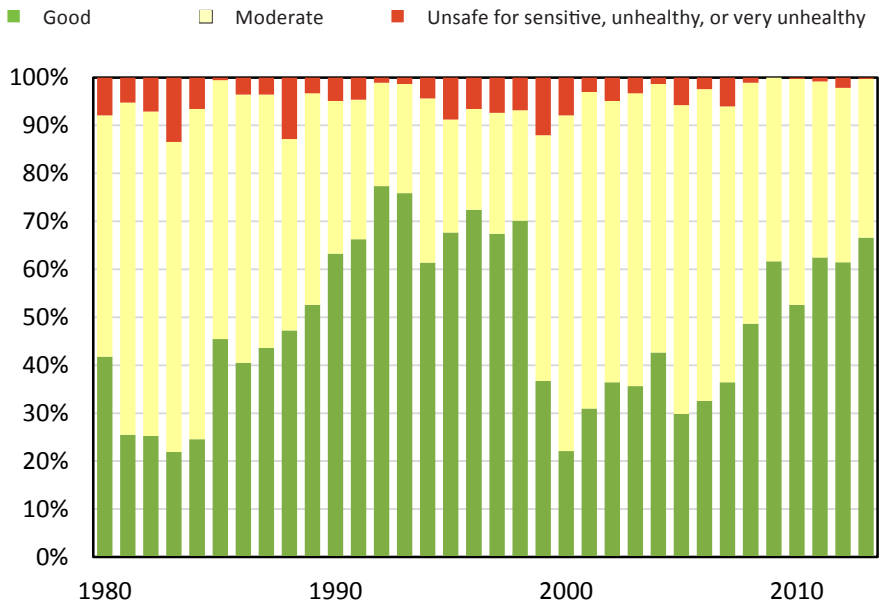
reaction that is facilitated by high temperatures and low humidity. Most of the ozone problems result from a mix of motor vehicle exhaust and summer weather, and if summers get hotter, the air quality suffers more. To maintain Nashville and the region's air quality, continuing to enforce controls on motor vehicles and other sources of pollution is critical. Replacing older, dirtier vehicles with newer, cleaner vehicles will help Nashville's air quality. But to really achieve cleaner and healthier air, Nashvillians and Middle Tennessee residents must pay attention to how we get around and find additional strategies that reduce the burden of vehicle exhaust in the region.

The Environmental Protection Agency (EPA) develops National Ambient Air Quality Standards based on known and measurable health hazards from carbon monoxide, sulfur dioxide, nitrogen dioxide, particles, and ozone. Nashville's success in achieving clean air is measured by the number of days in the year that the air here meets these National Standards. In 2013, Davidson County had good air quality on 243 days; moderate quality on 121 days; and unhealthy for sensitive groups on 1 day.[7] The Metro Health Department works with other agencies to maintain standards and

7 United States Environmental Protection Agency: http://www.epa.gov/airdata/

Air Quality Index, 1980 - 2013

Percent of days each year with good, fair, and poor air quality.



Source: Environmental Protection Agency, Air Quality System

address problems.

The EPA last updated the air quality standards for ozone in 2008 and has proposed strengthening the air quality standards for ground-level ozone which will expand the ozone monitoring season and will update the Air Quality Index to ensure people are notified when air quality is unhealthy. The new 8-hour standards will be set within a range of 65 to 70 parts per billion (ppb). EPA is seeking comment for setting the health standard as low as 60 ppb.

Making a city more walkable is good for the health of its citizens and their quality of life. It is also good for improving air quality. Historically, Nashville's approach to transportation, like most cities, revolved around automobiles. However, transportation is about more than streets and highways. In 2010, Mayor Dean signed a Complete Streets Executive Order, making Nashville's streets safer and more comfortable for all users. Nashville's goal is to create and sustain active, pedestrian-oriented, mixed use streets that address the needs of walkers, cyclists, and transit riders in addition to drivers. This strategy, in turn, helps maintain good air quality.

Building compactly and open space preservation also helps improve air quality. In evaluation of the environmental benefits of infill versus greenfield development, siting new development in an existing neighborhood, instead of an undeveloped green space on the suburban edge, can reduce miles driven by as much as 58 percent. Communities that make it easy for people to choose to walk, bicycle, or take public transit can also reduce air pollution by reducing automobile mileage and smog-forming emissions.[8]

Climate Change

The earth's natural greenhouse system keeps the planet warm and habitable; without it, the earth's surface would be about 60 degrees Fahrenheit colder on average.[9] Since the average temperature of the earth is about 45 degrees Fahrenheit, the natural greenhouse effect is clearly a good thing. However, scientists refer to what has been happening in the earth's atmosphere over the past century as the "enhanced greenhouse effect" – meaning that even more of the sun's heat has been trapped, causing global temperatures to rise. By pumping man-made greenhouse gases into the atmosphere, humans are altering the process by which naturally occurring greenhouse gases trap the sun's heat before it can be released back into space. This is attributable to climate change.

Since the beginning of the industrial revolution, atmospheric concentrations of carbon dioxide have increased nearly 30 percent, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15 percent.[10] These increases have enhanced the heat-trapping capability of the earth's atmosphere, which has led to a decrease in the polar ice caps and an increase in sea levels. Such trends have increased the frequency of severe storms, heavy rain events, and long period of drought in the country and around the world.

