~~2025~~ Environmental Corridors Report

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01 About This Report

Key Terms and Concepts

[infographic]

Environmental Corridors

Generally contiguous systems of open space and environmentally sensitive areas within urban service areas that are protected from development.

Estimated Environmental Corridors

Preliminary estimates of lands that would be required to be designated as Environmental Corridor if brought into an urban service area.

Voluntary Environmental Corridors

Lands that provide important benefits to the region but do not have legal protection from development or disturbance, such as old-growth woodlands. Recommended for voluntary inclusion in Environmental Corridors.

Urban Service Areas

Lands intended for urban development. Located in and around existing communities with the capacity to provide a full range of urban services.

**Dane County uses an alternative set of terms for open space planning elements. See Appendix B for details.*

Introduction

Environmental Corridors are contiguous systems of open space and natural areas in places that are otherwise urbanized or planned for urban development. These corridors include environmentally sensitive lands, natural and cultural resources requiring protection from disturbance and development, and lands needed for open space, stormwater management, and recreational use. Together, Environmental Corridors form a network of concentrated natural resources that are generally connected by open space and protected from urban development.

Environmental Corridors have been mapped for all Urban and Limited Service Areas in Dane County. Corridor boundaries are continually revised, updated, and expanded based on best available information and Urban Service Areas amendments.

Corridor delineation is based mainly on the locations of drainageways and stream channels, floodplains, wetlands, riparian steep slopes, and other significant natural resource features, as well as public parks and conservation and stormwater management areas. Working with local units of government, Capital Area Regional Planning Commission (CARPC) staff use various analytical tools

and datasets to delineate the corridors. The resulting corridor boundaries are then used to identify areas appropriate for urban development.

Areas beyond the boundaries of Urban Service Areas have been analyzed using similar methods and are mapped as **Estimated Environmental Corridors** and **Voluntary Environmental Corridors** (formerly referred to as Protection and Stewardship Areas, respectively, in the 2050 Regional Development Framework). Estimated and Voluntary Environmental Corridor boundaries can also be used to identify areas for future development.

Why We Define Corridors

Establishing Environmental Corridors and Estimated Environmental Corridors protects and preserves certain cultural resources and natural areas, such as wetlands, floodplains, riparian steep slopes, and other environmentally sensitive areas that would impair surface or groundwater quality if disturbed or developed. These natural areas can then~~, in turn,~~ protect and even improve the quality of our water resources by reducing and filtering nonpoint source pollution, reducing erosion and sedimentation, and preserving natural drainage ways. Preserving Voluntary Environmental Corridors can further enhance ~~protected~~ natural areas by safeguarding resources that do not have legal protection from development or disturbance.

Although the primary purpose of corridor planning is to preserve environmentally sensitive areas, the resulting corridors are also well suited to popular recreational activities that require trail development, such as hiking, biking, and cross-country skiing. Other urban open space and recreational uses like parks, sports fields, golf, and disc golf courses are also typically compatible with environmentally sensitive areas. In this way, Environmental Corridors play a major role in community and regional open space planning.

Voluntary Environmental Corridors like the Ice Age Trail Corridor provide additional recreational amenities. Achieving the continuity needed for trail development also provides valuable wildlife habitat that facilitates migration and movement. By incorporating Environmental Corridors and Voluntary Environmental Corridors into community and regional plans, communities can efficiently and effectively address the ~~multiple~~ interconnected concerns of managing drainage and stormwater ~~management~~, protecting water quality, providing recreational and open space, and preserving habitat ~~preservation~~ in a holistic manner.

Report Overview

This report updates and expands on existing environmental corridors information and introduces the new concepts of Estimated and Voluntary Environmental Corridors. This report will become a formal amendment to the *Dane County Water Quality Plan*, superseding previous Environmental Corridors Reports.

Chapter 02 provides the background of the regional open space planning framework as well as the general functions and values of open space. Chapter 03 describes the specific elements that make up Environmental Corridors and Voluntary Environmental Corridors and how their functions and values contribute to the regional ecosystem. Chapter 04 explains the role of CARPC and local communities in implementing open space planning, along with detailed corridor mapping procedures and the processes for updating Environmental Corridors.

The appendices of this report summarize previous and existing plans (Appendix A), catalog various terms used by CARPC and Dane County in open space planning efforts (Appendix B), and describe procedures for protection of Environmental Corridors (Appendix C). The adopted Policies and Criteria for Environmental Corridors (Appendix D), the Environmental Corridors Fact Sheet (Appendix E), and links to the GIS datasets used for Environmental Corridor mapping (Appendix F) are also attached to the main report.

About the Capital Area RPC

The Capital Area Regional Planning Commission (CARPC) is one of nine regional planning commissions (RPCs) in Wisconsin. Local communities establish RPCs to address issues that go beyond municipal boundaries. As an independent unit of government, CARPC develops and promotes regional plans, provides objective information, and supports local planning efforts. CARPC's planning region includes the cities, towns, and villages in Dane County.

OUR MISSION

To strengthen the region by engaging communities through planning, collaboration, and assistance.

OUR VISION

A region where communities create exceptional quality of life for all by working together to solve regional challenges

OUR ACTIVITIES

- Bringing communities together to collaborate on land use and water quality plans
- Developing a long-range Regional Development Framework that looks ahead 20-30 years
- Administering a regional Water Quality Management Planning Program for the WDNR
- Conducting watershed and future urban development planning
- Providing planning, mapping, and data assistance to local communities

02 Regional Open Space Framework

Protecting Open Space in Dane County

This chapter discusses the brief history of human settlement and open space planning in the Dane County region. It also outlines the role of environmental corridors as an element of the total open space system and reviews the seven primary functions of open space systems.

Historical Land Use in the Dane County Region

Humans have settled along the shores of *Waaksikhomikra*, the Ho-Chunk language name for Lake Mendota, for the last 12,000 years. For most of this history, oak savannas and wetlands were the primary land cover. The Ho-Chunk people took a balanced approach to land use, settling in permanent villages, cultivating crops in large gardens, fishing rivers and lakes, participating in communal bison hunts on prairies to the southwest, and for the most part, leaving natural resources intact. *Teejop* (the Ho- Chunk language name for Madison, meaning Four Lakes) was also the center of mound building culture, with thousands of mounds constructed on bluffs and hills or near springs.

Beginning in 1832, resource management in the greater *Teejop* region changed drastically as the U.S. government forcibly removed Native peoples from their ancestral lands. As people of European descent began to occupy the region, they filled wetlands, converted large areas to agriculture, introduced new species, and created large amounts of impervious land covers. These ~~new uses~~changes transformed the landscape to primarily agricultural with urban and rural settlements, often leaving little land in its natural form.

The Evolution of Regional Open Space Planning

In the late 19th and early 20th centuries, the American conservation movement grew out of a reaction to the impacts of rapid development and heavy exploitation of natural resources. While striving to balance a desire to maintain the long-term viability of resource extraction industries, early open space preservation efforts sought to protect unique landscapes, mitigate hazards like erosion and flooding, and connect growing urban populations to nature. During this time, well-known conservationists like Teddy Roosevelt, Bob La Follette, Charles Van Hise, and John Nolen championed open space preservation through the creation of state and national parks and the establishment of legal protections.

The 1960s ushered in a new era for open space planning in Wisconsin when Governor Gaylord Nelson initiated a Statewide Recreation and Open Space Plan (1964). A resource inventory directed by Phil Lewis, Professor of Landscape Architecture at the University of Wisconsin-Madison, served as the Plan's foundation. Lewis's study organized Wisconsin's natural and cultural resources into interconnected recreation and open space corridors, establishing the first statewide delineation of "environmental corridors."

In 1964, Phil Lewis designed the Nine Springs E-Way, an ecological corridor for the southern half of Dane County (Lewis, 1964). Mapping regional landscape patterns of topography, water features,

and wetlands, Lewis identified these resources as major determining factors for future urbanization.

[Photo: City of Middleton trail]

Dane County first established policies for parks and open spaces in the 1971 Plan for Parks and Open Spaces. Since then, policies have evolved through subsequent planning efforts. This evolution reflects a broadening perspective on the value of preserving or protecting open land and natural resources.

CARPC's predecessor, the Dane County Regional Planning Commission (DCRPC), first laid out the concepts of focusing development in areas served by a full range of urban services (i.e., urban service areas) and restricting development in environmentally sensitive areas in a 1973 Regional Land Use Plan. Sewer service area boundaries were first delineated with the adoption of the Dane County Water Quality Plan in 1979. The environmental corridors of the Central Urban Service Area were first mapped and adopted in 1983.

The first Environmental Corridors Report was published in 1984 as a formal component of the Dane County Water Quality Plan. This coincided with the detailed delineation of environmental corridors for other service areas in the county and their adoption by local units of government and DCRPC. The most recent report was updated in 1996. See Appendix A for a summary of previous related plans.

Defining Open Space Corridors

When the Dane County Land Use Plan was originally adopted in 1973, open space corridors were only mapped in a general fashion to outline a countywide system of the most crucial natural resource areas deserving the greatest degree of protection. The open space corridor planning concept for our region has since expanded to include natural resources that don't have legal protection from development or disturbance but still provide important benefits to the region.

Today, CARPC continues this open space corridor planning work through delineation of environmental corridors within the Urban Service Areas of Dane County, and delineation of estimated and voluntary environmental corridors outside of the current urban service areas. Dane County also conducts open space corridor planning outside of the urban service areas through delineation of "resource protection corridors.". These areas have similarities to Estimated and Voluntary Environmental Corridors, as further discussed in this report.

Dane County and CARPC map these similar open space corridor types for slightly different purposes. CARPC maps Environmental Corridors and Estimated Environmental Corridors to identify lands that will most likely require protection from development. Undeveloped lands that lack regulatory protection but are desirable for protection from development are mapped by CARPC as Voluntary Environmental Corridors.

