## 3.1 The Vision: Lancaster County's Natural Life Support System

Lancaster County's green infrastructure – land, water, air, and the plant and animal species they support – is vital to the health and well being of Lancastrians. As described in Chapter 1.0, the benefits provided by these resources are vast, ranging from ecological services such as cleaning the air and water, controlling flooding, and conserving native plant and animal diversity, to monetary benefits such as increasing property values, reducing energy consumption, and generating economic activity. However, the County's once abundant natural resources have been greatly altered by human activity, resulting in extensive negative impacts such as the loss and fragmentation of natural habitat and degraded air and water quality (see Chapter 2.0).

Greenscapes seeks to reverse this long-term trend through comprehensive action to maintain, restore, and enhance green infrastructure as Lancaster County's essential **natural life support system.** This system is envisioned as:

> A network of **natural areas, green spaces,** and **greenways** in rural, suburban, and urban areas that sustains ecological functions and values and provides a broad array of benefits for the people of Lancaster County and the surrounding region, including:
> - ***Environmental Quality:*** Natural resource protection and the perpetuation of native plant and animal species.
> - ***Community Health:*** Water and air quality, recreation, and mobility (walking and biking as integral parts of the transportation system).
> - ***A Sustainable Economy:*** Resource-based economic activity, increased property values, energy conservation, and reduced costs of engineered "gray infrastructure."

What does this vision mean for Lancaster County looking forward ten to twenty years and beyond? Imagine a future in which a healthy, interconnected network of natural and human ecosystems that contributes to the economic vitality and quality of life of county residents has been established. Imagine that…

- Scenic natural landscapes, high quality river and stream corridors, habitat for native plant and animal species, and other elements of Lancaster County's natural heritage have been protected, restored, and managed for ecological health in a comprehensive, connected system extending throughout the County.

- Green infrastructure is an integral part of the County's urban, suburban, and rural communities, as reflected in elements such as a flourishing tree canopy; green streets, roofs, and parking courts; conveniently located parks and open spaces; and community gardens and backyard habitat areas.

- Lancastrians walk and bike to work, shop, and recreate using safe and attractive streets, paths, and greenway trails that provide seamless connections within urban and suburban communities and from these communities to rural destinations such as county parks.

- Productive and sustainable agricultural lands are managed to conserve natural resources, such as buffers of riparian vegetation along rivers and streams with exceptional water quality.

- Holistic approaches such as green buildings, biological stormwater and wastewater treatment systems, and community-wide tree plantings are used to conserve energy, improve air and water quality, offset carbon emissions, and avoids the financial and environmental costs of conventional engineering solutions.

- Ecotourism – the sustainable enjoyment and use of green infrastructure resources by visitors – contributes to the economic prosperity of Lancaster County's communities.

- Governmental officials and agencies, institutions, nonprofit organizations, businesses, and citizens of all ages and backgrounds appreciate, take pride in, and provide support for maintaining and enhancing Lancaster County's green infrastructure system. Instilled in school children from an early age, the essential value of green infrastructure as the County's natural life support system is central to community life and discourse.

- A conservation ethic and culture of stewardship of natural resources has been embraced by Lancastrians, who understand the importance of green infrastructure to quality of life, community health, and a sustainable economy.

## 3.2 The Concept: Lancaster County's Green Infrastructure System

What will Lancaster County's green infrastructure look like when this vision is achieved? A physical concept of the proposed green infrastructure system has been developed at a county-wide scale based on the resource mapping and analysis described in Chapter 2.0. The concept is a spatial depiction of resources that correspond to the four primary system goals more fully described in Chapter 4.0: Preservation, Conservation, Restoration, and Recreation.

- **Goal 1: Preservation**
  *Preserve Lancaster County's exceptional natural resources.*
  Lancaster County is fortunate to have a number and variety of high quality natural resources worthy of preservation. These areas should be preserved, in perpetuity, as part of the foundation of the County's green infrastructure system. The exceptional natural resources that should be preserved include the highest quality streams and riparian areas, unique geologic features, natural gems, species of concern core habitat, the highest quality natural communities, interior forests, forest blocks greater than 100 acres in size, and important bird and mammal areas. Described in Chapter 2.0 and shown as a composite layer on Figure 26, these resources are the highest priorities for preservation as part of the green infrastructure system.

- **Goal 2: Conservation**
  *Conserve natural resources and services throughout Lancaster County's urban, suburban, and rural landscapes.*
  The patchwork of natural resources that threads its way throughout the County's urban, suburban, and rural landscapes performs a variety of important ecological functions. While the quality of these resources is not as high as those addressed by the Preservation goal, the functions they provide are essential to the health of our natural environment and to the quality of our lives. Conserving these resources through wise use and management is critical to sustaining the ecological functions they provide. Important natural resources (other than the exceptional ones addressed by Goal 1) include wetlands, 100-year floodplain areas, steep slopes and highly erodible soils, medium-quality streams and riparian buffers, medium quality natural communities, species of concern supporting habitat, forest blocks less than 100 acres in size, and other natural vegetation. Described in Chapter 2.0 and shown as a composite layer on Figure 27, these resources should be managed to maintain their ecological functions and natural carrying capacity. Important groundwater and wellhead protection zones also fall under the Conservation category but are not shown on Figure 27.

- **Goal 3: Restoration**
  *Restore ecological connections and natural resource systems throughout Lancaster County's urban, suburban, and rural areas.*
  The extent of degraded natural resources throughout Lancaster County's urban, suburban, and rural landscapes is widespread and readily apparent, even to the casual observer. Sediment-laden stream water, ozone alerts, and fish consumption warnings are all indicators of a highly stressed natural environment. Healing the landscape from three centuries of abuse will take both patience and perseverance. Degraded natural resource areas that provide opportunities for ecologi-