Just are large corporations have recognized and are planning for a world in which carbon emissions are more expensive, Nashville needs to plan as well. Nashville needs both to mitigate, or reduce, its contributions and to adapt, or be resilient, to climate change. Businesses, government, and individuals can take measures to reduce their impacts through driving more fuel efficient vehicles, minimizing water use, expanding mass transit, improving the energy efficiency of buildings, planting urban street trees, and investing in renewable energy sources. Denser, built-up areas, such as Nashville's downtown core, also have higher temperatures compared to the surrounding more rural landscapes. Incorporating best practices through redevelopment are key to reducing

8 United States Environmental Protection Agency: http://www.epa.gov/smartgrowth/topics/eb.htm

9 Earth's Climate System; http://earthguide.ucsd.edu/virtualmuseum/climatechange1/02_1.shtml

10 U.S. Department of Transportation; http://climate.dot.gov/about/overview/science.html

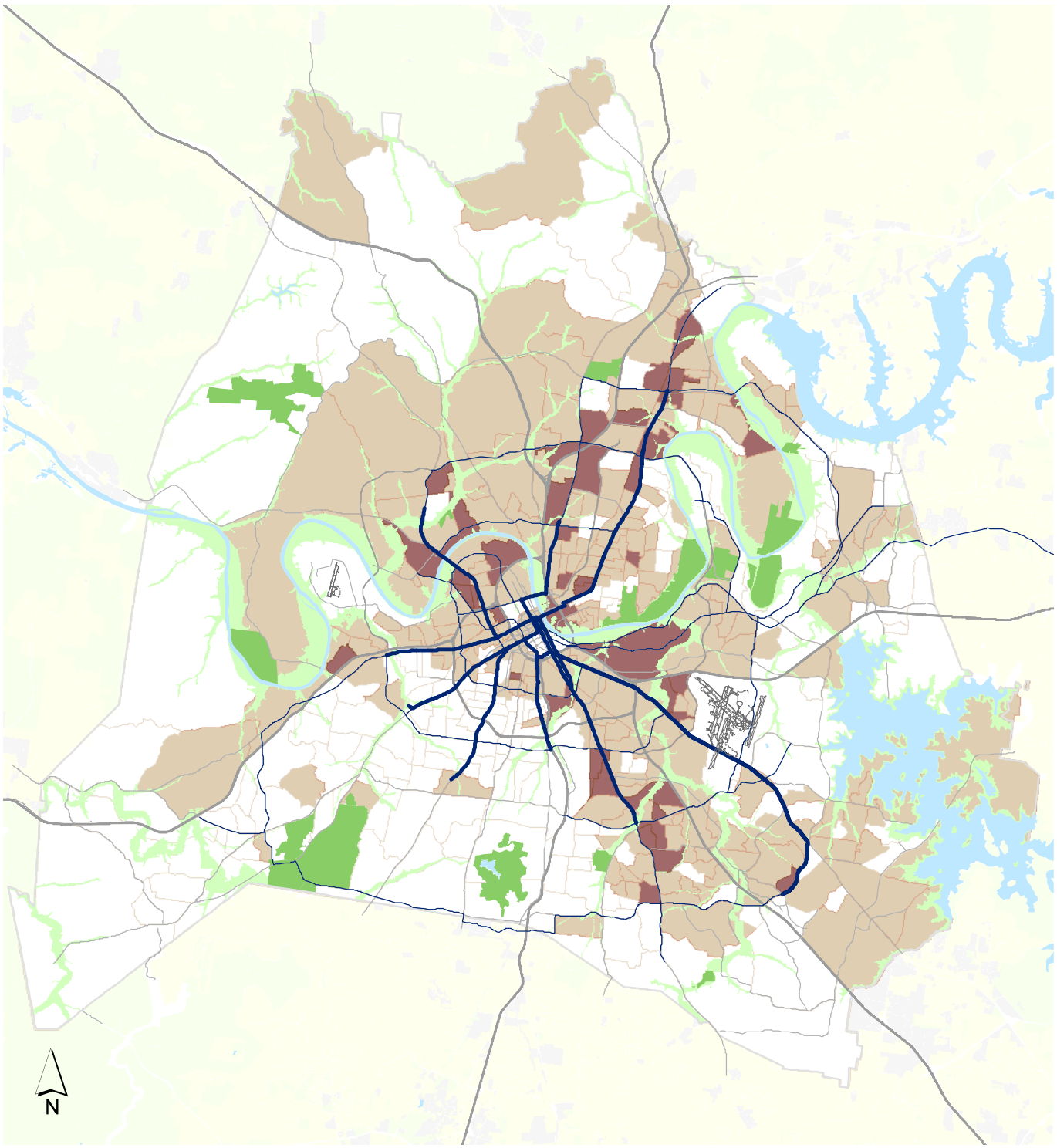
the urban heat island effect in Davidson County. The city has also taken steps through Mayoral pledges, developing a preliminary greenhouse gas inventory, and expanding the city's involvement in sustainability projects such as utilizing pervious pavements, meeting LEED standards with new buildings, and purchasing fuel-efficient and electric vehicles for city fleets. The city will need to continue to lead by regularly updating a greenhouse inventory and formalizing a climate action plan.

Environmental justice and equity

All cities have major thoroughfares and noxious or undesirable facilities such as landfills, asphalt plants and/or prisons. Many cities are also home to significant heavy industry. While these land uses are necessary to the overall function of the community, they place a heavy burden on nearby residents and neighborhoods. Historically, low income and minority communities have been disproportionately impacted by noxious facilities and physically fractured by interstate highways and sewer treatment facilities in Nashville. The locations of these facilities have impacted the health of communities and torn apart some neighborhoods. Meanwhile, some communities have not had access to some of the more desirable land uses, such as parks and Nashville's rich environmental resources. These land use decisions can have environmental justice implications.

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. Some communities have often directly or indirectly been excluded from the decision-making process. Studies have shown that often these uses are overloaded in minority, low-income, and tribal communities.

Block groups with Environmental Justice communities



Environmental Justice Communities Legend

Water Bodies

Anchor Parks

Floodplain Areas

Environmental Justice Communities

# of Factors

0 - 2

3 - 5

6 - 8

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 parks and 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.