Dane County maps resource protection corridors to generally prohibit non-farm development within them. See definitions below and Appendix B for a comparison of these definitions.

ENVIRONMENTAL CORRIDORS

Environmental Corridors are generally contiguous systems of open space and natural areas within urban service areas, forming a core component of the Dane County Water Quality Plan. These corridors include environmentally sensitive lands, natural and cultural resources requiring protection from disturbance and development, and lands needed for open space, stormwater management, and recreational use. The specific elements and functions of environmental corridors are explained further in Chapter 03.

ESTIMATED ENVIRONMENTAL CORRIDORS

Estimated Environmental Corridors, formerly referred to as protection areas in the 2050 Regional Development Framework, are a preliminary estimate of lands that would likely be designated as environmental corridor if brought into an urban service area.

Estimated Environmental Corridors are mapped based on limited data; therefore the boundaries should be considered approximate. Mapping of streams and wetlands (plus required buffers) is refined as better data becomes available, especially when specific lands are considered for inclusion in an urban service area.

The criteria for designation as an Estimated Environmental Corridor are the same as for the Environmental Corridor designation, per the policies and criteria adopted in the *Dane County Water Quality Plan*. This designation has no regulatory effect in the context of areawide water quality planning prior to consideration for inclusion in the urban service area.

VOLUNTARY ENVIRONMENTAL CORRIDORS

Voluntary Environmental Corridors, formerly referred to as stewardship areas in the 2050 Regional Development Framework, are lands that provide important benefits to the region but do not have legal protection from development or disturbance. Preserving these benefits requires stewardship by landowners and local government, and protection may be achieved through methods such as fee-simple public ownership, dedication to the public, or by conservation easement. These lands are recommended for voluntary inclusion in environmental corridors during urban service area amendments, but lands with this designation are not required to be included under the policies and criteria adopted in the *Dane County Water Quality Plan*.

RESOURCE PROTECTION CORRIDORS

Resource protection corridors is a term used by Dane County Planning & Development to describe areas unsuitable for development due to environmental sensitivity or the presence of fragile, irreplaceable resources as defined and mapped in the Dane County Farmland Preservation Plan and the Dane County Comprehensive Plan.

Resource protection corridors are areas outside of the urban service areas identified in the *Dane County Water Quality Plan*. Together with environmental corridors, resource protection corridors form a continuous open space corridor system throughout the county and its municipalities.

In many instances, mapped resource protection corridors closely align with mapped estimated and voluntary environmental corridors, as discussed in Chapter 03. Resource protection corridors include the following categories of lands:

- Wetlands, as defined in state statute and including both the shoreland wetland and inland wetland districts under Chapter 11, Dane County Code of Ordinances
- Shoreland setbacks and wetland buffers required under Chapter 11, Dane County Code
- 1%-annual chance regional floodplains, including the general floodplain district, floodway district and flood storage district, as described in Chapter 17, Dane County Code
- Other areas specifically planned to protect natural or cultural resources, and where structural development is strictly limited, as identified in the *Dane County Comprehensive Plan*, or its component town, city, village, or extraterritorial cooperative plans

Open Space Functions and Values

Historically, open space lands have been protected to provide the following general functions:

PROTECTION OF NATURAL RESOURCES AND CRITICAL ENVIRONMENTAL PROCESSES

Protecting natural resources and critical environmental processes is one of the most important functions of open space preservation. This functional category includes three major aspects of public concern:

- Protection of water resources, drainage and hydrologic functions, and related ecosystem services (including such features as surface drainageways and floodways, groundwater recharge and discharge areas, and flood storage and detention areas)
- Pollution control (including protection against erosion and sedimentation caused by construction activities and natural processes, vegetative filtering of surface runoff, maintenance of dry weather stream flows by protecting wetlands and groundwater discharge areas, and the vegetative stabilization of drainageways, streambanks and shorelines)
- Conservation of land and water habitat for a wide variety of wildlife

PROTECTION OF PUBLIC HEALTH, SAFETY, AND PROPERTY

The protection of public health, safety and property is another important function with significant economic implications. Protecting critical natural resource features protects public health and safety, and public and personal property by avoiding development in areas subject to flooding as well as in areas with unstable soils or steep slopes. This prevents development from occurring in areas potentially prone to landslides or excessive settlement, or where emergency vehicle access would be limited in adverse weather conditions. The economic impact to property when disaster strikes is well documented. Avoiding development in and near critical natural resource features also prevents activities that could cause contamination of surface waters used for fishing and recreation, and of groundwater used for the region's drinking water supplies. Beyond the public health and safety aspect of degrading water quality, this too can have severe economic impacts.

[graphic: Seven core functions and values of open space]

OUTDOOR RECREATION AND EDUCATION

Traditionally, open space preservation efforts have focused on meeting community outdoor recreation and education needs. Many protected resource features and lands are capable of satisfying both active and passive recreation, ~~and~~ outdoor education, and nature study needs. The continuous nature of resource protection corridors is particularly suited to outdoor recreation

activities utilizing trails, such as hiking, biking, or cross-country skiing, as well as providing access to water bodies and significant opportunities for nature study and observation of wildlife. However, not all resource corridors are suitable for intense or concentrated active recreational uses, necessitating the continual provision of additional upland recreational sites where resource corridors fall within lowlands ~~to satisfy some of these needs~~.

SCENIC BEAUTY AND URBAN FORM

Open space contributes to scenic beauty and shapes urban form. This is particularly important in urban areas, where open space can act as a buffer between incompatible land uses and provide separation between communities, corridors for utility and transportation systems, and boundaries for urban development. Being able to access the scenic beauty, serenity, and tranquility associated with natural processes and scenery fulfills a particularly important psychological and aesthetic need for residents of dense urban areas.

STORMWATER MANAGEMENT

Without effective stormwater management, ~~the potential impacts of development on receiving waterbodies can be~~development can exert substantial and ~~is~~ well documented impacts on receiving waterbodies. Effective stormwater management mitigates the effect of development and helps to slow stormwater runoff and attenuate peak flows, filter pollutants, and promote infiltration and groundwater recharge, thereby protecting downstream water resources and properties. Protecting areas designed for stormwater management facilities is increasingly important as the region continues to develop and the amount of impervious area increases. Modern stormwater management measures often include nature-based practices (i.e., green infrastructure) and provide additional ecosystem service benefits.

ARCHAEOLOGICAL AND GEOLOGICAL RESOURCE PROTECTION

Open space preservation protects archaeological sites and unique geological areas that hold thousands of years of our region's rich history. The historical destruction of archaeological sites like earthen mounds due to development has resulted in the irreplaceable loss of cultural resources. While legal protections now prevent new development from occurring in areas with identified archaeological sites, protection of the open space around these sites is still important. Parks and natural areas are often established around archaeological sites and unique geological formations. Unique geological areas do not have the same degree of legal protection as archaeological sites but still represent valuable historic and scientific areas and fragile, irreplaceable resources in need of protection.

CLIMATE RESILIENCE

A newly identified function of open space is providing climate resilience. As scientific understanding of climate change has expanded over the last several decades, open space preservation has emerged as an increasingly important mitigation and adaptation strategy. The Wisconsin Initiative on Climate Change Impacts (WICCI) reports continuing trends toward a warmer and wetter climate throughout the state, with more frequent extreme weather events (WICCI, 2021). These trends are expected to continue and potentially become more severe in the future.

Wetlands, grasslands, and forests in non-urbanized areas and greenspaces and green infrastructure in the urban environment can mitigate the impacts of climate change by reducing

flood risks, providing natural water storage, reducing stormwater pollution and runoff, and sequestering carbon in urban and suburban environments. Protecting these resources helps to ensure their natural functions will continue to benefit human and natural systems now and into the future.

Strategic planning around the delineation and use of open space corridors can also promote climate resilience. Managing land to promote vegetation and soil health, favoring species that are likely to persist and thrive in changing conditions, and strategically siting facilities and infrastructure can all increase the resilience of the region.

03 Corridor Elements & Benefits

Preserving Key Resources

This chapter further defines Environmental Corridors, Estimated Environmental Corridors, and Voluntary Environmental Corridors. It also describes the key elements of these areas and how they promote regional water quality, quality of life, and climate resilience.

Overview

Some natural resources such as bodies of water and floodplains are legally protected from development. Within Dane County's urban service areas, these resources are designated as **Environmental Corridors** through the WDNR-adopted *Dane County Water Quality Plan*. Outside of urban service areas, protected resources are mapped as **Estimated Environmental Corridors** that will likely be mapped as Environmental Corridor if/when they are added to an urban service area. Current federal, state, and county regulations prohibit development in these areas (see Appendix C).

Other natural resources such as old-growth woodlands and potentially restorable wetlands do not have legal protection from development or disturbance, yet still provide important benefits to the region. These resources are recommended for voluntary inclusion in environmental corridors. Outside of urban service areas, areas where these resources occur are mapped as **Voluntary Environmental Corridors**.

Preserving and enhancing connectivity between different corridor types protects and magnifies ecological services in our region (see Habitat Stepping Stones & Corridor Connections for more on this concept).

Environmental Corridors

Environmental corridors are managed through a cooperative working relationship between the Wisconsin Department of Natural Resources (WDNR), the regional planning commission, and area communities ~~in~~ towards preserving natural resources and protecting water quality.

CARPC has conducted water quality management and sewer service area planning in Dane County under a contractual agreement with the WDNR since 2007. Through this agreement, CARPC administers Dane County Water Quality Plan amendments including environmental corridor delineation. Corridors have been continually revised, updated, and expanded since they were first delineated and adopted in 1983. A fact sheet is available containing an overview of Environmental Corridors for use as a quick reference (see Appendix E).

Chapter NR 121 of the Wis. Admin. Code outlines the requirements for areawide water quality management plans. One of these requirements is to identify major areas that are unsuitable for the installation of wastewater treatment systems due to physical or environmental constraints. These major areas include, but are not limited to, wetlands, shorelands, floodways and floodplains, steep slopes, highly erodible soils and other limiting

soil types, groundwater recharge areas, and other physically restrictive features. Such areas are considered for exclusion from sewer service areas because of the potential for adverse water quality impacts.