**Figure 26 - Preservation Areas**

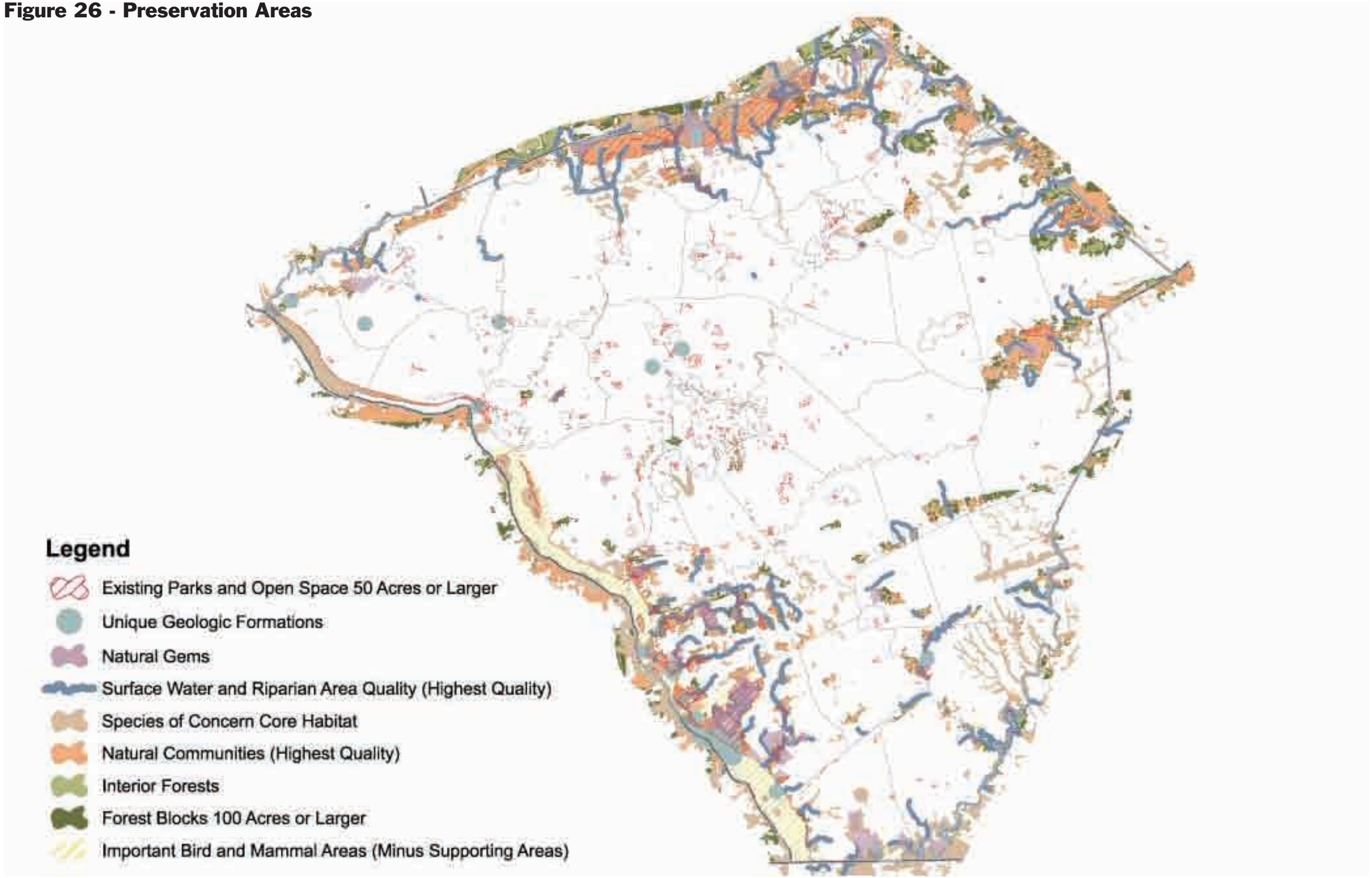


**Figure 27 - Conservation Areas**

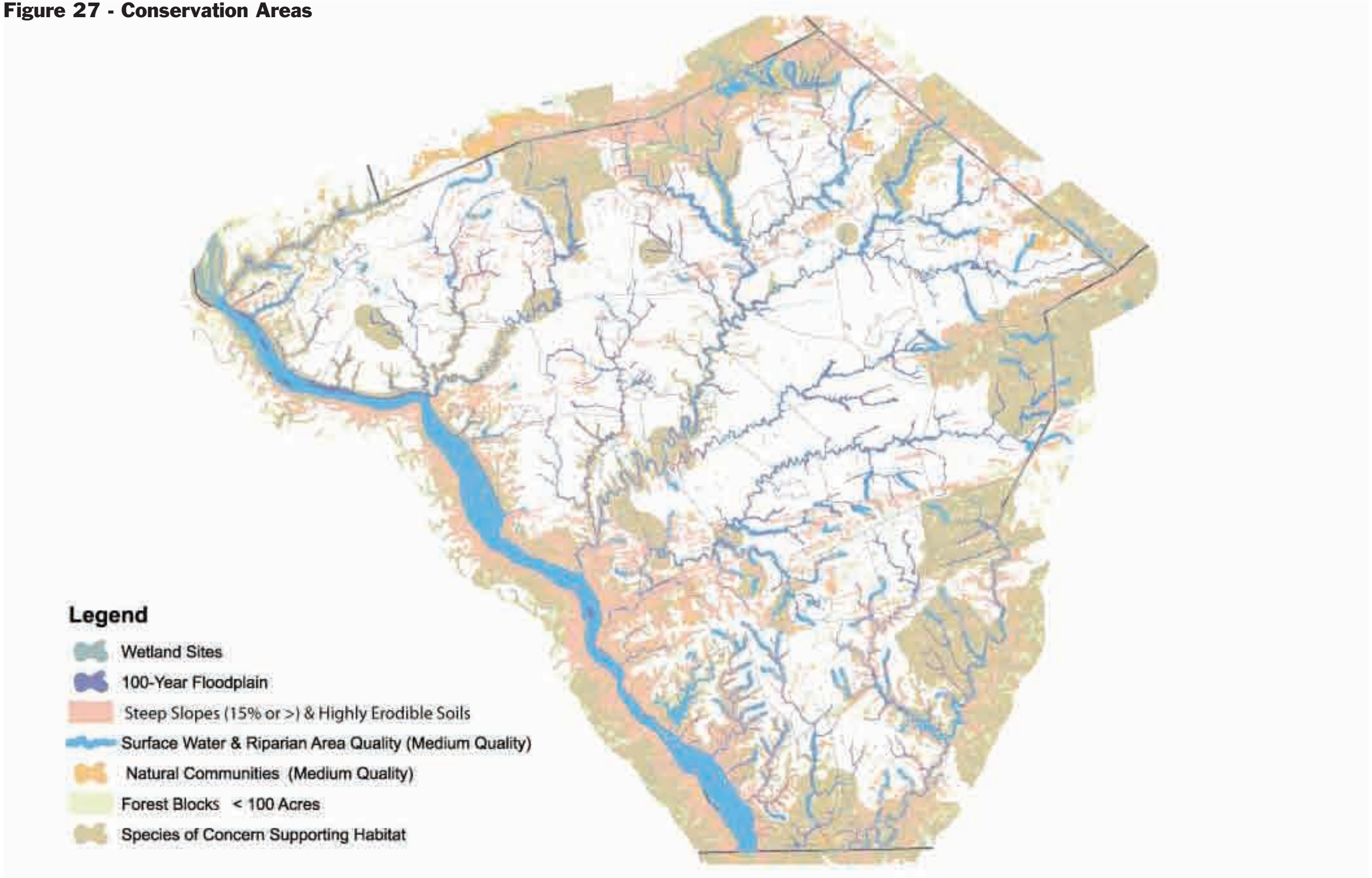
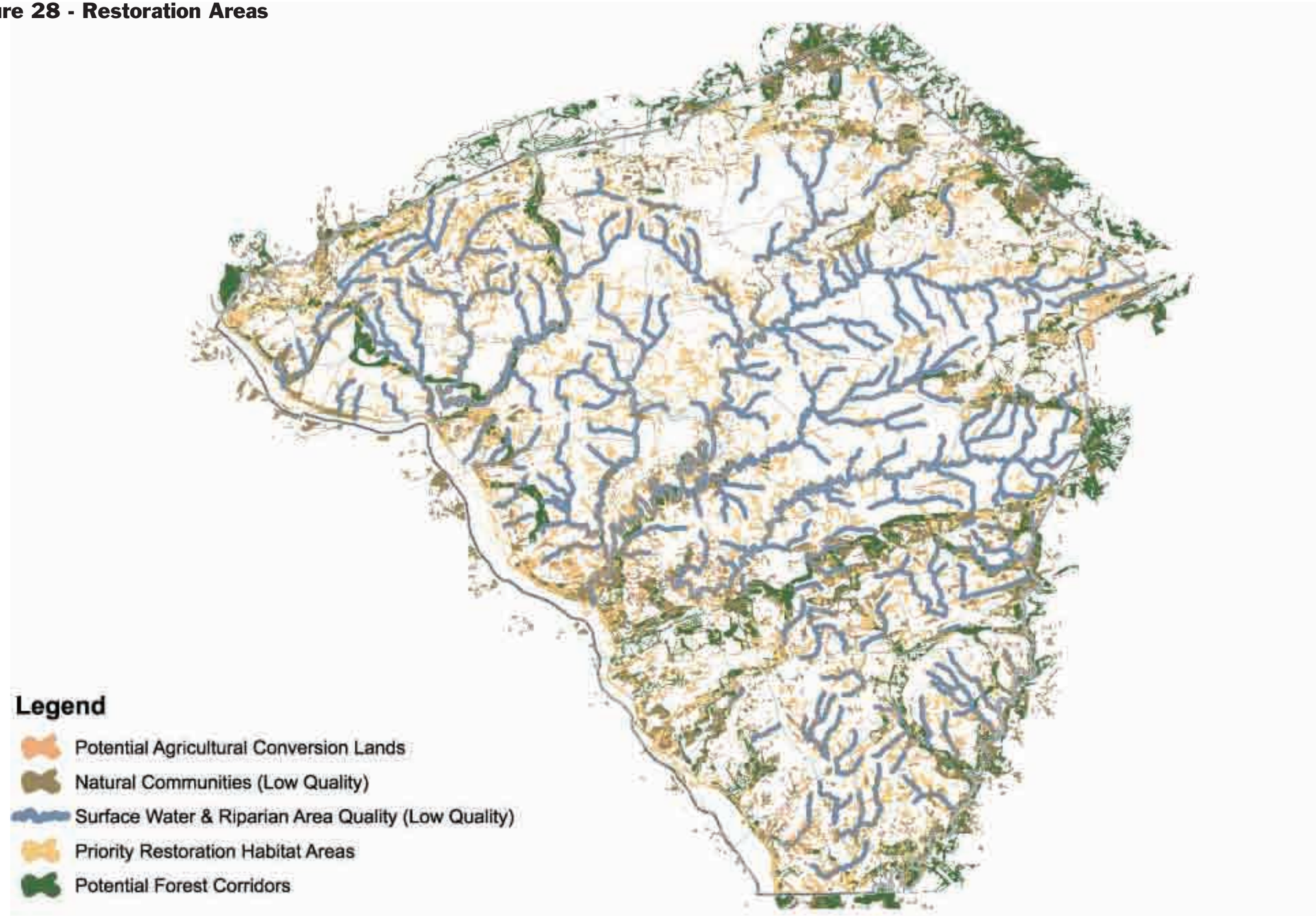