Natural hazards and building resiliency

Nashville's weather is changing, and the city has experienced an increase in extreme weather events because of climate change. In May 2010, Nashville received over 17 inches of rain during a two-day period, the most in 140 years of recorded weather. The resulting flood cost an estimated $2 billion in damages to private property and killed eleven people. More than 10,000 people were displaced from their homes; 2,800 businesses sustained damage; 13,000 jobs were temporarily lost; 1,500 jobs were permanently lost; $3.6 billion in business disruption occurred; and 115 roads were closed for up to a week. And in 2008, Nashville experienced a strong tornado, killing 22 people along its path in Middle Tennessee. Nashville's hottest day on record occurred in June 2012 when the temperature reached 109 degrees.

A "resilient" community is one that plans for potential hazards and adapts to climate change. Resiliency is a comprehensive approach that establishes patterns of growth, necessary infrastructure, and planned public safety response systems to manage any natural or man-made hazard. The result of a resilient community is one where there are fewer residents and businesses impacted when a catastrophic event occurs, and those that are impacted are more quickly able to get back in their homes and back to work.

Nashville/Davidson County faces natural and man-made hazards. Natural hazards include extreme weather events such as flooding, tornadoes, ice storms, cold snaps, and heat waves. Other hazards and catastrophes are also included, such as acts of terrorism, hazardous material spills, bridge failure, and sinkholes.

Nashville/Davidson County can shape its growth and preservation to

increase resiliency. Limiting development on steep slopes, unstable soils and in floodplains can reduce the likelihood of extreme weather events impacting residents and businesses. Compact land use patterns with robust street networks can provide quicker response times for emergency workers. Ensuring that there is street connectivity in suburban settings provides emergency workers more routes to get to residents in danger and allows residents more routes out of a neighborhood that has been impacted by a weather event.

Furthermore, community leaders can identify, build and protect critical infrastructure, making Nashville/Davidson County more resilient in the face of natural and man-made threats. Nashville's infrastructure network, including transportation, public safety, communications, parks and greenways, electric, water, and gas utilities, are critical to Nashville's emergency response, economy, and neighborhoods. Financial constraints, environmental concerns, and a culture of sustainability support diversification and connectivity of Nashville's infrastructure including multi-modal transportation systems, distributed energy resources, and smart telecommunications and data networks.

Balancing preservation and development to create resiliency

Systems, particularly natural systems, are inherently very complex and cannot be predictably controlled. Even though changes by humans to natural systems are easy to make, the response by natural systems to the changes cannot be as easily predicted. Because natural systems are so complex, negative consequences often come later, resulting in the need for more costly mitigation. Problems may be exacerbated through making individual development and investment decisions that fail to analyze or understand the implications on the entire natural system. That is why is it so important to monitor natural systems for problems and issues and try to correct causes early. Natural systems are dynamic and will adapt to new challenges in the absence of human disruption. Nashville's patterns of growth and preservation, its infrastructure, and its buildings should reflect our culture of sustainability and encourage sustainable living.

Through zoning and subdivision regulations, Metro manages the conversion of land to more intense development uses as well as the design of the built environment – the site, infrastructure and buildings – all of which

impact natural features. Residential and commercial development can significantly alter the natural relationships between water, woodlands, air, and climate. A commercial tree ordinance has strengthened the preservation of urban trees while a residential tree ordinance in Nashville is still needed.

Multiple skill sets, diverse perspectives, and collaboration are necessary to create sustainable, resilient development. In its broadest sense, strategies for sustainability and sustainable development aim to provide benefits to the environment, the economy, and for the community – today and in the future. Preserving and restoring natural systems leads to sustainability. This does not mean, however, a ban on development. It means a development approach that strategically locates new growth, utilizes appropriate building techniques, and preserves some areas as natural areas, serving an important function for the city.

This also means a development approach that integrates natural features into the design. It works progressively toward a process of continuous improvement. Increasingly built environments are being designed to mimic low maintenance natural environments. These built environments integrate native landforms, native plants, and natural functions; are cheaper to install than expensive concrete pipes and asphalt; and are less expensive to maintain. They also prove to be more resilient and adaptable to pests, storm events, and other hazards. As the city preserves, restores, and allows natural systems to continually regenerate, the result is higher quality and more resilient infrastructure that human infrastructure can do alone.

Finally, in addition to thoughtfully deciding where and how to grow, Metro should seek to invest in infrastructure wisely, considering long-term costs (including infrastructure constructed by the private sector that passes over to public ownership for operations and maintenance with those costs going to the city and its taxpayers). In this manner, future taxpayers, ratepayers, and the children of today's residents will avoid the price of inadequately, informed programs where the man-made system comes at one price when first installed and then costs much more years later when the system requires extensive maintenance. Today's citizens could instead enjoy natural, sustainable, and regenerative investments that add value now and that grow in value forever. Nashville has committed to creating a system of publicly and privately-held open space – parks and preserves – to protect some of Nashville's natural systems for their hazard mitigation properties and for their scenic, cultural and recreational value.

Nashvillians should strive to include a diversity of opinions, encourage honest debate about issues among decision makers, and ultimately balance impacts of land uses throughout the entire city and county. Nashville needs to expand its legacy of inclusion with policies that provide nearby access to environmental resources for those living in areas that are underserved and balance the economic, social, and environmental needs and impacts when making land use and transportation decisions.