ENVIRONMENTAL CORRIDOR ELEMENTS

Environmental corridors include the above elements required by NR 121, Wis. Adm. Code as well as other elements such as lands needed for recreational use or stormwater management that are voluntarily designated as environmental corridor. In urban areas, environmental corridors provide an outsized benefit to the surrounding areas and offer the rich diversity and exceptional natural features essential to regional quality of life. Even degraded environmental corridors can provide necessary water quality and flood storage functions.

The Policies and Criteria for Environmental Corridors document was adopted in 2008 as part of the Dane County Water Quality Plan (see Appendix D). This policy sets the basic, minimum criteria for resources that must be included in environmental corridors, including:

- Wetlands under WDNR jurisdiction with a 75- feet minimum vegetative buffer
- 1% annual chance (100-year) floodplains and floodways
- Riparian (within 75 feet of the ordinary high water mark of water bodies or from the top of each bank) steep wooded slopes (12% gradient and higher in the glaciated portions of the county; 20% gradient and higher for the driftless portion of the county)
- Navigable water bodies based on WDNR determination (or confirmation) of navigability (plus the 75-foot shoreland buffer on each side of the waterway and a 200-foot minimum total width)
- Non-navigable waterways based on WDNR determination (or confirmation) of navigability (plus the 25-foot shoreland buffer on each side of the waterway and a 75-foot minimum total width)
- Public lands, parks, and conservancy areas
- Problem soil areas and unique geologic formations (such as Karst features and known critical recharge areas)
- Archaeological sites
- Endangered and sensitive habitats (such as savanna and prairie remnants)
- Stormwater facilities

[Photo: Village of Shorewood Hills Reese Woods]

BENEFITS PROVIDED BY ENVIRONMENTAL CORRIDOR ELEMENTS

The following sections define each environmental corridor area element and describe their functions and values. These same elements generally comprise estimated environmental corridors located outside of the current urban service area.

[Table 1: Open Space Functions]

EC ELEMENT: Lakes, Ponds, and Streams

All lakes, ponds, and streams in Wisconsin are legally defined as waters of the state per ~~Section 281.01,~~ Wis. Stat. § 281.01. The WDNR primarily makes determinations regarding

the classification of a waterbody as a lake, pond, of stream using the concept of motion known as the perceptible flow test (*Nee-pee-nauk Club v. Wilson*, 96 Wis. 290 (1897)). This test considers a waterbody's natural state, whether it has a flow (stream) or is substantially at rest (lake or pond). Within urban service areas, navigable water bodies, non-navigable streams, and open drainageways are mapped as environmental corridors. Outside of urban service area boundaries, lakes, ponds, and streams are mapped as estimated environmental corridors.

Protecting lakes, ponds, and streams from development can protect water resources and critical environmental processes, protect public health, safety, and property, provide outdoor recreation and education opportunities, enhance scenic beauty, and shape urban form.

Lakes, ponds, and streams represent significant wildlife habitat for fish and aquatic organisms as well as food and water sources for land-based wildlife, birds, and waterfowl. Lakes in Dane County support a diverse warmwater fishery including northern pike, bass, and panfish. Most of the county's trout streams are in the southwestern third of Dane County (Driftless Area). To protect public health, safety, and property, it is important to avoid development which adversely impacts the ability of lakes, ponds, and streams to convey stormwater runoff and flood flows. Lakes, ponds, and streams are heavily used for outdoor recreation, nature study, and education. Swimming, boating, and fishing are among the most significant outdoor recreation activities in Dane County. Finally, lakes, ponds, and streams are among the most important features in enhancing scenic beauty and shaping urban form, particularly in Dane County where these features have long ~~dominated and~~ controlled the form of urban development and provided a beautiful setting. The tranquility, serenity and beauty afforded by views of the lakes, ponds, and streams in Dane County are particularly important in providing a sense of psychological well-being in an urban environment.

EC ELEMENT Wetlands

Wetlands, as defined in Wis. Stat. §23.32(1), are areas "where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions." Generally, the federal wetland definition aligns with the state definition but there are differences in when each agency has jurisdiction over wetland activities. The state (WDNR) will have regulatory oversight/ jurisdiction over all wetlands in Wisconsin while the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) only have jurisdiction over Waters of the United States (WOTUS). For jurisdictional determinations contact both the USACE and WDNR. Wetlands under WDNR jurisdiction are mapped as environmental corridors within urban service areas. In areas outside of urban service area boundaries, wetlands under WDNR jurisdiction are mapped as estimated environmental corridors.

Wetlands are particularly fragile and important natural resources that contribute to almost every open space function. Wetlands protect and enhance water resources and hydrologic functions by acting as either groundwater discharge areas that maintain stream flows during dry weather conditions or groundwater recharge areas that protect against contamination.

Wetlands provide temporary detention and storage of floodwaters and runoff, which reduces flood damage and maintains the hydrologic balance between ground and surface waters. Wetlands within and downstream of urban areas counteract the harmful impacts of increased runoff from pavement and buildings.

Wetlands play an important role in pollution control, acting as natural water purifiers that filter sediment and absorb many pollutants in surface waters. Wetlands treat stormwater runoff by allowing sediments to settle and by removing and utilizing contaminants and nutrients. However, it is important to avoid overloading wetlands with excessive flows and pollution via untreated stormwater flows from developed areas to avoid degrading the natural functions.

Wetlands are perhaps the most important resource feature in terms of wildlife habitat, as they produce and support numerous living organisms at the edge between land and water. Wetlands are vital sources of food, water, nesting, and breeding habitat for a wide variety of wildlife.

Avoiding construction and development in and around wetlands protects public health, safety, and property because these areas are usually subject to flooding and contain unstable and compressible soils. Wetlands are also extremely important resources for nature study, interpretation, and education. For example, the Waubesa Wetlands, located along the southwestern shore of Lake Waubesa, has been studied by scientists for over a century and used as an outdoor classroom for researchers around the world. Wetlands are, however, fragile resources which are generally unsuited to intensive recreational use.

Finally, wetlands are important in enhancing scenic beauty and shaping urban form. They often provide logical barriers or boundaries to urban development, as well as buffers between communities and incompatible land uses.

[Photo: Waubesa Wetlands by Cal DeWitt]

EC ELEMENT: Wetland Buffers

Wetland buffers are vegetated strips of land around the wetland, left wholly undeveloped and partially untouched, and serve to protect water resources and critical environmental processes. Wetland buffers enhance wetland water quality by preventing the buffer area itself from serving as a source of pollution, as well as by processing pollutants that flow from upland areas. They maintain habitat for aquatic, semi-aquatic, and terrestrial wildlife (ELI, 2008).

Although there is no scientific agreement on an all-purpose buffer width for wetlands, a minimum 75-foot vegetative buffer from the edge of wetlands under WDNR jurisdiction is currently required to be mapped as environmental corridor within urban service areas. A 75-foot buffer is also applied to wetlands under WDNR jurisdiction outside of urban service area boundaries and mapped as estimated environmental corridors.

In general, wide and densely vegetated buffers are better than narrow and sparsely vegetated buffers. The buffer width needed for protecting a resource depends on the goal and target of protection and the topography and landscape design of the buffer area. The required minimum 75-foot vegetative buffer is effective for sediment and phosphorus control but could be less effective where nitrogen control or wildlife habitat functions are desired (Figure 1). According to McElfish et al. (2008), buffer distances that may most effectively accomplish water quality functions are 30 to 100+ feet for sediment and phosphorus control and 100 to 160+ feet for nitrogen control (Figure 1).

Buffer distances for wildlife protection are dependent on the species and the habitat characteristics. In general, as buffer width increases, wildlife benefits increase (WDNR, 1997). However, there is no universally applicable recommendation for managing vegetated buffers for wildlife (WDNR, 1997). According to McElfish et al. (2008), buffer distances of 100 to 300+ feet may most effectively accomplish a wildlife protection function.

[Figure 1: Wetland buffer distance by function. From Planner's Guide to Wetland Buffers for Local Governments, Environmental Law Institute, 2008.]

[Figure 2: Wetland buffer tiers. From Planner's Guide to Wetland Buffers for Local Governments, Environmental Law Institute, 2008.]

[Photo: Village of DeForest retention pond]

EC ELEMENT: Floodplains

A **floodplain** is any land area susceptible to being inundated by floodwaters from any source. Also known as the flood hazard area, the floodplain is comprised of **floodway** and flood fringe areas (see Figure 3). The floodway is the channel of a river, stream, or other watercourse and the adjacent land areas required to carry the base flood. The **base flood** is a flood having a one percent chance of being equaled or exceeded in any given year, also referred to as the 100-year flood or regional flood. The **flood fringe** is the portion of the floodplain outside of the floodway that is inundated by floodwater during a base flood or larger flood event, generally associated with standing water rather than flowing water.

The 1% annual chance (or 100-year) floodplain is mapped as environmental corridor within urban service areas. Outside of urban service area boundaries, floodplains are mapped as estimated environmental corridors.

Floodplains perform crucial drainage and hydrologic functions. According to the Federal Emergency Management Agency (FEMA), floodplains store and convey floodwaters, reduce flood velocities and peaks, reduce frequency and duration of low surface flows, enhance the quality of surface waters, and promote infiltration and groundwater and aquifer recharge. Loss of the flood conveyance and storage capacity provided by floodplains can result in increased flooding and damage both upstream and downstream.

Another primary reason to protect floodplains from development is to protect public health, safety, and property. Flooding can damage critical public health infrastructure, pollute

drinking water supplies, result in contaminated water, and increase the chance of spreading waterborne diseases. Locating development in the floodplain exposes property such as buildings, streets, and utilities to extensive and expensive flood damage, as well as exposing the resident population to significant risks to health and safety during floods.