**Figure 28 - Restoration Areas**



## Figure 29 - Recreation Areas

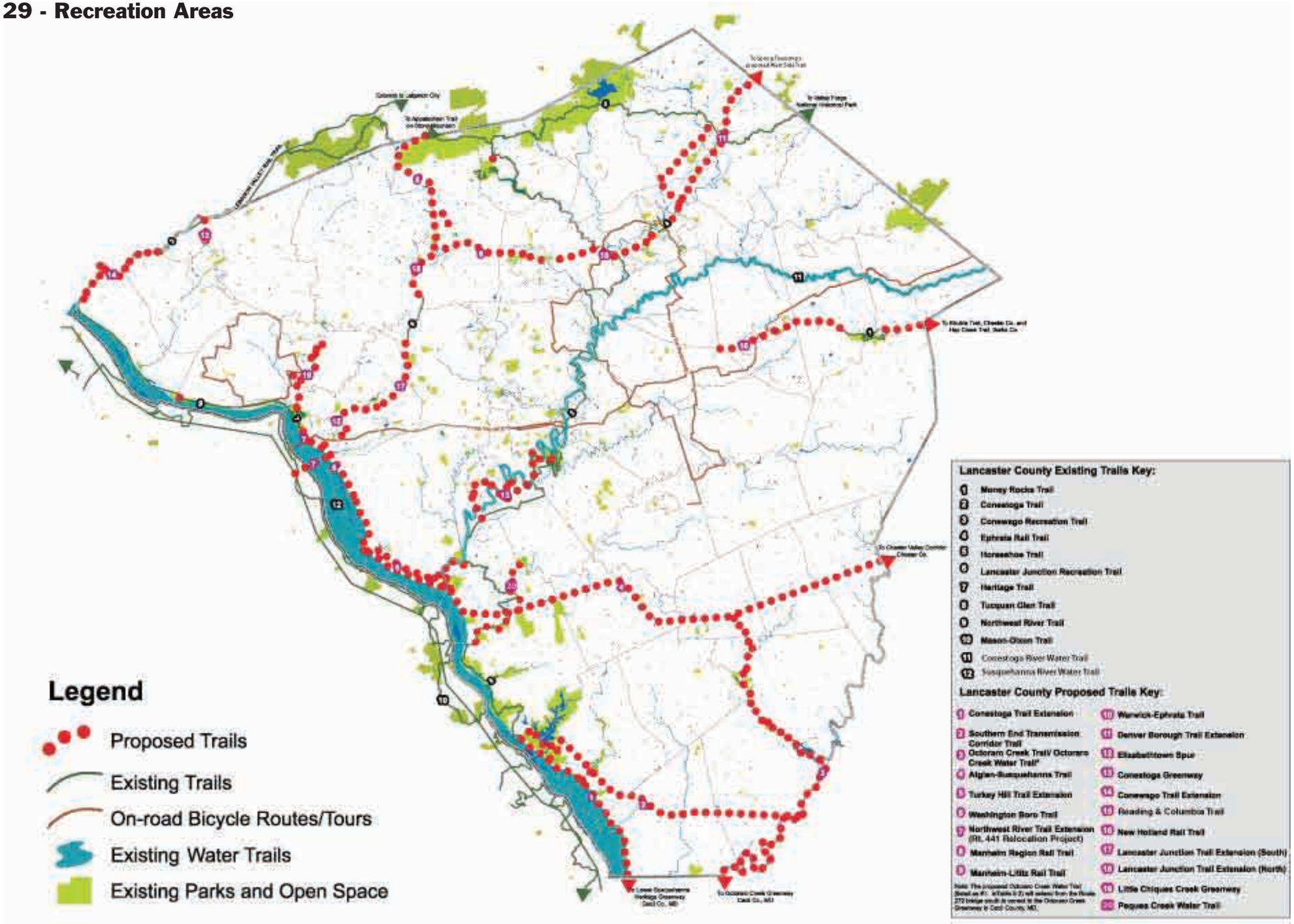


**Figure 30 - Lancaster County Green Infrastructure Concept Map**

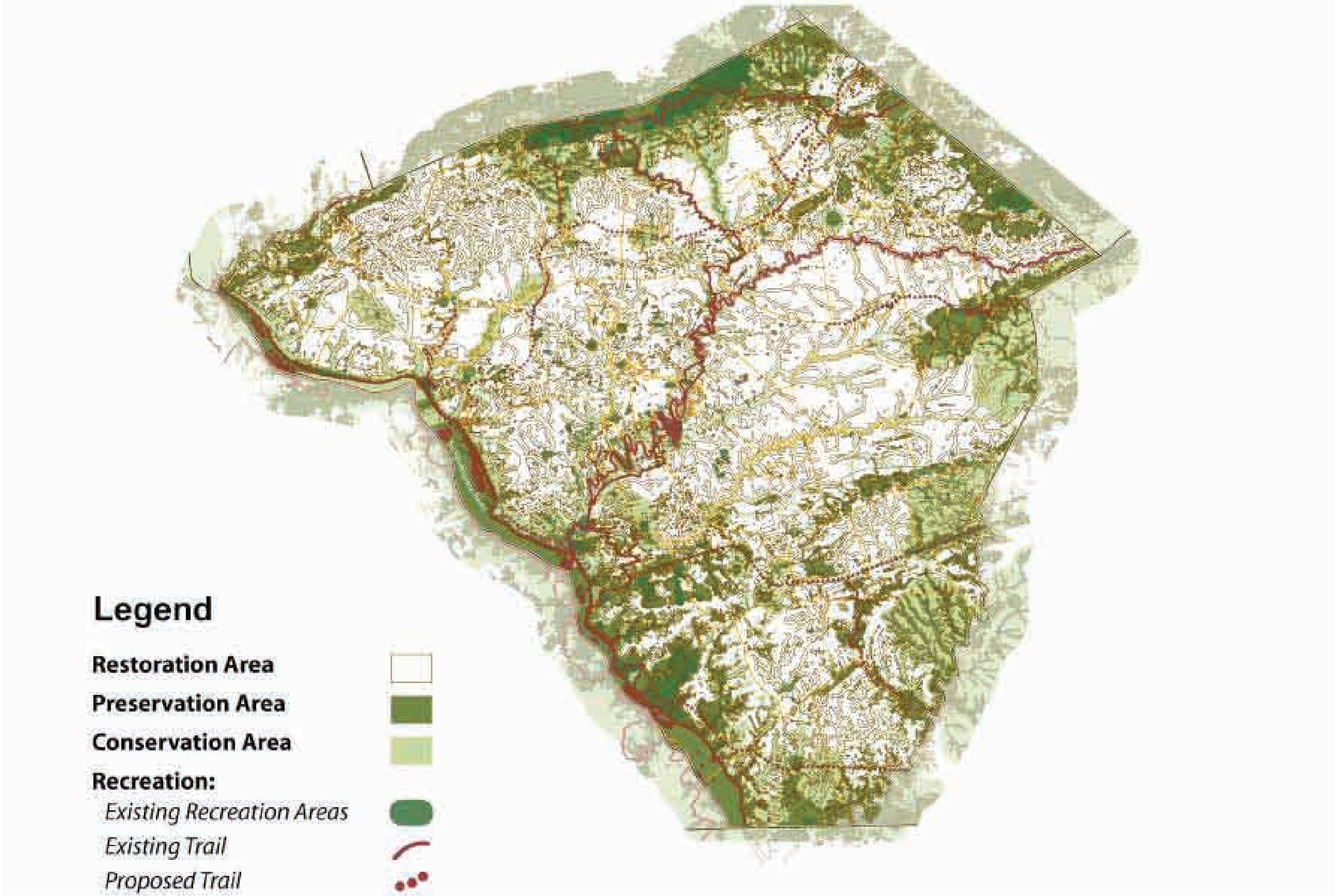
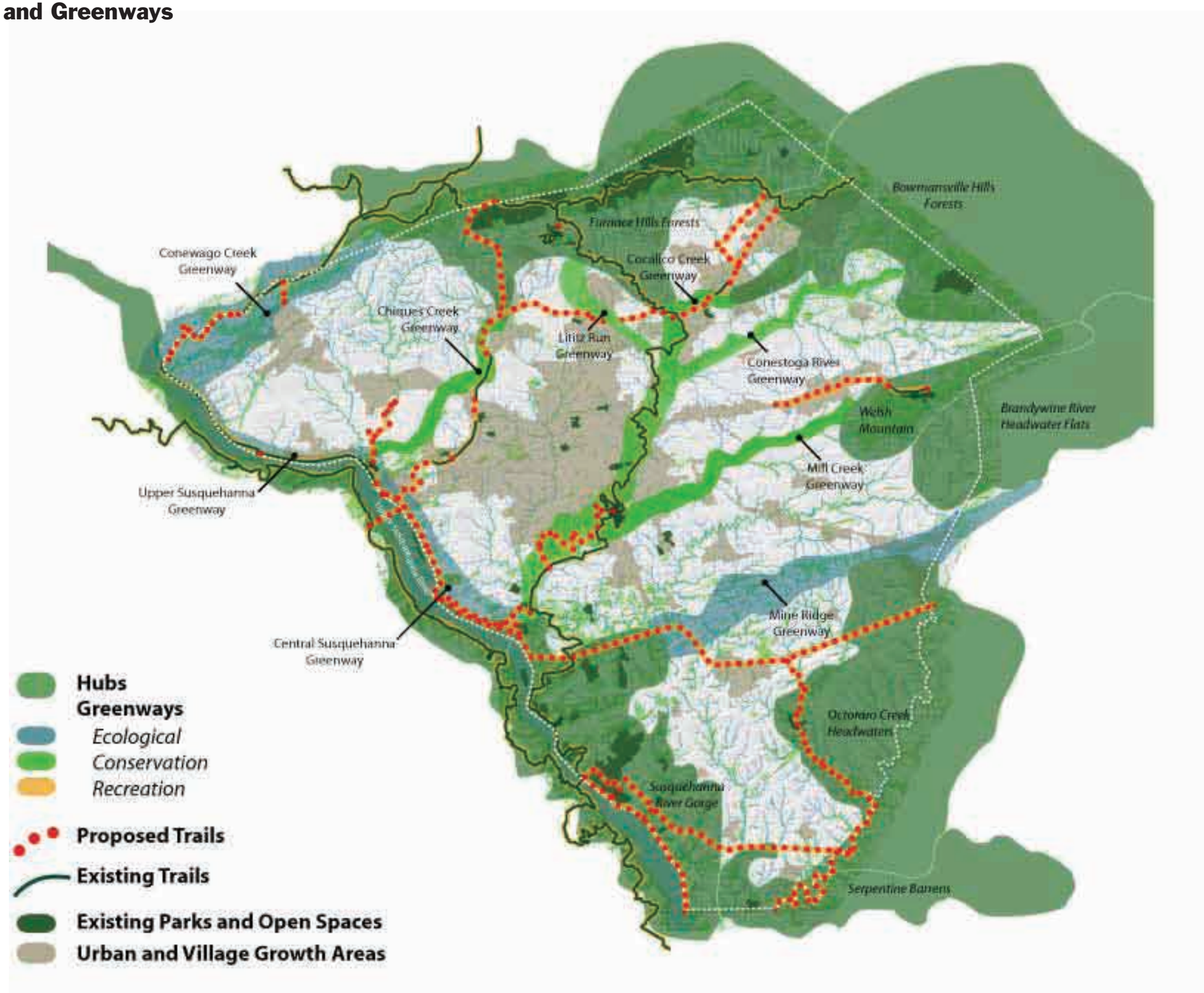


**Figure 31 - Hubs and Greenways**



cal restoration include low quality streams and riparian buffers, low quality natural communities, priority restoration habitat areas, and areas that could be potentially established as forest corridors. Efforts to heal the County's landscapes should focus on these areas, which are described in Chapter 2.0 and shown as a composite layer on Figure 28. It should be noted that incorporation of green elements such as street trees, parks and gardens, green roofs, etc. into the built environment is an important aspect of the restoration goal that cannot be mapped at a countywide scale and thus is not illustrated on Figure 28.

- **Goal 4: Recreation**
  *Enhance the quality-of-life of residents through the provision of a diversity of easily accessible outdoor recreation opportunities and experiences.*
  The availability of quality outdoor recreation experiences is paramount to a high quality of life for Lancastrians. The County's open space resources – whether resource-based, passive recreational opportunities on lands owned by the Commonwealth of Pennsylvania, Lancaster County, and Lancaster County Conservancy or active recreational opportunities on municipal and school district lands – should be thought of as a system or network that needs to be carefully planned and connected throughout the landscape. These outdoor recreational resources include trails; state, county, and municipal parks; and other types of recreation and open space lands such as school district facilities, state game lands, land owned by the Lancaster County Conservancy, and lands managed by utility companies as natural open space. These various types of resources are described in Chapter 2.0 and shown as a composite layer on Figure 29. Figure 29 illustrates a countywide trail system consisting of existing and proposed trails. The proposed trail segments are described in detail in Appendix C. While only existing county and municipal parks are shown on Figure 29, additional parkland should be added to the system through county and municipal actions to meet the standards of 5 acres of regional (county) parkland and 10 acres of municipal parkland per 1,000 residents.