Today, Nashville is redirecting priorities to restoring natural systems that can protect the lives and property of Nashvillians from future extreme weather events, while thoughtfully, strategically deciding where to grow and how to develop land. Numerous people and organizations across Nashville and the Middle Tennessee region have come together and are diligently working to protect and enhance our natural resources and our resiliency. Like many cities, Nashville must address development that occurred over decades where policy and regulations did not protect natural systems such as floodplains, wetlands, and steep slopes and did not provide critical infrastructure needed for resiliency like connected streets and sidewalks. However, for several years now, Nashville's development regulations have protected natural systems that play a key role during extreme weather events. Meanwhile, the city has taken decisive action – after the 2010 flood and other floods – to purchase properties in the floodway and remove buildings inappropriately located. Metro departments that work in growth and development have introduced policies, regulations, tools, and incentives to encourage sustainable, resilient development. The Codes Department created a "Green Building Permit" that is issued to any building meeting the sustainable design protocol within the zoning code. The green permit incentivizes sustainable development through expediting the permitting process for a building permit and providing local recognition for excellence in sustainable development. Meanwhile, the Parks Department strategically locates greenways on or near floodplains, providing an amenity to the community as well as a visual reminder of the importance of protecting Nashville's natural resources. Metro Nashville has also led the region in creating "green streets" – streets design that incorporates urban natural infrastructure. Deaderick Street and the 28th Avenue/31st Avenue Connector included green street elements. However, it takes all residents of Nashville and Davidson County – from individual behaviors to larger community approaches – to accomplish what needs to be done. This will enable us to secure the best Nashville for our current and future generations.

Goals and policies

Goals set broad direction for the plan by applying the Guiding Principles to NashvilleNext's seven plan elements. They identify, for each element, what NashvilleNext is trying to achieve.

Policies extend goals by providing more detail. They give more direct guidance on community decision making, without specifying which tools to use. (Identifying and adopting which tool is a job for actions and implementation.) As implementation occurs, if one particular tool is rejected by the public, the policy guidance remains.

Actions (Volume IV and at the end of this chapter) are short-term steps to carry out these Policies and achieve these Goals. The plan is structured so that the Action plan is updated the most frequently. During the annual update process, actions can be removed if accomplished or if they were deemed infeasible. Removing an action because it's infeasible leaves the overarching Policy in place. During the update, the Planning Department would seek to identify alternate ways of accomplishing the policy.

Related plans

With a strong commitment to annual updates and review, the General Plan is able to play a key role in providing coordination between other agencies and plans. It helps other departments understand long-term goals and how their work shapes that, even if they must focus on short-term needs that are out of step with the long-term plan. For example, the long-term vision for transit is to build a high-capacity transit network operating along major corridors, with few deviations from those corridors. In the short-term, MTA needs to conduct its operations to connect to riders, who may not live along those major corridors. Eventually, MTA operations should merge with the long-range vision, but it will take time to build the infrastructure and housing to support the high-capacity network.

Thus, Element chapters highlight related plans when discussing NashvilleNext Goals & Policies.

Much of what Nashvillians want for the future goes beyond what Metro can achieve on its own. Partnerships with community groups, non-profits, and the private sector are critical.

» NashvilleNaturally

NR goal 1

Nashville invests in and increases its natural environment for beauty, biodiversity, recreation, food production, resiliency and response to climate change through mitigation and adaptation strategies.

NR policy 1.1

Prioritize water quality and conservation by protecting the Cumberland River and its tributaries.

NR policy 1.2

Provide resources such as land, sustained funding, staffing and policies to maintain a growing parks and natural infrastructure network.

NR policy 1.3

Develop a secure and sustainable local food system that supports our local farmers and growers.

NR policy 1.4

Preserve Nashville's existing tree canopy including urban trees, street trees and larger tracts of forested lands.

NR policy 1.5

Invest in robust and diversified infrastructure including transportation choices which prioritize the maintenance of existing streets, expansion of mass transit service, and the creation of more walking and biking options in order to reduce sprawling development patterns, improve air and water quality, and preserve existing open spaces in Nashville.

NR goal 2

All communities in Nashville enjoy equally high levels of environmental protection, equitable access to nature and opportunities to improve their health and quality of life.

NR policy 2.1

Diversify participation in the policy making and implementation of Nashville's local services relating to infrastructure, land use, transportation and parks.

NR policy 2.2

Increase access to recreational opportunities that distinguish Nashville, improve quality of life and support the local economy.

NR goal 3

Nashville's built environment — public, private and residential — conserves and efficiently uses land, energy, water and resources while reducing waste and pollution.

NR policy 3.1

Establish and implement citywide energy reduction goals and target percentages of renewable energy sources with input from key stakeholders.

NR policy 3.2

Establish a wide-ranging green education campaign that focuses on the "why" and "how" for water conservation, energy efficiency and reductions, recycling and waste reduction, natural resources preservation and outdoor activity.

NR policy 3.3

Metropolitan Government buildings should lead the city in energy efficiency by modeling best practices to meet the city's green initiatives which reduce energy and water consumption and shift to renewable energy sources.

NR goal 4

Nashville's built and natural environment is resilient, sustainable, and smart because it adapts to and mitigates the impact of climate change involving extreme weather, hazards and catastrophes.

NR policy 4.1

Identify threats to current and future infrastructure related to climate change including extreme weather, hazards and catastrophes.

NR policy 4.2

Establish policies that encourage resiliency and mitigate the effects of climate change leading to weather extremes, hazards and catastrophes.

NR policy 4.3

Prepare for and quickly respond to extreme weather, hazards and catastrophes by creating, implementing and communicating contingency plans with smart and connected infrastructure.