[Figure 3: Floodplain elements. From Floodplain Management in Wisconsin Quick Guide, Wisconsin Department of Natural Resources, 2019.]

Floodplains provide pollution control mainly through settling out sediment from slow-moving waters in flood fringe or storage areas. Floodplains can improve downstream water quality by trapping sediment during overbank flood events, reducing the amount of sediment entering surface water. Floodplains act as natural filters, absorbing harmful contaminants from runoff. They also process organic waste and moderate water temperature.

Floodplains provide valuable wildlife habitat and enhance biological productivity and biodiversity. Since floodplains are associated with lakes and streams, they include the land-water edge, which is particularly important in satisfying the food, water, and habitat needs of a wide variety of land and water-based wildlife. Floodplains also provide critical nursery habitat for fisheries, create and enhance waterfowl habitat, and provide habitat for rare, threatened, and endangered species. In addition, floodplains have a continuous nature, and this continuity is extremely important in enhancing the value of open space for wildlife habitat.

While floodplains are not always particularly scenic, they provide important buffers between adjacent communities or incompatible land uses as well as logical boundaries for urban growth.

Floodplains also provide cultural, recreational, and educational value as an additional secondary or supplemental function. Many floodplains contain cultural resources like historic and archaeological sites. Many active and passive recreational uses are compatible with floodplains, particularly for activities not requiring structures or facilities which would be vulnerable to flood damage. Floodplains can also serve as areas for scientific studies and outdoor learning experiences.

[Photo: City of Madison wooded steep slope]

EC ELEMENT: Riparian Steep Slopes

In the glaciated portions of the county, slopes with a 12% gradient and higher are considered steep; in the driftless, or unglaciated, portion of the county, steep slopes have at least a 20% gradient. Steep slopes within 75 feet of the ordinary high water mark of water bodies and wetlands or from the top of each bank are considered "riparian.". ~~:~~ Based on the current policies and criteria (adopted in 2008), wooded, riparian steep slopes must be mapped as environmental corridor within urban service areas. However, including *all* steep slopes adjacent to waterbodies and wetlands as environmental corridor, not just wooded ~~ones~~slopes, ~~as environmental corridor~~ has significant merit. Riparian steep slopes are mapped as estimated environmental corridors outside of urban service area boundaries.

The primary purpose of protecting riparian steep slopes from development or disturbance is the need to provide sediment control for downstream water resources and allow the natural morphological chances within the stream corridor to occur. Except for properly executed streambank restoration work, disturbing the soils and vegetation makes these slopes particularly vulnerable and can result in extremely severe erosion and transport significant quantities of sediment and nutrients to downstream locations, negatively impacting the water quality of nearby water resources. Placing these slopes into environmental corridor protects the natural functions of the stream corridor. Although not required for inclusion in environmental corridor, protecting the area immediately upslope of the steep slope can provide for protection from erosion and thus enhance the protection of the water resources.

These areas also provide critical wildlife habitat benefits. Where riparian steep slopes are found in conjunction with woodlands and other natively vegetated areas, the functions and values are multiplied if left in a natural condition.

Finally, riparian steep slopes are extremely important in enhancing scenic beauty and shaping urban form. They represent an obvious barrier to urban development and are often logical boundaries for urban growth. Often these slopes are highly visible and therefore important in determining the scenic qualities of an area. When riparian steep slopes are stripped of vegetation by mining or construction activities, this can affect the scenic beauty of an entire area.

Protecting all riparian steep slopes from disturbance and employing stringent structural and non-structural erosion control practices during construction activities can help mitigate risks. While slopes in the glaciated portions of the county are fairly gentle compared to the slopes in the driftless portion, drumlins are more present in these areas. Using mechanized equipment on the steep slopes on the sides of some of the drumlins can cause problems with soil erosion (WGNHS, 1983).

The question of what degree of steepness presents a problem depends on the topography, geology, climate (precipitation), land use and land cover in a particular area. Severe and very severe limitations to urban development occur on slopes steeper than 12%. Careful attention needs to be paid to concerns of erosion control, slope stability, and emergency vehicle access.

Non-riparian steep slopes, although not required to be included in environmental corridors, are nonetheless a sensitive resource that warrants consideration for inclusion in environmental corridors as voluntary environmental corridors. In some cases, it may be possible to allow low- density development on slopes ranging from 12 to 20%; however, this should only be permitted in the context of specific and careful review and approval of individual site plans and proposals by municipal engineering staff. Maintaining the stability of the slope should be a priority, while mitigating the lost water quality benefits, groundwater recharge, and habitat also should be considered. Slopes of over 20% will almost always present serious erosion and public safety problems if disturbed or developed. These slopes should be excluded from development at urban densities and protected from significant vegetation clearing.

EC ELEMENT: Shoreland Buffer Strips

According to the Wisconsin DNR, shoreland buffers are vegetated strips of land that protect water from the impacts of nearby development, provide wildlife habitat, and screen buildings viewed from the water. These strips represent a necessary protective buffer in areas where floodplains are absent or provide inadequate protection to the waterbody.

Vegetated shoreland buffers are mapped as environmental corridors within urban service areas (refer to Mapping Environmental Corridors in Chapter 4 for specific buffer distances). Required vegetated shoreland buffers are mapped as estimated environmental corridors outside of urban service area boundaries.

Shoreland buffer strips along waterways help filter out pollutants, prevent flood damage by limiting development in flood-prone areas, allow for the natural hydrologic functions of waterways, and provide recreation areas. They also contribute to providing wildlife habitat and outdoor recreation, enhancing scenic beauty, and shaping urban form.

Buffer strips along streams and drainageways also accommodate the lateral movement and migration of stream beds or channels that occurs naturally over time. Such movement is expected to be particularly pronounced with increased intensity in precipitation as the result of climate change.

[Photo: Starkweather Creek]

Another extremely important function of shoreland buffer strips is to provide stormwater runoff control. The extensive root systems of native plants and trees not only act to bind soil particles together, thereby stabilizing drainageways and preventing erosion from banks and adjacent uplands, but also promote infiltration and groundwater recharge. Pollution control is also achieved by allowing natural vegetation to filter sediment and contaminants from runoff entering the waterbody. It should be noted that these functions are far greater realized with the use of properly managed, native vegetation rather than conventional turf grass or non-desirable invasive species. These functions are particularly important in older urban areas, where development without adequate stormwater management practices has caused substantial increases in stormwater runoff and flood flows. The increased flows destabilize and erode natural stream channels and drainageways unless significant efforts are made to protect these areas.

Shoreland buffer strips can also enhance scenic beauty and shape urban form. Buffer strips along streams and drainageways often include wooded areas and provide and preserve views of water bodies. While the scenic aspects of shoreland buffer strips along intermittent streams may not be as important, these strips buffer adjacent incompatible land uses, shape urban form, and provide logical boundaries to urban growth.

Shoreland buffer strips also function to provide outdoor recreation, education opportunities, and wildlife habitat. Shoreland buffer strips allow for development or extension of trail-oriented recreational and educational activities, such as hiking, biking, cross-country skiing, and nature study, particularly in urban areas. In many cases, shoreland buffer strips along

intermittent streams and drainageways provide a significant amount of open space and recreational opportunities at the subdivision or neighborhood scale. While shoreland buffer strips along perennial streams are more important for this function than those along intermittent drainageways, the continuity provided by shoreland buffer strips and the ability to connect one area of significant wildlife habitat with another can make them important features of a continuous wildlife habitat system in urban areas.

EC ELEMENT: Public Lands, Parks & Conservancy Lands

Public lands, parks, and conservancy areas and proposed public parks and conservancy areas are mapped as environmental corridor within urban service areas. Isolated (small) neighborhood parks, however, are not mapped as environmental corridor. Existing public lands, parks, and conservancy areas are mapped as estimated environmental corridors outside of existing urban service area boundaries.

While parks may include other resource features (such as steep wooded slopes, floodplains, etc.) they often also include lands which exhibit none of these features. Even when other resource features are not involved, however, parks contribute to several open space functions. Where not in conflict with these other environmentally sensitive resources, ancillary structures necessary for the function of the space (e.g., shelters, restrooms, playground structures, parking lots and walkways) are allowed within the environmental corridor. These compatible uses are eligible to receive sanitary sewer service.

Parks provide outdoor recreation and education opportunities, including year-round opportunities for both passive and active recreation, interpretive signs, and information kiosks. Many parks in the region contain scenic overlooks and provide barriers between water resources and other land uses. Tenney Park in the City of Madison is located along the shorelines of Lake Mendota and the Yahara River and provides a variety of outdoor recreation opportunities.

Parks also typically provide pollution control and wildlife habitat. The open vegetated spaces usually generate little erosion or nonpoint source pollution, although the exception may occur for manicured lawns (e.g., athletic fields) receiving fertilizers and chemical treatments. Large open vegetated spaces can provide wildlife habitat and prevent habitat fragmentation (see Connecting Corridors section). Parks provide foraging and nesting habitat for pollinator species. Birds and small mammals can also flourish in parks where there are plenty of trees and/or patches of suitable habitat. Parks can also serve the function of protecting cultural, historic, and scientific areas, enhancing scenic beauty, and shaping urban form. Parks play a role in promoting climate resilience by serving as carbon sinks and improving air quality, especially those with significant tree canopy. Large networks of parks and natural corridors can help maintain habitat health and connectivity as species' ranges shift due to climate change.

[Photo: Tenney Park]

EC ELEMENT: Problem Soil Areas & Unique Geologic Formations

Problem soil areas and unique geologic formations should be mapped as environmental corridor within urban service areas, although the distinction of what is considered problematic or unique can be subjective. Some issues presented by problem soils can be mitigated with enhanced or specialized engineering provisions. Furthermore, problem soils and unique geologic formations often coincide with other environmental corridor elements requiring inclusion in Environmental Corridor, or in Estimated Environmental Corridors outside of urban service area boundaries. Because of this, mapping of environmental corridors often is dictated by these other features, and absent these other features, the final mapping is based on site-specific conditions and mitigation strategies.