Figure 30 combines the four categories of resources identified above into a complete green infrastructure system concept map depicting exceptional natural resources to be preserved, natural resources to be conserved, degraded natural resources to be restored, and existing and proposed publicly accessible recreational resources.

## 3.3 The Structure: Green Infrastructure System Components

The green infrastructure system is not intended to be separate and isolated from land uses such as residential or commercial development and agriculture, but rather to be integrated into the fabric of the County in multiple forms and at multiple scales. In addition to the spatial array of resource types shown in Figure 31, this system can be conceptualized in terms of four basic structural components or "building blocks":

- Hubs
- Greenways
- Nodes
- Links

The largest scale components of the system, **hubs and greenways** establish the countywide framework for the green infrastructure system. Figure 31 shows the locations of these major system components in diagrammatic fashion, generalized from the Green Infrastructure Concept Map. **Nodes and links** are smaller components of the system (e.g., small parks or woodlots; local trails or stream corridors) found at the intermediate to local scales throughout the County. They should be identified and mapped at the multi-municipal and municipal levels within the countywide framework set by Greenscapes.

Given the intent to integrate the green infrastructure system into the overall fabric of Lancaster County, its four basic structural components – hubs, greenways, nodes, and links – need to be considered not only as individual elements, but also in relation to the larger context in which they occur. Therefore, a fifth structural component of the green infrastructure system has been identified: **landscapes** are the broad patterns of human settlement and use within which hubs,

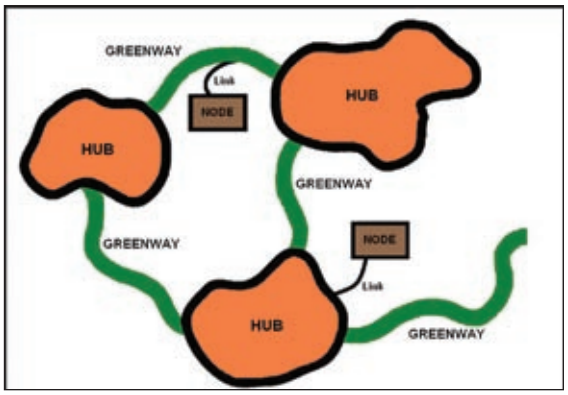
greenways, nodes, and links are located. Hubs and greenways, nodes and links, and landscapes are described in more detail below in Sections 3.3.1, 3.3.2, and 3.3.3, respectively.

### 3.3.1 Hubs and Greenways

**Hubs**

Hubs are large areas that contain Lancaster County's greatest concentrations of the exceptional natural resources illustrated on Figure 31, along with support or buffer areas that directly contribute to the health of these resources. Hubs are mostly located around the periphery of the County, where they extend into adjacent counties. While their primary value and function is to preserve natural resources and provide ecological services, hubs can also support passive recreational activities (e.g., hiking, nature observation, hunting, and fishing) and sustainable resource-based economic activities (e.g., sustainable forestry). These activities should be managed to maintain natural carrying capacity and avoid impacts on sensitive resources (e.g., species of concern habitat). The following green infrastructure hubs (listed alphabetically) are shown on Figure 31:

***Bowmansville Hills Forests:*** The forested hills and rich stream valleys of this northeast hub straddle the border of Lancaster and Berks Counties and include numerous interior forest blocks. The area hosts the 598 acre State Game Lands 52. Creeks originating in the forested landscape feed the Conestoga River and Cocalico Creek in Lancaster County as well as the Schuylkill River in Berks County. The floodplains and wetlands associated with the many streams that meander through the hub provide important habitat for numerous native plant and animal species. These species include species of concern located in ten Natural Heritage Areas identified in the 2007 Lancaster County Natural Heritage Inventory Update.[1] Many of these species are shared with or occur completely within Berks County. The




**Connecting various ecological components in the landscape will help rare, threatened, and endangered species survive by enabling them to migrate and diversify the gene pool.**

streams originating from the forested hills are of high quality, but become quickly degraded as they progress through downstream agricultural and urban landscapes. Preservation of high quality creeks and restoration of floodplain and wetland habitats on all lower quality creeks should be a priority activity within this hub. In addition, the connectivity of natural habitats, especially intact forests and riparian corridors, should be preserved and enhanced.

***Brandywine River Headwater Flats:*** This hub is located primarily in Chester County, but encompasses similar habitat in eastern Lancaster County where the streams draining south from Welsh Mountain meander across the relatively flat valley of the Pequea Creek watershed. There are no major parks or regional preserves in this area of the county. The predominantly agricultural landscape also contains considerable forested habitats, primarily in Chester County. The forests and other natural environments provide essential habitat for many native plants and animals as well as a key connection in a potential migratory pathway from the Bowmansville Hills Forests though Welsh Mountain to the Octoraro Creek Headwaters Hub. The meandering stream floodplains also provide essential habitat for several species of concern in six Natural Heritage Areas extending into Chester County. Riparian restoration of floodplain and wetland habitats should be a priority activity within this hub.

***Furnace Hills Forests:*** The northern expanse of woodlands between Lancaster and Lebanon Counties referred to as the Furnace Hills contains the largest expanse of forested habitats and

1 Natural Heritage Areas support species of concern (plants and/or animals considered rare, threatened or endangered at state or federal levels) that occur singly or in overlapping or adjacent habitats. (Pennsylvania Natural Heritage Program, A Natural Heritage Inventory of Lancaster County, Pennsylvania, Update 2007.)

most significant interior forest blocks remaining in Lancaster. The area also contains the largest amount of natural lands preserved in the county. Approximately 8,500 acres of natural lands, comprised primarily of state game lands, have been permanently protected in this hub. The hub also contains the 415 acre Speedwell forge County Park. This area provides substantial habitat and potential migratory pathways for a wide variety of native plants and animals, including a number of species of concern in ten Natural Heritage Areas. The nearly uninterrupted forested landscape provides a link to similar habitats in Lebanon and Berks Counties. In portions of the forest, the lack of understory recruitment of native trees and shrubs and a visible browse line suggests that action needs to be taken to reduce the deer herd. Invasive species of shrubs and trees dominate the understory in other locations, indicating a need for silvicultural restoration to improve future forest stands.

The Furnace Hills Forest hub encompasses a portion of a critical aquifer recharge area in northern Lancaster County that was evaluated by the Susquehanna River Basin in partnership with the Lancaster County Conservation District.[2] Included in this hub are the headwaters of Chiques Creek, Cocalico Creek and Middle Creek, which provide essential habitat for common native species as well as several species of concern. The Furnace Hills Forests Hub supports a large concentration of the highest quality streams in Lancaster County. However, the water quality of these streams decreases as they traverse agricultural and urban landscapes towards the Susquehanna River. Riparian restoration of floodplain and wetland habitats should be a priority activity within the southern portion of this hub.

***Octoraro Creek Headwaters:*** Octoraro Creek forms the boundary between Lancaster and Chester Counties. Many branches of the creek meander across wide floodplains that have been used for pasture and hay crops. Portions of the floodplain have been revegetated by characteristic floodplain plant communities – primarily on the Chester County side of the creek – while the Lancaster County side remains mostly in active agricultural production. Floodplains with native vegetation provide habitat for a variety of plants and animals as well as a potential natural migratory pathway from Chester County through Welsh Mountain south to Maryland. Riparian restoration of floodplain and wetland habitats should be a priority activity within this hub. Very little of the natural landscape has been preserved in this hub. The County's Ted Parker III Natural Area and State Game Lands 136 are the only two areas of significant size that have been preserved.