#	NRHA Goal	Policy	Action	Time frame	Responsible party
1	**1**		**Nashville invests in and increases its natural environment for beauty, biodiversity, recreation, food production, resiliency and response to climate change through mitigation and adaptation strategies.**		
2		**1.1**	Prioritize water quality and conservation by protecting the Cumberland River and its tributaries. See EWD 1.1.4 related to eco-industrial districts.		
3		1.1.1	Maintain funding to replace outdated and deteriorating infrastructure that can significantly impact the environment and increase the utilization of Low Impact Development techniques. This action should meet the Consent Decree issued by the United States Environmental Protection Agency and the Tennessee Department of Environment and Conversation to reduce combined sewer overflows into the Cumberland River.	Short	Metro Council, Mayoral Administration, Metro Water Services
4		1.1.2	Advocate for an increased variable stream buffer program on impaired waterways that preserves vegetated areas as a buffer from adjacent land uses. Research how the buffer width should be context sensitive and scaled by the intensity of the surrounding development and the waterway's quality and quantity. Utilize the Mill Creek watershed as a pilot for the program, and replicate similar buffer programs on other impaired waterways in Davidson County.	Short	Cumberland River Compact
5		1.1.3	Coordinate with non-profit organizations and private agencies to repair stream buffers with native plantings and appropriate vegetation.	Short	Metro Water Services, Cumberland River Compact
6		1.1.4	Strengthen hillside development regulations to minimize development on greater than 15% slopes.	Short	Metro Planning Department
7		1.1.5	Advocate strengthening and revising procedures to ensure that regulatory standards provide appropriate protection to new development and redevelopment through Metro's stormwater variance process and to reduce the amount of undisturbed floodplain area that can be developed to a range of 0-15% with required conditions. Some exceptions may be needed in areas with future Center and Downtown land use policies identified in Metro Nashville's Community Character Manual.	Mid	Cumberland River Compact
8		1.1.6	Decrease stream dumping with campaigns coordinated through public-private partnerships that educate Nashvillians on proper refuse removal with the long term goal to eradicate all stream dumping in the future, and strengthen the Metropolitan Code to more stringently prohibit stream dumping. Fund staff capacity to enforce regulations.	Short	Metro Water Services

#	NRHA Goal	Policy	Action	Time frame	Responsible party
10		1.1.7	Coordinate with the State of Tennessee, Middle Tennessee communities, U.S. Army Corps of Engineers and other agencies on regional watershed planning issues to enhance water quality and address water quantity issues.	Mid	TDEC, Metro Water Services, US Army Corps of Engineers, TVA, Cumberland River Compact
11		**1.2**	Provide resources such as land, sustained funding, staffing and policies to maintain a growing parks and natural infrastructure network.		
12		1.2.1	Increase the funding for expansion of open space, parks and greenway acquisition to keep pace with population growth and maintain Nashville's natural assets through the Open Space Acquisition Fund with at least $5 million leveraged by a minimum of 20% in private dollars. One key initiative includes acquiring property for a new legacy park within the southeast quadrant of the county, as depicted on the NashvilleNext Growth Framework map within five years. Additionally, within each Tiered Center, acquire property for parks within an appropriate timeframe.	Short	Metro Council, Mayoral Administration, Metro Parks, Tennessee Parks and Greenways Foundation, Land Trust for Tennessee
13		1.2.2	Appropriately fund maintenance and operational needs on an annual basis for existing and newly acquired parks, open space and greenways.	Short	Metro Council, Mayoral Administration, Metro Parks
14		1.2.3	Update the Metropolitan Parks and Greenways Master Plan on a regular basis to determine where parks, open space and greenways should be developed in the future. Metro's Master Plan should integrate with the Nashville Open Space Plan and other relevant plans.	Short	Metro Parks
15		1.2.4	Identify and implement the best ways to encourage neighborhood schools and their related open space and playground infrastructure to function as parks for the community's use. Refer to E&Y 2.5 and E&Y 4.3 for additional guidance.	Mid	Metro Schools, Metro Parks
17		1.2.5	Create a Regional Open Space and Greenways Plan that serves Metro Nashville, surrounding counties, and municipalities with the help of the Nashville Area Metropolitan Planning Organization and Cumberland Region Tomorrow.	Mid	Nashville Area MPO, Cumberland Region Tomorrow, Metro Planning Department, Metro Parks

#	NRHA Goal	Policy	Action	Time frame	Responsible party
18		1.2.6	Research methods to define and identify ecologically valuable lands, and recommend an appropriate in-lieu fee to Metro stakeholders involved in the implementation of the Open Space Plan (Metro Water Services, Metro Parks, or Office of Sustainability) where permanent protection cannot be accomplished to fund a land bank for Davidson County.	Long	Metro Parks, Metro Water Services, Land Trust for Tennessee
		1.2.7	Identify alternate strategies for funding the acquisition of park land (TIF, Business Improvement District, and other methods) as an essential element of the city's green infrastructure, particularly in Centers and other redeveloping areas.	Mid	Metro Parks, Mayor's Office of Economic Development
19		**1.3**	Develop a secure and sustainable local food system that supports our local farmers and growers.		
20		1.3.1	Conduct a community food assessment with stakeholders including the Food Policy Council that addresses the food system needs within a 100 mile radius of Nashville. It should recommend ways to improve the quality and accessibility of healthy food in Middle Tennessee, build on the city's strengths and trends for integrated food strategies, and encourage development supportive agriculture linked to Rural policies outlined in NR 4.2.1.	Short	Food Policy Council, Metro Health Department
21		1.3.2	Launch programs that supplement local food supply distribution in Nashville that leverages the demand for local food among consumers, institutions and commercial enterprises.	Short	Food Policy Council, Nashville Farmer's Market
22		1.3.3	Assess and implement policies and regulations using best practices from other cities that preserve prime farmland, and create an agricultural zoning category for existing farms and prime farmland soils based on this research and stakeholder outreach.	Mid	Metro Planning Department, Land Trust for Tennessee
23		**1.4**	Preserve Nashville's existing tree canopy including urban trees, street trees, and larger tracts of forested lands.		
24		1.4.1	Implement and regularly update the Metropolitan Nashville Urban Forestry and Landscape Plan to promote diverse tree plantings. Create a street tree policy, residential tree ordinance, maintenance program and preservation policy. Enact a planting program, including maintenance and watering, to supplement cases where trees must be removed. Fund and train more interdisciplinary inspectors to handle enforcement of these regulations.	Short	Metro Public Works, Metro Parks, Metro Codes