Problem Soil Areas

Problem soils are soils that can pose severe limitations for development. The most common forms of problem soil include soils with high shrink-swell potential, high compressibility, erodibility, and low bearing capacity. In addition, these soils are often associated with areas of high groundwater, posing concern for contamination of groundwater. Furthermore, development in these areas can result in additional construction costs and drainage problems, as well as subsequent problems such as basement flooding. Hydric soils have a lot of these limitations and are discussed later in this chapter under Benefits of Voluntary Environmental Corridor Elements. Hydric soils are mapped as voluntary environmental corridor in undeveloped areas of the county.

The primary reason to avoid building in areas with problem soils is to protect public health, safety, and property. Unless properly engineered, development and construction on compressible or unstable soils can result in both short-term and long-term construction, maintenance, and economic problems to landowners and the community. The resulting damage to buildings, roads and utilities, and the long-term maintenance costs are often prohibitively expensive.

An additional open space function of prohibiting development in problem soil areas is to protect water resources, drainage, and hydrologic functions. Areas where soils pose limitations for development often coincide with many of the other resource features associated with environmental corridors.

Unique Geologic Formations

Unique geology in Dane County includes shallow karst features, critical groundwater recharge areas, rock outcrops, and glacial features (such as drumlins). Rock outcrops can be found in the Driftless Area along river valleys and in roadcuts, and in the moraine zone of the county. Glacial features, such as drumlins, are a visible and distinctive feature left behind from Wisconsin's glaciated past. Drumlins are elongated hills that form at a glacier's bed and parallel the ice flow direction. Wisconsin is home to one of the largest concentrations of drumlins in the world (WDNR, n.d.).

The primary function of protecting areas of unique geology is to protect natural resources and critical environmental processes. These areas also enhance scenic beauty and shape urban form. Unique geologic features also provide outdoor recreation, education, and nature study opportunities, though the fragile nature of many of these areas is often not suited to

intensive recreation. Unique geological formations are often preserved in parks and natural areas.

Karst is a common landscape throughout much of the upper Midwest created when water dissolves carbonate rocks such as dolomite and limestone. Typical features of a karst landscape include seepages, sinkholes, caves, fractures, springs, and stream sinks (see Figure 4).

Karst features, such as vertical fractures and conduits, provide primary pathways for groundwater movement and can dramatically increase groundwater susceptibility to pollutants when present. Water moves readily through these openings, carrying sediment and pollutants directly into our groundwater.

Potential karst units may be encountered at varying depths throughout Dane County (see F for link to map). The location of karst features is difficult to predict, and the thickness and type of the overlying soil greatly affects how much water drains into them. Thus, shallow karst features pose a concern for potential groundwater contamination if improperly managed. While not mapped as environmental corridor themselves, areas of potential karst and their limitations are important to consider when planning the placement of stormwater management facilities to prevent contamination of groundwater.

Sinkholes are holes or depressions that form when water washes sediment down into cracks and voids in karst bedrock. Sinkholes are common in Dane County and easy to remediate.

Groundwater recharge, or the addition of water to the water table, varies spatially and temporally. Spatial variation is due primarily to physical differences in land use, soils, and topography (Hart et al., 2012). Temporal variation is due to fluctuations in climate and precipitation (Hart et al., 2012).

[Figure 4. Karst landscape. From Runkel et al., 2003.]

Protection of groundwater recharge areas through placement in environmental corridors contributes to the open space functions of protecting natural resources and critical environmental processes. It allows the areas with the highest potential for replenishing our groundwaters to be set aside for use in infiltrating large amounts of water as well as limiting the potential for groundwater contamination from various land uses. Knowledge of the location of groundwater recharge areas and the rates of groundwater recharge is essential for groundwater flow models and for water resources planning.

Recharge rates vary widely across the county (see ~~Appendix F for link to~~CARPC's groundwater recharge web map). The majority of Dane County has a recharge rate of 9-10 inches of water per year. The unglaciated western and southwestern parts of the county have the highest recharge due to the presence of thin soils with low storage capacity that occur over carbonate and sandstone bedrock (WGNHS, 2012). The eastern two-thirds of the county, or glaciated areas, has comparatively moderate recharge with little variation. Moderate hydraulic conductivity and higher storage capacity of the glacial tills reduce recharge rates in this area (WGNHS, 2012).

Impervious urban development in Dane County can have an adverse effect on groundwater resources. Impervious areas prevent the infiltration of rainfall and snowmelt, reducing groundwater recharge. The lower recharge values in the central part of the county are due primarily to urban development in the Madison area and its suburbs.

Areas with naturally high infiltration potential should be used to recharge groundwater levels to the greatest extent possible. They may also be prime locations for regional stormwater facilities that could be used to infiltrate groundwater generated in other parts of the watershed.

Protecting high recharge areas helps offset the loss of natural recharge experienced locally due to development. Infiltrating stormwater runoff, assuming proper pretreatment and groundwater separation practices are employed, should be employed at every opportunity to help reduce the increased volume of stormwater runoff due to increased impervious surfaces and ~~even~~ to ~~help~~ mitigate well water withdrawals where site conditions are favorable. Protecting groundwater recharge areas can also contribute to enhancing water resource quality in a changing climate.

EC ELEMENT: Archaeological Sites

Unique archaeological sites, such as burial mounds, are protected by state statutes, and are included in Environmental Corridors, usually in areas accessible to the public. Archaeological sites listed on the National Register of Historic Places or identified by the Wisconsin Historical Society are mapped as Environmental Corridor within urban service areas. Unrestricted/non-sensitive, or publicly available records are mapped as Estimated Environmental Corridor outside of urban service area boundaries. Exact locations of some restricted/sensitive records are not shared to protect burial site locations.

Between 350 to 2,800 years ago, Native Americans of the Midwest built at least 15,000 earthen mounds in a variety of shapes and sizes (UW-Madison, n.d.). Mound shapes vary from hemispherical or ovate to linear embankments. Effigy mounds were built between 1,000 to 1,300 years ago and take the form of recognizable animals.

With the highest concentration of prehistoric mounds in the country, southern Wisconsin is considered the epicenter of effigy mounds. Clusters are found in the Madison, Muscoda, and the Prairie du Chien areas (UW-Madison, n.d.). Burial mounds are typically found on high places overlooking bodies of water (like bluffs or ridges), bottom lands, and shorelines near resource-rich areas that were able to support temporary gatherings of large groups of people (UW-Madison, n.d.). Over 1,500 mounds in numerous clusters were built along the shorelines of the Yahara chain of lakes. Most of these mounds have been destroyed as a result of agricultural practices and urban development.

Burial sites fall into two categories: catalogued and uncatalogued. A catalogued burial site is a human burial site believed to still contain human remains; it is in a known location and is listed in the Wisconsin Burial Sites Catalog. The Wisconsin Burial Sites Catalog is an electronic list of human burial sites. Catalogued sites receive a higher degree of protection under state law and have a state minimum ~~10 foot~~10-foot setback. Uncatalogued sites are human burial sites that have been destroyed; these can't be located or have not yet been

listed in the Wisconsin Burial Sites Catalog. There are nine catalogued and 15 uncatalogued mounds on county parkland as of 2022 (Dane County Parks, 2022).

Archaeological areas provide a primary function in protecting cultural, historic, and scientific areas. Many mound groups are located within municipal, county, or state parks, forests, and other properties. There are four "extant" (intact above ground) mound groups on the University of Wisconsin-Madison campus: Willow Drive Mounds, Observatory Hill Mound Group, Eagle Heights Mound Group, and Picnic Point Mound Group.

Under the Wisconsin Burial Sites Preservation law (Wis. Stat. § 157.70), Native American burial mounds, unmarked burials, and all marked and unmarked cemeteries are protected from intentional disturbance. If anyone suspects that a Native American burial mound or an unmarked or marked burial is present in an area, the Wisconsin Historical Society (WHS) should be notified. Catalogued and uncatalogued sites may not be disturbed without authorization from the WHS.

[Photo: Blackhawk Country Club Mound Group]

EC ELEMENT: Endangered & Sensitive Habitats
[Table 2. Natural Communities of Dane County]

Habitats are ecological or environmental areas that are the home of a plant or animal. A natural community is defined as the assemblage of different plant and animal species that live together in a particular area, at a particular time. According to the WDNR, assessment and management of natural communities is the most effective way to sustain species of greatest conservation need that are declining because of habitat limitations.

Habitats considered endangered or sensitive based on WDNR determination are mapped as Environmental Corridor within urban service areas. This may also include the habitat of endangered wildlife or areas of high-quality landscapes unaltered by human development (e.g., oak savanna and prairie remnants), based on consultation with DNR staff, local government and other expert resources management professionals. In areas outside of urban service area boundaries, savannas and remnant prairies are mapped as Estimated Environmental Corridors. The primary reason to avoid development in these areas is to protect wildlife habitat and biodiversity.

Natural communities are not legally protected but instead are provided a global and state rank by WDNR. These natural communities are included on Wisconsin Natural Heritage Inventory (NHI) Working List. This list contains species known or suspected to be rare in the state along with natural communities and geological features native to Wisconsin. Most of the species, natural communities, and geological features on the list are actively tracked. There are 32 natural communities from 10 community groups in Dane County (see Table 2).

The WDNR provides the following recommendations if sensitive habitats or rare, natural communities are encountered:

> *This natural community may occur within the project site. Natural communities may contain rare or declining species and their protection should be incorporated into*

the project design as much as possible. We recommend minimizing impacts to the community, implementing invasive species BMPs, and/or conducting work under frozen ground conditions when working within or adjacent to this natural community.