***Serpentine Barrens:*** This southern hub supports a mixture of agricultural and rural residential uses with scattered woodlots and outcrops of serpentine bedrock that are among the most globally important habitats in Pennsylvania. The serpentine habitats are part of a series of terrestrial habitat "islands" (isolated patches of bedrock) located in southern Lancaster and Chester Counties and adjacent areas of Maryland that should be thought of as a single system. They contain a very high concentration of plant and insect species of concern found in ten Natural Heritage Areas identified in the 2007 Lancaster County Natural Heritage Inventory Update. The Lancaster County Conservancy's Rock Springs Nature Preserve is the only natural area permanently preserved within this hub.

The plants that characterize the serpentine barren habitats are adapted to the dry, nutrient poor soils and periodic fire events and require active management (e.g., prescribed burns) to prevent succession to woodlands. Protection of the core habitat areas and management of the surrounding landscape context is needed to ensure the future of these globally rare habitats. Natural corridors between the barrens should be established to allow genetic flow between isolated species populations. The landscape context may be best maintained in an agricultural or rural setting. Residential development near or between the barrens should be strongly discouraged.

***Susquehanna River Gorge:*** This large hub in the southwest part of the county is known locally as the "River Hills." It includes the area along the Susquehanna River between the mouth of the Conestoga River at Safe Harbor and the Mary-

2 Robert E. Edwards and Robert D. Pody, Northern Lancaster County Groundwater Study: A Resource Evaluation of the Manheim-Lititz and Ephrata Area Groundwater Basins, September 21, 2005

land border. Because it is characterized by steep, hilly topography and is mostly unsuitable for agricultural uses, this area has retained much of its natural forested character despite being repeatedly logged in the past. It contains 16 Natural Heritage Areas with numerous species of concern and also provides a wide natural habitat corridor that provides a vital link in the regional migratory pathway. Many of the cool, moist ravines provide habitat for an impressive suite of spring wildflowers, drawing tourists to Shenks Ferry and other destinations during the peak spring blooming season. Numerous species of concern also occur within the forested habitats of the ravines. The streams flowing though the forested ravines of this area are considered to have some of the most intact riparian buffers in Lancaster County.

In addition to the Susquehanna River Gorge's forested ravines, the river, its floodplain, and associated islands provide ample habitat for a wide array of native plants and animals. The deep water behind Holtwood Dam is a popular recreational boating area. The Susquehanna River below Holtwood Dam is one of Pennsylvania's most unusual and picturesque riverine landscapes with islands and exposed bedrock that support many plant species that are uncommon in Pennsylvania.

This hub contains a number of nature preserves owned by the Lancaster County Conservancy and a large passive park owned by Martic Township. However, unlike the Furnace Hill Hub, the preserves are smaller and scattered throughout the landscape. There are also several large utility owned parks in this hub. While open to the public, these areas are not permanently protected.

***Upper Susquehanna River:*** The Upper Susquehanna River Hub includes the section of the Susquehanna River between the Dauphin County border at Conewago Creek and the mouth of the Conestoga River at Safe Harbor Dam. Sections of the river are popular recreational boating destinations due to the deep water created by the York Haven and Safe Harbor dams. This area also contains many significant riverine habitats, including eight Natural Heritage Areas, and functions as an important migratory corridor for many birds and fish. Most of the existing natural habitat is within the river or its floodplain and associated islands, which support a wide variety of native plants and animals including several species of concern. The Susquehanna River is subject to extreme seasonal water level fluctuations; the natural disturbances of flooding and drying, along with seasonal ice scour, help maintain the unique habitats associated with the river. The natural disturbance cycle also creates conditions favorable for the establishment of invasive species of plants, which frequently dominate the shoreline of the river.

There are several large parks in this hub that have helped secure the protection of natural resources in the riparian areas of this corridor. Chickies Rock County Park (422 acres) in West Hempfield and Riverfront Park (238 acres) in East Donegal are two of the largest parks in this hub. The Northwest River Trail--a narrow linear corridor of open space from Marietta to the Dauphin County line—has been protected for the development of a 14-mile multipurpose recreation trail that generally follows the route of the historic PA Mainline Canal.

Recently improved fish ladders on the three major dams on the Susquehanna River in Lancaster County have helped to alleviate formerly impassable barriers to migratory fishes that live in salt water and migrate to freshwater habitats to spawn. However, the American eel, which lives in fresh water but breeds in the ocean, has not benefited from the current fish ladder designs. The American eel may be an important link in the

**The American Eel--once a staple of Native Americans and early settlers in Lancaster County--no longer exists in the aquatic habitat of the Susquehanna River due to a number of factors including the presence of hydroelectric dams blocking traditional migratory routes.**

lifecycle of several native freshwater mussel species, so an improvement in eel migratory routes may help improve freshwater mussel populations as well.

***Welsh Mountain:*** The hilly topography of the Welsh Mountains in eastern Lancaster County supports extensive forests with several significant interior forest blocks. The forested landscape provides essential habitat and migratory potential for a wide variety of native plants and animals, including several species of concern located in a Natural Heritage Area identified in the 2008 Lancaster County Natural Heritage Inventory Update. Streams draining from Welsh Mountain flow to the Conestoga River, Mill Creek, and Pequea Creek. Most of Welsh Mountain is relatively undisturbed forest; however, several roads and numerous rural residences fragment the tree canopy. The hub includes Lancaster County's 381 acre Money Rocks Park. Over 800 acres of additional natural lands owned by the New Holland Borough Authority as watershed protection for the New Holland Reservoir are currently being acquired by the Lancaster County Conservancy.

**Greenways**

Greenways are linear "ribbons" that provide the major, countywide connections in the County's green infrastructure system. They run between and through green infrastructure hubs and connect the hubs to the interior of Lancaster County and its major population centers, as well as to greenways in adjacent counties. Greenways generally correspond to major river and stream corridors (including adjoining natural resource areas such as floodplain, riparian vegetation, and steep slopes), although they may also follow upland features such as ridgelines.

Greenways provide a variety of benefits, such as:

- Protection of water quality (filtering sediment, nutrients, and pollutants from runoff)
- Streambank stabilization (erosion protection during high water events)
- Storage of floodwaters
- Habitat for aquatic and terrestrial organisms (including species of concern)
- Migration pathways for native plants and animals (including species of concern)
- Aquatic ecosystem services such as shading, cooling, and providing food (leaf litter) for organisms
- Scenic value
- Recreational and educational opportunities

The functions and benefits of individual greenways vary based upon context. For example, the primary function of the largest greenways with the greatest concentration of natural resources is to preserve those resources and provide ecological services. These greenways should be as wide as possible to protect natural resources, provide interior habitat for species of concern such as neotropical songbirds, and support plant and animal migration. Like the County's green infrastructure hubs (with which they overlap), they can support passive recreational activities managed to maintain natural carrying capacity and avoid impacts on sensitive resources.

At the other end of the spectrum, greenways in Designated Growth Areas are typically limited in width due to surrounding development. Where possible, they should integrate ecological and recreational values through riparian buffers that protect water quality and wetlands while accommodating multi-use trails accessible to the surrounding population. Conversely, public access to greenways in working agricultural landscapes should be limited, although linear resources such as rail trails that can accommodate public access without interfering with the agricultural economy and way of life of the adjacent farm community should be permitted. In general, greenways in these areas should be managed to reestablish natural riparian buffers and reduce the water quality impacts of agricultural practices.