#	NRHA Goal	Policy	Action	Time frame	Responsible party
		1.4.2	Fund and staff a tree planting and maintenance program to meet Nashville's tree canopy goal as a collaboration between Metro Public Works, Metro Beautification, Metro Parks, the Tennessee Department of Transportation, utility providers, private stakeholders, and non-profits to supplement efforts. The partnership should emphasize an urban forestry program as outlined in the Downtown Urban Tree Canopy Assessment to ensure the survival of trees, provide shade, improve stormwater retention and add aesthetic value.	Short	Metro Public Works, Metro Parks, TDOT, NES, Piedmont Gas, Metro Water Services, non-profit organizations
25		1.4.3	Enact a conservation subdivision ordinance by right with a minimum of 50% open space requirement.	Mid	Metro Planning Department
		1.4.4	Revise the existing cluster lot subdivision regulations to increase the amount of required preserved land to be 33% minimum.	Mid	Metro Planning Department
26		**1.5**	Invest in robust and diversified infrastructure including transportation choices which prioritize the maintenance of existing streets, expansion of mass transit service, and the creation of more walking and biking options in order to reduce sprawling development patterns, improve air and water quality, and preserve existing open spaces in Nashville. See LUTI 7.0.14 related to mass transit funding and expansion. See LUTI 7.0.1 related to developing a Department of Transportation.		
27		1.5.1	Provide an appropriate amount of funding on an annual basis for easements, acquisition, construction and maintenance of sidewalks, greenways, bikeways, and bikeshare locations. Prioritize projects identified in regularly updated versions of the NashvilleNext General Plan, Community Plans, the Strategic Plan for Sidewalks and Bikeways, and the Parks and Greenways Master Plan based upon their ability to encourage the preservation of open spaces, ecologically sensitive areas, and improve air and water quality.	Short	Metro Council, Mayoral Administration, Metro Parks, Metro Public Works
28		1.5.2	Reexamine existing policies related to infrastructure improvements with residential infill redevelopment and new development to determine appropriate policies, methods, and design standards to ensure the development of sidewalks, greenways, and bikeways as development occurs.	Short	Metro Planning Department, Metro Parks, Metro Public Works
31		1.5.3	Fund major connectivity projects to link people walking and biking to areas of Davidson County where physical and natural barriers exist and where gaps in equitable access exist.	Mid	Metro Public Works, Metro Parks
33	**2**		**All communities in Nashville enjoy equally high levels of environmental protection, equitable access to nature and opportunities to improve their health and quality of life.**		

#	NRHA Goal	Policy	Action	Time frame	Responsible party
34		**2.1**	Diversify participation in the policy making and implementation of Nashville's local services relating to infrastructure, land use, transportation and parks.		
35		2.1.1	Establish and sustain within Metropolitan Government's structure an Environmental Policy and Sustainability Office, within the Mayor's Office (or a similar organizational structure) with an advisory board, director and staff to lead the city's sustainability efforts and coordinate with Metro departments and partner agencies on sustainability issues. The staff should be charged with review and oversight of all department projects and budget requests for their impacts on environmental standards and sustainability goals as well as the responsibility in expanding research and grant writing capabilities to secure diversified funding sources.	Short	Metro Council, Mayoral Administration
36		2.1.2	Encourage and increase civic engagement with an emphasis on participation by low income and immigrant residents by establishing a diverse citizen's advisory committee for input on parks and open space and active involvement in implementation of projects.	Short	Metro Parks, Metro Human Relations Comission, Nashville 4 All of Us
37		2.1.3	Develop, promote and educate the benefits of an incentive program for residents who treat stormwater on their commercial or residential site through rain gardens or other natural means. This incentive program may include a reduced storm water fee or reimbursement for materials and labor to treat stormwater runoff more naturally.	Long	Metro Water Services
38		**2.2**	Increase access to recreational opportunities that distinguish Nashville, improve quality of life and support the local economy.		
39		2.2.1	Build projects connecting Nashvillians to nature and parks where accessibility gaps exist. These include areas where parks and green space are currently lacking, as well as neighborhoods that have a disproportionate amount of noxious uses, or those that have been simply overlooked as Nashville has grown.	Short	Metro Parks, Metro Public Works
40		2.2.2	Identify and pursue acquisition of parcels that are ideal locations for small neighborhood and pocket parks with an emphasis on rapidly redeveloping areas of Davidson County such as Downtown, as well as underserved areas lacking access. Encourage these parks to be managed through an "adoption" process by a Nashville parks foundation or friend's group similar to the Friends of Warner Parks.	Short	Metro Parks