Prairies and savannas are considered the most imperiled. Tallgrass prairies are among the most decimated and threatened natural communities in the Midwest and the world. According to the WDNR, less than 10,000 acres of varying quality native prairie remains today, and most are small remnants less than 10 acres in size. Oak savanna was once one of the most common landscapes in the Upper Midwest. Intact oak savannas are now Wisconsin's rarest native plant community, with less than a fraction of one percent remaining.

Natural communities capture much of our native biodiversity and support many listed species, like the federally endangered rusty patched bumble bee. The WDNR defines suitable habitat vs non-suitable habitat for the bee. Suitable active season habitat includes but is not limited to prairies, woodlands, marshes/wetlands, agricultural landscapes, and residential parks and gardens. The species also relies on diverse and abundant flowering plant species in proximity to suitable overwintering sites for hibernating queens. Some endangered and sensitive habitats may not be well suited for outdoor recreation. Passive recreation along dedicated paths can provide education opportunities.

[CALLOUT BOX **Habitat Example: Rusty Patched Bumble Bee**

Historically found across much of the eastern and upper midwestern United States, the rusty patched bumble bee is now a federally endangered species and a Wisconsin state-designated Special Concern species. To protect RPBB habitat, the U.S. Fish and Wildlife Service developed a Rusty Patched Bumble Bee High Potential Zone Map.

Projects occurring within this zone must determine if suitable bee habitat is present and whether surveys are necessary. Existing habitat should be preserved as much as feasible, and site plans should include measures to mitigate any loss of habitat. Conservation measures should be coordinated with the WDNR Endangered Resources Review Program.]

EC ELEMENT: Stormwater Management Areas

Stormwater management refers to the collection of strategies and practices to control the movement and flow of rainwater or melted snow (i.e., stormwater) which runs off the land. Development and the associated expansion of impervious surfaces increases the volume and rate of water that runs off a site, picking up pollutants along the way and often causing detrimental impacts to water quality, water temperature, and groundwater recharge. Modern stormwater management is intended to mitigate these stormwater runoff quantity and quality concerns related to development and to protect groundwater and downstream surface water resources.

Recognizing their multiple important functions, stormwater management areas were first mapped as Environmental Corridor in the early 2000s and the adopted policies and criteria for environmental corridors require that stormwater management areas be placed into

environmental corridor within urban service areas. Outside of urban service area boundaries, stormwater management areas are mapped as Estimated Environmental Corridors.

Of the wide range of stormwater management practices available, those typically included in environmental corridor include structural facilities such as wet and dry detention/retention basins, infiltration basins, bioretention basins, and vegetated bioswales. Although important tools of stormwater management, areas with porous pavement, green roofs, underground and manufactured treatment devices, storm sewers, and non-structural practices (e.g., street sweeping or leaf collection) are not included in environmental corridor as they function concurrently with urbanized land uses incompatible with environmental corridors and don't have the secondary open space functions typical of other environmental corridors.

[Photo: City of Madison retention pond with cranes]

[Photo: City of Fitchburg retention pond near trail]

Consideration is also given to the relative size of a stormwater management area and its proximity to other environmental corridors. For example, small rain gardens within an urbanized setting are typically not included in environmental corridor.

The Dane County Water Quality Plan is oriented to a green infrastructure approach to stormwater management, moving toward integrated water resource management. In this context, stormwater management measures are increasingly designed to mimic the natural functions that are generally impaired by development.

Areas that provide stormwater management for a regional area (e.g., regional basins) should be placed in public outlots, and all structural stormwater facilities should be located outside environmentally sensitive areas whenever feasible.

A primary open space function of stormwater management areas is to protect water resources and critical environmental processes. This includes maintaining drainage and appropriate hydrologic functions, providing pollution control, improving water quality in receiving waters, promoting infiltration and groundwater recharge, and providing flood control. The sum of these functions is critical to protecting public health, safety, and property. Stormwater management areas can also provide habitat for flora and fauna, including waterfowl, marsh birds, pollinators, and other wildlife.

Additional open space functions of stormwater management areas are to provide outdoor recreation and education opportunities, enhance scenic beauty, and shape urban form. Stormwater facilities can also be designed into scenic landscape elements and include walking trails and other recreational amenities.

Voluntary Environmental Corridors

Some natural resources do not have legal protection from development or disturbance, yet still provide important benefits to the region. These resources are identified as Voluntary Environmental Corridors because preserving their benefits requires stewardship among landowners and communities. Voluntary Environmental Corridors are recommended for

inclusion in Environmental Corridors but are not required to be included under the policies and criteria adopted in the Dane County Water Quality Plan. Voluntary Environmental Corridors include:

- Potentially restorable wetlands and hydric soils
- Old-growth woodlands
- Areas with a 0.2% annual risk of flooding, also known as the 500-year floodplain
- Ice Age Trail corridor
- Natural Resource Area Boundaries
- Internally drained areas

The concept of voluntary environmental corridors was first introduced in the 2012 North Yahara Future Urban Development Area (FUDA) Study. This study mapped buffers adjacent to environmental corridors (referring to them as stewardship areas) and suggested special conditions that could be implemented to protect the critical habitat and ecological services of these areas. The Village of DeForest included FUDA study recommendations for stewardship areas in its 2015 Comprehensive Plan.

The concept of voluntary environmental corridors is also included in CARPC's *2050 Regional Development Framework*, also referred to as stewardship areas. While the FUDA study suggested following low impact standards in stewardship areas, the Regional Development Framework recommends that stewardship areas be considered for placement in environmental corridors. Placing voluntary environmental corridors into environmental corridors works toward the Framework goal of conserving important natural resources and the objective of enhancing stewardship and natural resource areas.

Building off the Regional Development Framework, the sewer service area planning process can now include discussions of potential voluntary environmental corridors.

Protective actions could include adding voluntary environmental corridors to environmental corridors as the *Dane County Water Quality Plan* is amended. Voluntary environmental corridors could also be designated as recreational amenities, which enhances nearby property values. Private landowners also play an important role in enhancing voluntary environmental corridors.

Benefits of Voluntary Environmental Corridor Elements

The following sections define each voluntary environmental corridor element and describe their functions and values.

VEC ELEMENT: Potentially Restorable Wetlands

According to the U.S. Fish and Wildlife Service, historic losses in wetlands have resulted in increased flooding and habitat loss. As of 1990, Wisconsin had lost 46% of the estimated ten million wetland acres originally present in the 1780s (Dahl, 1990).

Potentially restorable wetlands (PRW) are areas that are not currently mapped as wetland, but where soil and water pooling data indicate wetland restoration may be possible. To be

considered a potentially restorable wetland-, an area must have hydric soil, not be currently mapped as a wetland, and have a land use compatible with restoration techniques.

By banking additional stored carbon, PRWs can make a significant contribution to climate change mitigation (EPA, 2019). Potentially restorable wetlands are mapped as voluntary environmental corridors outside of urban service areas.

VEC ELEMENT: Internally Drained Areas

Internally drained areas act as closed watersheds because they lack a surface outlet to streams or other drainageways due to their topography. During average storm events, the only way for water to leave is through infiltration, evaporation, or mechanical means. Internally drained areas often have permanent or ephemeral wetlands or ponds at their low point, typically providing significant groundwater recharge.

Unless fully mitigated by stormwater management controls (which would exceed current requirements), development in internally drained areas results in increased stormwater runoff volumes and water levels in local ponds and wetlands, thereby increasing the potential for localized flooding. During large storm events, or if an artificial outlet is constructed to mitigate localized flooding, these internally drained areas can become connected and drain to a previously unconnected downstream area, leading to potentially significant hydrologic changes and an increase in flood risk downstream.

Mapping internally drained areas provides an important tool for improving stormwater management and reducing flood risk in the region. The Dane County stormwater ordinance contains recommended standards for stormwater management in internally drained areas to protect local properties and aquatic resources within and downstream of closed basins; however, it does not preclude development within these areas and does not fully mitigate the increases in stormwater runoff volume generated by development.

Internally drained areas within the urban service area do not necessarily require inclusion in environmental corridor; however, environmentally sensitive resources within these areas are included in environmental corridor. Outside of the urban service area, internally drained areas are mapped as voluntary environmental corridors to address flooding concerns, protect potential prairie pothole communities, serve as habitat stepping stones, and provide groundwater recharge. Wetlands, open water, stormwater management areas, floodplains, and known significant or sensitive groundwater recharge areas located within internally drained areas are mapped as estimated environmental corridors.

[Photo: Cherokee Marsh]

VEC ELEMENT: 0.2% Annual Chance Floodplains

Areas with a 0.2% chance (or 1 in 500) of flooding in any given year are considered moderate to low-risk flood areas. However, locating development outside of the high-risk (1% annual chance) floodplain doesn't necessarily guarantee its protection. In fact, the Wisconsin DNR reports that nearly 25% of flood insurance claims and one-third of Federal Disaster Assistance requests come from outside the high-risk 1% annual chance flood zone.

Further, flood risks change as land use and other factors change. In Wisconsin, annual average precipitation rose by about 20%, or about 1 inch per decade, between 1950 and 2024, a trend that is expected to continue over the next 50 years~~annual average precipitation rose by about 3 inches, or 10%, from 1950 to 2006, a trend that is expected to continue over the next 50 years~~. According to the United States Environmental Protection Agency (EPA), the average 1% annual chance flood area is projected to expand by 45% by 2100.

Protecting the 0.2% annual chance (or 500-year) floodplain provides important flood storage and protects public health, safety, and property, especially as flood events increase in frequency and severity. These areas also enhance the water quality, wildlife habitat, and recreational, cultural, and aesthetic value of the protected 1% annual chance floodplain. For these reasons, the 0.2% annual chance flood area is recommended for inclusion in environmental corridors and is mapped as voluntary environmental corridor.

VEC ELEMENT: Hydric Soils

Hydric soils as defined by the National Technical Committee for Hydric Soils (NTCHS) are soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in their upper layer (Changes in Hydric Soils of the United States, 1994). Formed over thousands of years, these soils maintain hydric characteristics such as mottled or gray coloring even after they have been altered by ditching, draining, or cropping. Soils that are sufficiently wet because of artificial measures are also considered hydric soils. Hydric soils are present throughout Dane County but found in higher concentrations in the eastern half of the county.