While greenways can provide multiple benefits, the proposed network of primary greenways shown on Figure 31 has been divided into three categories based upon primary function:

- **Ecological Greenways** provide critical habitat corridors for the movement of plant and animal species.
- **Conservation Greenways** promote the protection and restoration of riparian habitat along river and stream corridors, particularly in agricultural areas and

**What is a Riparian Buffer?**

A riparian buffer is the area adjacent to a stream bank that is inhabited by native trees, shrubs, and other types of vegetation. Riparian buffers offer countless benefits to the adjacent stream, the quality of water in the stream, and the aquatic species living in it. For example, riparian buffers help to improve water quality by filtering pollutants such as pesticides, sediment, nitrogen, and phosphorus contained in runoff from agricultural land. The roots of riparian vegetation hold soil in place, preventing stream bank erosion and sediment from entering the stream. Riparian buffers are most productive when they are allowed to grow freely with native vegetation, creating valuable wildlife habitat. They also provide areas for streams to overflow their banks during times of high water. This recharges groundwater and reduces the potential for flooding downstream by allowing the high water to dissipate naturally.

areas with urban or suburban development. Public access is typically restricted.

- **Recreational Greenways** promote public access and use along linear features such as major river corridors, abandoned rail lines, and canal towpaths.

Several greenways in Lancaster County have been designated as "Major Greenways" by the Pennsylvania Department of Environmental Conservation (DCNR) and are included in the County's greenway network.[3] These greenways are the Susquehanna Greenway, the Lower Susquehanna River Water Trail, the Horseshoe Trail, and the Conestoga Trail. The Susquehanna Greenway and Lower Susquehanna River Water Trail are part of a statewide greenway extending along the Susquehanna River from New York to Maryland, where it connects to a greenway initiative in Maryland. The Horseshoe Trail and Conestoga Trail provide important recreational connections from adjacent counties through the interior of Lancaster County.

The following greenways (listed alphabetically) are shown on Figure 31:

***Central Susquehanna Forested Greenway/Upper Susquehanna Forested Greenway:*** These proposed Ecological Greenways comprise the terrestrial (upland) corridor associated with the Upper Susquehanna River Hub described above. Because the lands have been largely converted to agricultural, urban, and suburban uses, they currently have minimal natural habitat outside of the vegetation located in the narrow area between the river bank and the railroad tracks that parallel the river. Therefore, in their present condition they provide little opportunity for the migration of native species that rely on upland habitat. By contrast, the Susquehanna River provides an excellent migration corridor for species that can use the aquatic habitat, and the Susquehanna River Gorge Hub to the south contains ample habitat for resident and migrating species. Expanding the upland natural habitat along the length of the Susquehanna River between the Conewago Creek and the Conestoga River should be considered a restoration priority to help improve a vital link in this important regional migratory pathway. The expanded greenway would also provide outdoor recreational opportunities and connect municipalities along the river through existing and proposed trails. It is a key linkage in the state-designated Susquehanna Greenway.

***Chiques Creek Greenway:*** The Chiques Creek Greenway follows Chiques Creek from Manheim Borough to the Susquehanna River. This proposed Conservation Greenway currently has only fragments of natural habitat along the creek, its floodplain, and associated uplands. The many branches and tributaries of Chiques Creek originate in the Furnace Hills, where they are considered among the best quality streams in the County, but the water quality decreases as Chiques Creek flows towards the Susquehanna River. Restoration of floodplain, wetland, and upland forest habitats should be a priority activity along the entire length of Chiques Creek. The restored habitat would help provide suitable habitat for plants and animals, improve the water quality of Chiques Creek, and provide a natural

3 As defined by DCNR, a Major Greenway is 50 miles or more in length, passes through two or more counties, and is recognized in an official planning document.

connection between the Furnace Hills and the Susquehanna River though a predominantly agricultural and urban landscape.

***Cocalico Creek Greenway:*** The Cocalico Creek Greenway is a key linkage connecting the Furnace Hills Forests and Bowmansville Hills Forests Hubs to the Conestoga River Greenway and Susquehanna River. This proposed Conservation Greenway could incorporate undeveloped and underutilized land in around Ephrata Borough and surrounding suburban areas, including the Cocalico Creek floodplain. Cocalico Creek and its associated floodplain and upland areas currently have only fragments of natural habitat. Riparian restoration would provide additional habitat for plants and animals, improve water quality, and create a local migratory corridor though a predominantly agricultural and urban landscape. Recreational opportunities could be provided for local communities, as compatible with establishing viable natural habitat.

***Conestoga River Greenway:*** The Conestoga River is a proposed Conservation Greenway that is also a state-designated "Major Greenway" containing Lancaster County's longest continuous trail, the Conestoga Trail. The greenway includes numerous fragments of natural habitat along its length from its headwaters in the Bowmansville Hills Forests Hub to the confluence with the Susquehanna River. These fragments include forested uplands where the creek is flanked by steep slopes and wide floodplain areas that occur intermittently along the meandering course of the river. The Conestoga River passes though southern Lancaster City, creating a potential barrier for animals using the river corridor as a migratory pathway. Upstream and downstream of Lancaster City, the surrounding landscape consists primarily of agriculture, rural residential development, and newer suburban development. By combining preservation of the remaining fragments with restoration of additional floodplain, wetland, and upland forest areas along the river and its tributaries, the Conestoga River could become a significant habitat corridor through Lancaster County to the Susquehanna. This restoration would provide additional habitat for plants and animals, improve water quality, and create a migratory corridor though the predominantly agricultural and urban landscape. Habitat

**Linear open spaces (or Greenways) such as this along the Pequea Creek, serve as habitat for migratory animal species; filters stormwater before it enters the stream; and provides open space for recreation.**

restoration could also provide an opportunity to expand recreational opportunities associated with the existing trail, serving communities along the length of the Conestoga River, as compatible with establishing viable natural habitat. The Conestoga Greenways River Corridor Conservation Plan, published by the Lancaster Inter-Municipal Committee (LIMC) in 1999, provides strategies to develop greenways along sections of the Conestoga River, Little Conestoga Creek, and the West Branch of the Little Conestoga Creek in central Lancaster County.

***Conewago Creek Greenway:*** The Conewago Creek Greenway is a proposed Ecological Greenway located between the Pennsylvania Turnpike and the Susquehanna River. The creek, stream banks, and adjacent vegetated upland areas provide habitat for a variety of native plants and animals, including several species of concern located in two Natural Heritage Areas. The greenway contains numerous patches of natural habitat, including several blocks of interior forest that form a "stepping stone" connection between the Furnace Hills Forests and the Upper Susquehanna River Hubs. Most of the forested habitat of this greenway occurs on thin soils over diabase bedrock that are not suitable for agricultural uses, so much of the area has remained forested. The Conewago Creek floodplain contains lesser amounts of natural habitat and should be considered a priority for riparian restoration.

***Lititz Run Greenway:*** The Lititz Run Greenway is a proposed Conservation Greenway that follows the stream corridor and incorporates its

tributaries to the northeast. The headwaters of Lititz Run are primarily agricultural lands in the northwest part of the watershed. One species of concern has been documented at the cave openings of a spring that emanates from limestone bedrock in a park in Lititz Borough. The watershed incorporates all of Lititz Borough and the surrounding designated growth area in Warwick Township. The much-heralded Lititz Run has been the focus of a public-private restoration initiative for the past 20-years. Stream restoration initiatives in the corridor include riparian buffers, dam removal, agricultural best management practices BMPs), floodplain restoration (including legacy sediment removal), and several wetland rehabilitation projects. Continued focus on BMPs, in the headwaters of the watershed, urban greening efforts in the designated growth area, and floodplain restoration will help continue the significant gains in water quality already achieved.