#	NRHA Goal	Policy	Action	Time frame	Responsible party
41		2.2.3	Conserve the Cumberland River for recreational opportunities along Nashville's riverfront. As redevelopment occurs, reclaim areas near the River for additional green space and to mitigate pollution. These areas could be utilized for activities including sculling, sailing, water taxis, paddling, canoeing, and other water-based activities.	Short	US Army Corps of Engineers, Metro Parks, Cumberland River Compact
42		2.2.4	Build additional greenways or multi-use paths that connect beyond the current water-based network such as the development of a secondary tier of connections that provide east-west mobility to the stream based greenways which will provide important routes for transportation needs, not just recreational opportunities.	Long	Metro Parks, Metro Public Works
43	**3**		**Nashville's built environment — public, private and residential — conserves and efficiently uses land, energy, water and resources while reducing waste and pollution.**		
44		**3.1**	Establish and implement citywide energy reduction goals and target percentages of renewable energy sources with input from key stakeholders.		
45		3.1.1	Fund Metro to support an energy management program, including staff and technical needs, so the city has the capability to regularly monitor and report to the public both private-sector and Metro numerical benchmarks and narrative descriptions of progress, in addition to new measures needed to stay on track in meeting the energy reduction goal.	Mid	Metro Council, Mayoral Administration, Metro Office of Sustainability, NES, TVA
46		3.1.2	Develop programs similar to Chicago, Boston, and Seattle that require the public disclosure of energy use within commercial buildings over a yet-to-be-determined square footage so renters and leasees have more information to make decisions involving their energy use.	Long	Metro Office of Sustainability
47		3.1.3	Implement a food waste recycling program including composting for large producers of food waste such as public and private schools, universities, hospitals, large corporations with cafeteria components and the Nashville Farmers' Market. In the program, include a system for composted food waste to be utilized by area farms, urban agriculture and community gardens (and potential to be sold at the Farmers' Market) as a natural means for soil enrichment, rainfall infiltration and reduced greenhouse gas emissions from landfills. Incentivize private sector composting/anaerobic companies and markets for composting/anaerobic materials.	Mid	Food Policy Council, Vanderbilt University, Metro Schools, Metro Health Department, Metro Public Works

#	NRHA Goal	Policy	Action	Time frame	Responsible party
48		3.1.4	Add policies to utilize composted and recycled products to benefit urban agriculture soil health in Metro Government Procurements.	Mid	Metro General Services, Metro Finance Department, Mayoral Administration
49		3.1.5	Continue to phase in the use of green infrastructure methods outlined in the Low Impact Development (LID) Manual within the private sector. Assess an increase in plan review fees to cover program administration, ensure fees correspond with stormwater loads and impervious cover, and set stringent thresholds for when LID methods are waived on a site.	Mid	Metro Council, Mayoral Administration, Metro Water Services
50		3.1.6	Develop a method for identifying projects to improve water quality in impaired watersheds and establish a mechanism to fund them. Refer to NR 4.1.2 related to working with adjacent counties upstream along the Cumberland River.	Mid	Metro Water Services, Cumberland River Compact, TDEC
51		3.1.7	Create a revolving loan fund to pay for long-term energy retrofits and renewable energy installations to create a new source of green jobs. Align the program with local community colleges and universities to develop installation, design, and engineering talent in support of clean energy infrastructure. Include incentives to recruit and train people from low income and immigrant communities for green collar job skills and opportunities. Similar programs have been created in Chicago and Boston.	Mid	Metro Office of Sustainability, Mayor's Office of Economic Development
52		3.1.8	Allow flexibility where improvements to water quality can be made within Metropolitan Government's infrastructure standards that allows private development and Metro-constructed facilities to utilize green best practices where deemed appropriate and provide needed infrastructure upgrades while reducing infrastructure costs and improving the environmental conditions.	Short	Metro Water Services, Metro Public Works, General Services
52		3.1.9	Assess and implement a robust Pay As You Throw waste program by examining other cities' programs that may be appropriate for Nashville. These methods might include utilizing a cart-based system that is weighed and charged based on its weight to the resident, similar to the process used by a utility, charging a fee on large trash cart pickup while small carts are included as part of property taxes a resident pays, or other best practices.	Mid	Metro Public Works
53		3.1.10	Increase funding to support the increased frequency of residential curbside recycling to match or exceed the frequency of residential curbside trash collection	Mid	Metro Public Works

#	NRHA Goal	Policy	Action	Time frame	Responsible party
54		3.1.11	Continue requiring certain materials such as cardboard, yard waste, and e-waste to be diverted from trash landfills and increase waste diversion by promoting and advocating for these services.	Short	Metro Public Worl
55		**3.2**	Establish a wide-ranging green education campaign that focuses on the "why" and "how" for water conservation, energy efficiency and reductions, recycling and waste reduction, natural resources preservation and outdoor activity.		
56		3.2.1	Sustain an educational program similar to the Mayor's Workplace Challenge that encourages residents, government, businesses and their employees towards the adaptation of sustainable practices inclusive of conserving energy and using renewable energy sources. Develop a range of personal and corporate incentives, educational outreach, and technical assistance based on the most current social science research. Advocate for Southeastern cities to lead in strategies that meet and/or exceed current international and national standards.	Long	Metro Water Services, Metro Public Works, Metro Office of Sustainability, Cumberland River Compact
57		3.2.2	Collaborate with Metro Schools and other educators to participate in The GLOBE (Global Learning and Observations to Benefit the Environment) Program and coordinate programming with ECO-TN (Every Child Outdoors – Tennessee) to emphasize sustainability as the behavioral norm using techniques that are based on social science research.	Long	Metro Schools, Metro Office of Sustainability
58		**3.3**	Metropolitan Government buildings should lead the city in energy efficiency by modeling best practices to meet the city's green initiatives which reduce energy and water consumption and shift to renewable energy sources.		
59		3.3.1	Establish a revolving Metro fund for the installation of renewable energy generators, such as rooftop solar arrays, on all Metropolitan Government buildings.	Mid	General Services, Metro Office of Sustainability
60		3.3.2	Retrofit surface parking lots owned by the Metropolitan Government with pervious pavement solutions that reduce stormwater runoff.	Mid	General Services
61		3.3.3	Establish energy and water reduction, efficiency and conservation goals for Metropolitan Government buildings that emphasize the connection between water use and energy consumption. Implement strategic solutions that include water harvesting and graywater re-use, as well as traditional water efficiency and conservation methods.	Mid	General Services, Metro Office of Sustainability, Metro Water Services