Hydric soils have several applications in land use planning, conservation planning, and assessment of potential wildlife habitat. Areas with hydric soils may also contain potential wetlands and should be surveyed to prevent unintended wetland filling (see Potentially Restorable Wetlands). For this reason, the Regional Development Framework recommends that communities designate hydric soils as voluntary environmental corridor outside of urban service areas. Predominantly hydric soils should also be considered for mapping as voluntary environmental corridors because they share the same characteristics as hydric soils.

[Photo: City of Middleton wetland]

[Photo: UW Arboretum by Kenneth Casper]

VEC ELEMENT: Old Growth Woodlands

Old-growth woodlands are areas that have remained in a perpetual forested condition since Euro-Americans arrived in Dane County in the 1830s. With the exception of wood gathering and grazing, human disturbance to these woodlands was relatively minimal throughout their history. These areas have never been plowed for agriculture resulting in an intact soil structure.

Without management, old-growth woodlands typically have a multi-age cohort of forest trees underlain by old-growth oak savanna. As low intensity frequent ground fires have become less common, old-growth woodlands have shifted from oak savanna to more mesic

higher density forest. With management activities, there is potential to restore these areas to a more historic savanna condition.

Woodlands in general provide many ecosystem services including wildlife habitat, enhancing scenic beauty, and shaping urban form. Woodlands support a wealth of wildlife species as many small and large organisms utilize woodlands for food, shelter, and rearing of young. Seasonal changes in woodlands enhance the scenic beauty of open space areas, especially in the fall. Existing topography often contributes to the scenic beauty of woodlands. Wooded areas are also important in providing a sense of natural open space in dense urban areas.

Woodlands also provide carbon storage, mitigate the heat island effect through shading and cooling, reduce rainwater runoff, and filter pollutants. In general, wooded areas result in low levels of surface runoff, erosion, and nonpoint source pollution. Strong roots anchor soil against erosion by catching runoff and slowing its flow, reducing flood risks. Healthy woodlands can act as a natural filter by absorbing nutrients and sediment before they reach water resources. In addition, woodlands contribute to the overall hydrologic cycle by transpiring water to the atmosphere. Steep wooded slopes are particularly important for these functions and are extremely vulnerable to impacts from development or construction. For these reasons, woodlands have significant merit for inclusion in Environmental Corridor especially when connected to water resources.

Woodlands further support year-round outdoor recreation, research, and environmental education opportunities. For example, the University of Wisconsin Arboretum provides opportunities for hiking, citizen science, ecological research, snowshoeing, and cross-country skiing.

Projected climate change impacts on southern Wisconsin forests and woodlands include longer growing seasons, CO2 fertilization, increased drought risk, extreme weather, less frozen ground, increased fire risk, species range shifts, and increased stressors (Handler et al., 2014). Interactions between threats can trigger big changes like stress, disturbance, invasive species, insect pests, and forest diseases. Upland forests are moderately vulnerable to climate change as most of the primary tree species are expected to maintain or gain suitable habitat over the next century.

Forests play a critical role in climate change mitigation by removing carbon dioxide from the atmosphere through photosynthesis and storing carbon in soils and vegetation (Handler et al., 2021). When trees are lost and when soil is disturbed, much of this carbon is then released back into the atmosphere. Protecting existing trees and increasing regional canopy cover can help achieve the goals of the Dane County Climate Action Plan by contributing to climate resilience, and in urban areas, decreasing the urban heat island effect. As such, old-growth woodlands are mapped as voluntary environmental corridors for consideration in Environmental Corridor.

VEC ELEMENT: Natural Resource Area Boundary

Natural Resource Area Boundaries (NRABs) serve as a planning acquisition tool and resource/recreation management tool for Dane County Parks to create a unified

management strategy/-plan. This designation typically ~~identifies~~ includes large, contiguous blocks that may include a mixture of agricultural lands, water, wetlands, steep topography, prairie, and forests. The mapping of these areas allows Dane County Parks to pursue grant funding to acquire additional land. According to the Dane County Parks and Open Space Plan, NRABs have no bearing on any zoning or land use decisions, and private landowners or local units of government carry out any outlined resource protection initiatives on a voluntary basis.

Creation of larger areas can provide space to incorporate limited recreation use without impacting protected resources and allow native vegetation management practices, such as prescribed burns, to take place. Natural Resource Area Boundaries are mapped as Voluntary Environmental Corridors outside of urban service areas.

VEC ELEMENT: Ice Age Trail Corridor

Designated a National Scenic Trail (NST) by Congress in 1980, the Ice Age Trail winds its way for over 1,000 miles across Wisconsin from the St. Croix National Scenic Riverway on the Minnesota border to Potawatomi State Park in Door County. The Trail is managed by a partnership among the National Park Service, the WDNR, and the Ice Age Trail Alliance.

The purpose of the Ice Age NST is to ensure protection, preservation, and interpretation of the nationally significant resources and values associated with continental glaciation in Wisconsin, and to provide outdoor recreational and educational opportunities in support of and compatible with the conservation and enjoyment of the nationally significant scenic, historic, natural, and cultural resources along the trail. The trail preserves outstanding landscapes and landscape features resulting from continental glaciation. The Ice Age Trail Corridor includes the land public agencies and non-profit organizations want to acquire along the Ice Age NST.

The Ice Age Trail Corridor passes through the west side of Dane County from Lodi Marsh in the Town of Dane to the Brooklyn State Wildlife Area in the Town of Montrose (see the Dane County Parks & Open Space Plan). The trail traverses the terminal moraine of Dane County's last glacier, passing through oak savannas, prairies, and oak, hickory, and maple forests. While the WDNR is the primary landowner, the trail also traverses private land, city parks, county forests and national forests.

[Photo: Ice Age Trail Springfield Hill Segment by Kenneth Casper]

The Regional Development Framework recommends that communities designate trail corridors as stewardship areas to maintain large networks of natural corridors to facilitate connectivity. The Ice Age National Scenic Trail Corridor is mapped as voluntary environmental corridor outside of urban service areas.

Habitat Stepping Stones & Corridor Connections

[Figure 5. Habitat stepping stones and corridor connectivity. From ~~the Cornell Lab of Ornithology and The Nature Conservancy,~~ ~~XXXX~~Crain, 2015.]

Open space and natural resource areas also provide important benefits as wildlife corridors and habitat, contributing to biodiversity and regional ecosystem resilience. Collectively, these resource features provide tremendous ecosystem services that support the region's high quality of life and productive economy.

Biodiversity is declining worldwide. According to the 2020 World Wildlife Fund (WWF) Living Planet Report, land use changes (including fragmentation) account for the largest portion of biodiversity loss. As defined by Wilcove et al. (1986), the process of habitat fragmentation is one in which "a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original." Fragments of habitat may not meet the needs of or be able to support as many species as a large expanse of habitat. As fragments decrease in size, they can support fewer species (i.e., "richness"), and as species richness decreases, so does ecosystem function.

Rates of fragmentation have increased substantially due to human activities. Major drivers of fragmentation are agriculture, infrastructure, and urbanization. Providing more opportunities for connectivity in a landscape can counter the adverse effects of fragmentation (Bennett, 2003).

~~Intentionally maintaining or creating stepping stones, or smaller patches of environmental corridors in close proximity to other corridors, can help maintain some of this corridor connectivity, as illustrated in Figure X.X and described further below. Connectivity supports biodiversity by providing wildlife with the ability to access habitat necessary for their survival. According to Bennett (2003), linking habitats helps animals cross local barriers and ecologically inhospitable environments, maintain traditional migratory movements, and recolonize habitats by increasing dispersal and immigration. Managing the whole landscape mosaic to promote movement and population continuity can help achieve landscape connectivity for wildlife species.~~

A **habitat corridor** is a linear strip of vegetation that provides a continuous ~~(~~or near continuous~~)~~ pathway between two habitat patches or nodes. Habitat corridors should ~~also~~ be of sufficient width to reduce edge effects~~,~~ and of suitable habitat to permit the organism to cross during its lifespan (animals) or ~~to be~~of suitable quality to allow for temporary colonization (plants). ~~With some sensitive organisms, i~~If the corridor doesn't provide suitable habitat, some sensitive organisms ~~it~~ will not identify it as a place to move through. This can affect ~~be important for~~ species moving from one wetland habitat to another~~, but the~~when the corridor contains upland habitat without sufficient hydrology to provide cover during movement. Interconnected networks of corridors increase and enhance habitats by accommodating a wider variety of species and allowing movement across the landscape.

Wildlife corridors can be strengthened by identifying potential habitat stepping stones that can best connect isolated patches of resource areas to the broader network of corridors. **Stepping stones** are small patches of habitat that can serve an important role in fragmented landscapes by allowing for species movement between larger patches (Bentrup, 2008). They can enhance connectivity in developed landscapes by maintaining continuity of ecological processes when corridors are not possible or needed.

Intentionally maintaining or creating stepping stones, or smaller patches of environmental corridors in close proximity to other corridors, can help maintain some of this corridor connectivity, as illustrated in Figure 5 and described above. Connectivity supports biodiversity by providing wildlife with the ability to access habitat necessary for their survival. According to Bennett (2003), linking habitats helps animals cross local barriers and ecologically inhospitable environments, maintain traditional migratory movements, and recolonize habitats by increasing dispersal and immigration. Managing the whole landscape mosaic to promote movement and population continuity can help achieve landscape connectivity for wildlife species.

[Photo: City of Madison crane]

04 Implementation

This chapter describes the roles of CARPC and local communities in environmental corridor delineation. It provides specific mapping criteria for each environmental corridor element, including those for estimated and voluntary environmental corridors, as well as the process of delineating the actual corridor boundary based on the mapped data. It also discusses the process for changing the Environmental Corridor.