***Mill Creek Greenway:*** Mill Creek is a proposed Conservation Greenway connecting the Welsh Mountain Hub with the Conestoga River Greenway and the Susquehanna. Like the other potential greenways, Mill Creek flows through a landscape dominated by agriculture, rural residences, and suburban developments and currently has only scattered fragments of natural habitats. With a combination of preservation of the fragments remaining and restoration of floodplain, wetland and upland forest habitats, Mill Creek could become a significant habitat connector through the county to the Susquehanna River. Restoration of floodplain, wetland and upland forest habitats should be a priority activity along the entire length of Mill Creek and its tributaries to improve water quality and create a significant habitat corridor across the County.

**Trails can provide educational opportunities if they are paired with interpretive resources, such as this wayside panel along the Heritage Path in Chickies Rock County Park.**

***Mine Ridge Greenway:*** The Mine Ridge Greenway is a proposed Ecological Greenway that follows a ridgeline of undulating hills that runs east-west across the southern part of Lancaster County and supports a significant series of upland forested habitats. The hilly topography and thin soils over quartzite bedrock are the likely factors that have kept the land out of agricultural production. Despite several significant interruptions, particularly in the vicinity of Route 222, the forested ridgeline makes a natural migratory pathway between the Lancaster / Chester county line and the Susquehanna River. Restoration of natural habitats along the floodplains of Big Beaver Creek and Little Beaver Creek could help provide the missing connections. By combining preservation of the forested ridgeline with restoration of floodplain and wetland habitats, Mine Ridge could become a significant habitat connector across southern Lancaster County.

### 3.3.2 Nodes and Links

The hubs and greenways are the largest components of Lancaster County's green infrastructure system and can be mapped at a countywide scale. Other existing and potential components of the system exist at a more local scale throughout rural, suburban, and urban parts of the County, where they can be identified and mapped through municipal and multi-municipal planning efforts within the countywide framework set by Greenscapes. They take a variety of forms and can perform a variety of functions, but are generally classified as **nodes** (local green infrastructure resources) and **links** (linear green infrastructure connections).

**Nodes** range from localized and sometimes isolated occurrences of natural resources (e.g., woodland, wetlands, steep slope areas with natural vegetation, and species of concern habitat) to "managed" landscape features in more urban settings (e.g., parks, other "green" open spaces, and vegetated stormwater management areas). Nodes can provide a variety of benefits, such as

water and air quality improvement, stormwater management, wildlife habitat, and recreation. While they can occur as isolated sites within surrounding agricultural or urban landscapes, their value to the green infrastructure system is enhanced when they are connected by greenways or links.

**Links** are smaller scale, linear components of the green infrastructure system that include both natural features (e.g., small stream corridors) and man-made feature (e.g., trails within rights-of-way). Similar to nodes they provide a variety of benefits ranging from water quality protection and stormwater management to recreation, with an emphasis on connectivity. A promising type of green infrastructure link for Lancaster County's urban and suburban areas is the "green street," a concept that has been developed in cities such as Portland and Seattle. Green streets typically integrate the following:

- Stormwater management such as vegetated swales and bioretention areas within the right-of-way, thus reducing the need for piped infrastructure
- Canopy trees that intercept rainwater, improve air quality, and cool the temperature
- Safe connections for bicyclists and pedestrians

Hedgerows – linear strips of trees, shrubs, and herbaceous plants along field borders – are an example of a link in rural parts of Lancaster County. Hedgerows provide wildlife habitat, reduce stormwater runoff and soil erosion, decrease wind damage, and provide opportunities for diversified income from farming operations.

### 3.3.3 Landscapes

Landscape is a word with rich and varied meanings. The traditional definition of the term relates to its visual or scenic qualities (e.g., "an expanse of scenery that can be seen in a single view"). Another definition relates to natural elements such as landforms or rivers that characterize a region. Two such regional landscapes designated by multi-state or state programs occur in Lancaster County:

**What is a Landscape?**

A Landscape is generally defined as a geographic region where the interaction of people and nature over time has produced an area of recognizable character with distinct aesthetic, ecological, and cultural values. The relationship of people and the land and natural resources they use to sustain them shapes the landscape and, in turn, the landscape shapes the people living in it--their settlement patterns, buildings, livelihoods, products, cultural practices and beliefs. Therefore, landscapes encompass the past and the present and include both tangible and intangible heritage elements. These landscapes can range from those that are primarily natural in character to those that have an emphasis in cultural distinctiveness.

While it is nearly impossible to find a landscape in today's world that hasn't had some human influence, there are still places that are very rich in biodiversity and other natural values. Here in Lancaster County, the Susquehanna River Gorge, the Furnace Hills, and the Welsh Mountains all exhibit this type of character. These are working landscapes that still contain a high level of biological diversity and important natural, cultural, and recreational resources. Other areas of the County illustrate a more dominant cultural influence on the landscape, such as the Mill Creek Valley in eastern Lancaster County where the Amish and Plain Sect communities practice their agrarian way of life.

The landscapes of present day Lancaster County are appreciated by residents and millions of visitors alike each year. These landscapes have been inherited from the past and reveal the relationships that people have had with their surroundings over time. As stewards of these living working landscapes, it is this generation's responsibility to help conserve and preserve these dynamic and highly complex resources for the future as models of sustainable land use and development.

- The Furnace Hills Forests and Welsh Mountains Hubs are part of the **Highlands Region,** a large geographic area of forested mountains and hills extending from northwestern Connecticut through New York, New Jersey, and Pennsylvania to the Maryland state line. The Highlands was recognized by the Highlands Conservation Act, signed by President Bush in 2004.

- The **Susquehanna River Corridor** in Lancaster County, which includes the Susquehanna River Gorge and Upper Susquehanna River Hubs, is part of the Susquehanna Greenway designated by the Commonwealth of Pennsylvania. It is also part of a river system that originates in upstate New York, flows through Pennsylvania and Maryland, and empties into the Chesapeake Bay, one of the world's great estuaries.

The Highlands and the Susquehanna have been designated by the Pennsylvania Department of Conservation and Natural Resources as two of only five "Mega-Greenways" within the Commonwealth. In addition, the lower Susquehanna River corridor has recently been recognized by DCNR as a Conservation Landscape Initiative (CLI). The CLI recognition is given to landscapes with state-significant natural resources and character. The CLI designation is a holistic planning approach that enables DCNR to focus both technical and financial resources in specific regions to preserve the characteristics that make them distinct.

While the Highlands and the Susquehanna River Corridor are major resources that provide a regional context for a significant part of Lancaster County's green infrastructure, a more holistic definition of landscape is needed that applies across the County. For the purposes of Greenscapes, **landscapes** are defined as the broad physical patterns of human settlement, land use, and resource conservation within which the core components of the green infrastructure system – hubs, greenways, nodes, and links – occur. At the broadest level, these landscapes are the Urban and Village Growth Areas and the Rural Areas defined by the Growth Management Element of the Lancaster County Comprehensive Plan. The Growth Management Framework Map further breaks down Rural Areas into three designations (Agricultural Areas, Agricultural with Natural Areas, and Natural Areas) based on mapping of key resource and land use factors.

Achieving the vision of a healthy green infrastructure system in Lancaster County depends not only on establishing the core hubs, greenways, nodes, and links, but also on managing the surrounding urban and rural landscapes to sustain green infrastructure functions and values. This means taking action at the landscape level to preserve and enhance the core components (e.g., riparian reforestation along stream corridor greenways and links in urban or agricultural landscapes to improve water quality). It also means integrating green infrastructure directly into the landscape fabric. In rural areas, this could mean approaches such as sustainable forestry or agriculture and improving wildlife habitat on farmland. In urban areas, it could mean approaches such as green roofs, canopy tree plantings, and backyard habitat.