#	NRHA Goal	Policy	Action	Time frame	Responsible party
62		3.3.4	Increase the utilization of Renewable Energy Credits (REC's) for Metro owned buildings, whether purchased or through on-site solutions. Set an appropriate goal for Metro REC utilization on an annual basis.	Long	General Services, Metro Office of Sustainability, TVA, NES
63		3.3.5	Establish a Metro target percentage for increasing renewable energy sources.	Short	Metro Office of Sustainability
64		3.3.6	Issue regular reports to the public which include both numerical benchmarks and narrative descriptions of progress, in addition to new measures needed to stay on track in meeting goals involving Metropolitan Government buildings.	Mid	Metro Office of Sustainability
65	**4**		Nashville's built and natural environment is resilient, sustainable, and smart because it adapts to and mitigates the impact of climate change involving extreme weather, hazards and catastrophes.		
66		**4.1**	Identify threats to current and future infrastructure related to climate change including extreme weather, hazards and catastrophes.		
67		4.1.1	Update the preliminary Greenhouse Gas Inventory on a regular basis and monitor best practices among cities to establish relevant goals to reduce the city's carbon footprint. Develop a management system within Metro to continually track and report greenhouse gas usage by all Metro departments.	Mid	Metro Office of Sustainability
68		4.1.2	Collaborate with upstream counties, state and federal agencies to assess and understand the influence of land use patterns in upstream watersheds beyond Davidson County for potential impacts to source water supply, water quality and extremes events, such as drought, flood, and wildfire. Identify risks of concern to upstream landscapes and contribute to joint regional efforts to mitigate risks with land conservation, source water protection, hazard reduction and floodplain management practices.	Mid	Cumberland Region Tomorrow, Nashville Area MPO, Cumberland River Compact, TDEC, adjacent counties
69		4.1.3	Update infrastructure design specifications to incorporate climate projections that provide a safety margin for the trends of changing precipitation patterns and weather extremes for all infrastructure projects both public and private, during new construction, planned upgrades and major repair projects (roads, bridges, utilities, storm drains, etc.)	Long	General Services, Metro Public Works, Metro Water Services, Metro Parks, Metro Planning Department

#	NRHA Goal	Policy	Action	Time frame	Responsible party
70		4.1.4	Analyze stormwater best management practices (BMP) inventories, assess life-span and functional status and develop long-range stormwater BMP retrofit process to restore, upgrade or replace degraded stormwater practices in aging sites, such as detention ponds, large parking lots and other BMP upgrade opportunities.	Long	Metro Water Services
71		4.1.5	Communicate climate related threats with appropriate agencies and task them to create a resiliency plan and inter-departmental action plan. Provide appropriate levels of support for hazard and disaster response, including proactive funding, staffing, materials and technology to successfully mitigate extreme weather events. Include special considerations for disaster response measures that benefit vulnerable neighborhoods with less ability to respond, such as low income, immigrant, elderly or disable residents.	Mid	Metro Office of Emergency Management, Metro Office of Sustainability, Nashville, MTAMetro Public Works, Metro Human Relations Commission, Metro Health Department, non-profit organizations
72		4.1.6	Monitor the latest ozone standards and regulations within Middle Tennessee and anticipated Federal changes. Update and implement Metro policies as appropriate. Educate and promote ways to decrease air pollution, especially during hot temperatures.	Short	Middle Tennessee Clean Air Partnership, Metro Health Department, Nashville Area MPO
73		**4.2**	Establish policies that encourage resiliency and mitigate the effects of climate change leading to weather extremes, hazards and catastrophes.		
74		4.2.1	Update areas of Davidson County as appropriate to new Rural Conservation, Rural Agriculture, and Rural Countryside Community Character Manual Policies that guide a reduction in development and discourage the expansion of sewer infrastructure.	Short	Metro Planning, Metro Water Services

#	NRHA Goal	Policy	Action	Time frame	Responsible party
75		4.2.2	Create a Climate Adaptation/Resiliency Plan to understand the impacts of climate change and potential opportunities and challenges related to natural resources and the local economy by coordinating with the Nashville Area MPO, partner agencies and Middle Tennessee communities.	Mid	Nashville Area MPO, Metro Office of Sustainability, Cumberland River Compact, Cumberland Region Tomorrow
76		4.2.3	Regularly assess and modify adopted Metropolitan Government ordinances to reflect the latest best practices in protecting critical facilities such as water and sewage treatment facilities, and effectively strike a balance between safeguarding hazardous materials and public health hazards within the floodplain with the necessity for some industries to be located along the Cumberland River. See NR 1.1.5 related to strengthening regulatory standards for development within the floodplain.	Short	Metro Council, Metro Water Services
77		**4.3**	Prepare for and quickly respond to extreme weather, hazards and catastrophes by creating, implementing and communicating contingency plans with smart and connected infrastructure.		
78		4.3.1	Update and expand the county-wide outdoor early warning sirens and connect any stand-alone university or satellite city's early warning siren systems to Metro's system.	Short	Metro Office of Emergency Management
79		4.3.2	Continue to update flood crest prediction programs for streams in Davidson County and respond to information appropriately between the US Geological Survey, National Weather Service, Metro Water Services and Metro Office of Emergency Management.	Short	Metro Office of Emergency Management, Metro Water Services, US Geological Survey, National Weather Service
80		4.3.3	Improve street connectivity throughout Davidson County by requiring street connections for all new developments and limiting the use of cul-de-sacs. Funding should be established for future street right-of-way acquisition to provide additional street connectivity in areas that are at a high risk for flooding.	Short	Metro Council, Metro Planning Department, Metro Public Works