The Role of CARPC

CARPC provides contractual services to the WDNR to administer the *Dane County Water Quality Plan* and conduct sewer service area planning. An integral component of this planning work is delineating environmental corridors. CARPC staff apply the policies and criteria related to environmental corridors during reviews of development plans, and work to continuously update and refine the mapped environmental corridor.

Through this work, staff work collaboratively with the local municipality and other interested agencies to delineate, refine, and revise environmental corridors based on best-available information. ~~While t~~The central goal is to protect water quality through appropriate application of environmental corridor policies. This often means restricting development in certain areas due to the environmental sensitivity of resources within; however, CARPC also seeks to collaborate with communities to maintain and expand the environmental corridors network in a way that, where possible, satisfies both local interests and regional concerns. Local input into corridor delineation is a critical step to identifying the most accurate resource information and resulting corridor boundary.

The Role of Local Communities

Local units of government are both the ultimate protectors and beneficiaries of the Environmental Corridors within their jurisdiction. Beyond the significant ecological benefits discussed in detail previously in this report, environmental corridors are valuable community resources that improve property values and increase the desirability of adjacent development. In addition to maintaining the integrity and consistency of corridor delineations through collaboration with CARPC on proposed amendments to the sewer service area and reviews on both private and public development proposals (typically through sanitary sewer extension reviews), local communities can protect multipurpose environmental corridors through a combination of regulation and acquisition (see Appendix C). Ultimately, enforcement of environmental corridor requirements by the local units of government during zoning reviews, site plan reviews and other local review and approval processes is paramount to ensuring development does not occur within these important areas.

Protection through floodplain, shoreland, and wetland zoning and conservancy areas allows lands to remain in private ownership and is appropriate where public access is not needed. Where public access, publicly owned stormwater management, or public maintenance is required, it is necessary to acquire lands through dedication or purchase. In addition, public acquisition may be required to protect important resource areas vulnerable to development and not adequately

protected through zoning or other regulatory means. Conservation easements may also be used in instances where fee-simple title is not needed.

Furthermore, delineating and incorporating environmental corridors and estimated environmental corridors in community plans sets a legal basis for the regulation of privately owned lands through zoning or other regulatory means. This is particularly appropriate for state mandated zoning, such as floodplain and wetland zoning, as well as for zoning which is not mandated by the state, such as conservancy zoning.

The mapping and adoption of environmental corridors also informs other local governmental bodies and departments of the intent to protect these areas, so that actions by individual departments or other governmental units do not conflict with or detract from the goals and purposes of the environmental corridor system. Incorporating voluntary environmental corridors into local plans also communicates the intent to protect certain areas.

Finally, mapping and adopting environmental corridors can provide a long-term framework for communities to show how individual actions affecting small areas fit into the overall open space system. It also allows local governments to gradually develop the overall environmental corridor system over multiple years.

Mapping Corridors

Environmentally sensitive features associated with surface waters (wetlands and waterways and their associated buffers, floodplains, and wooded, riparian steep slopes) must always be included in environmental corridor as they have the most direct potential for adverse impacts on water quality from point or nonpoint source pollution. Meanwhile, the requirements for inclusion of other non-sensitive elements (parks and stormwater management areas) or elements not associated with surface waters (problem soils and unique geologic formations, archaeological sites, and endangered and sensitive habitats) allows for site-specific considerations.

Criteria for Non- Environmentally Sensitive Elements

Three general criteria guide corridor delineation when dealing with non-environmentally sensitive elements: (a) degree of contribution of an element to an open space function; (b) degree of continuity, connectivity, and linkages; and (c) degree of existing development.

Degree of Contribution to an Open Space Function

The first priority for inclusion in the corridor is land which makes a “major contribution” to one of the seven environmental corridor functions listed in Chapter 02. A major contribution can be made by either a single important environmental corridor element or a group of elements which are important because of their interrelationship. Environmental corridor elements frequently abut each other, increasing an area’s importance and need for protection. Other lands are included because two or more resources occur together, such as a riparian steep slope. The presence of an isolated individual resource, such as a woodlot or a steep slope located away from environmentally sensitive features, does not typically justify inclusion of land in the corridor without other supporting factors or resources.

For example, major parks and conservancy lands (both existing and proposed) are included in environmental corridor, by virtue of being in (or proposed for) public control and contributing large areas of open space (i.e., directly contributing to the outdoor recreation and education open space function). Smaller neighborhood parks may or may not be included, depending on their location and relationship to other resources (criterion b).

[Photo: Cherokee Marsh woodland trail]

Stormwater management is one of the seven functions described previously; however, ~~such~~ stormwater management areas are generally only included in environmental corridor if ~~it is~~they are publicly owned, ~~provides regional treatment,~~ contained in an easement providing long-term assurance of its function, ~~or~~ adjacent to an environmentally sensitive area, or provide regional treatment.

Whether problem soil areas, unique geologic formations, archaeological sites, or endangered/sensitive habitats are included as environmental corridor varies. Unique geologic formations and archaeological sites are generally only included for the reasons described in the archaeological and geological resource protection section of Chapter 02. Problem soils often coincide with other environmental corridor elements and don't contribute anything beyond the open space functions of those elements. While endangered/-sensitive habitats are not often included in environmental corridor due to their rareness or distance from urban areas, they significantly contribute to two open space functions: protection of natural resources and critical environmental processes and climate resilience.

Degree of Continuity, Connectivity, and Linkages

The next priority is to include land which links other environmental corridors together to form a continuous system. Continuity may be created for ecological reasons, as with drainage systems or wildlife habitat, or to provide a continuous pathway for recreation.

Including land because it provides continuity is a matter of judgment; there are no specific criteria on the distance between major resource areas to be connected or the size of the link. In general, the purpose is not to arbitrarily connect points but to provide continuity where it is logical and justifiable for the purposes noted above.

Any of the following may be used as linkages in the corridor: railroad corridors, bicycle paths, narrow drainage or walkway easements, individual environmental corridor elements that do not qualify for inclusion on their own, or undeveloped land with no resource significance other than open space. Some land is also included in the corridor because it enhances a naturally continuous pattern. For example, small parks and private stormwater management areas adjacent to major resource features are generally included because of their association with protected elements.

Degree of Existing Development

The final criterion used to assess non-environmentally sensitive elements for inclusion in an environmental corridor is that the land be undeveloped and free of existing commitments for future development. While this may seem self-evident, much land classified as floodplain, shoreland, or another significant resource is already developed and thus no longer serves the functions of environmental corridors. Portions of municipal or county parks which are not actually in

recreational use, such as administration buildings and equipment storage, are also generally excluded.

The only development compatible with environmental corridor functions is recreational facilities in parks (tennis courts, tracks, etc.) and the streets, utilities, and railroads used for access to recreational or institutional uses in the corridor.

Mapping Environmental Corridor Elements

The first step in delineating Environmental Corridors is compiling and reviewing data for each of the corridor elements described in Chapter 03. Much of the data used comes from publicly available sources (see Appendix F); data that is not publicly available is discussed in the sections below. Unless specified otherwise, Estimated Environmental Corridors are mapped outside of urban service areas using the same criteria.

Mapping of individual environmental corridor elements can result in overlapping features, especially in areas around streams. The furthest extent of any mapped environmental corridor element determines the extent of the environmental corridor boundary. Mapping these features together often creates a generally contiguous corridor pattern. However, major resource features are sometimes isolated from the corridor system.

Given that much of the development in the region predates the adoption of the policies and criteria for Environmental Corridors in 2008, there are many instances where existing development or impervious areas are within what should be environmental corridor. The footprints of such areas are excluded from Environmental Corridor and considered exempt from the requirements of environmental corridors.

However, if the site is ever redeveloped there shall be no further encroachments into the environmental corridor and new impervious surfaces are strongly encouraged to meet the current policies and criteria wherever feasible. This does not exempt development which has or does occur within the environmental corridor after the year 2008. Such activity would be subject to mandatory removal and restoration of the corridor.

[Photo: wetlands near upper Mud Lake]

EC ELEMENT Wetlands

Wetlands recognized by WDNR are required to be mapped as environmental corridor within urban service areas. The first source for mapping wetlands is the GIS dataset developed by WDNR. The dataset includes polygon data for wetlands greater than 2 acres and point data for wetlands less than 2 acres, dammed ponds, and excavated ponds. All wetland locations for the dataset were obtained from the Wisconsin Wetland Inventory (WWI) prepared for each Wisconsin county by the WDNR.

The WDNR completed the initial inventory of the state's wetlands in 1984. Most of the state was mapped using traditional stereo-pair, black-and-white, infrared photography and delineated at the nominal scale of the 1:24,000 (1 inch = 2,000 feet) base map. Wetland types are identified according to the WWI Classification Guide (1992). LiDAR technology has advanced the ability to see surface features and has allowed for improved wetland and surface water mapping. Parts of

Dane County have been mapped since 1996 using LiDAR based digital elevation models and high-resolution imagery. Portions of the county were updated using LiDAR in 2010 and 2017.

WDNR recognizes the limitations of using remotely sensed information as the primary data source. Remote data is to be used as a guide for planning purposes. The most accurate method of determining the legal extent of a wetland for federal or state regulations is a field delineation of the wetland boundary by a professional trained in wetland delineation techniques. Wetland delineations are required when a specific development site includes an area that may be a wetland, often prior to the sewer service amendment or site development review processes. Wetland delineations, therefore, are the secondary and preferred data source used to delineate environmental corridors for wetlands and supersede mapping based on WWI-mapped wetlands. Generally, wetland delineations are considered valid for five years from the date of WDNR's confirmation of the delineation.

Delineated wetlands that receive wetland fill permits or are determined exempt by WDNR are not mapped as environmental corridor. If these WDNR determinations occur after the delineated wetland and its required buffer are mapped as environmental corridor, that area is removed from environmental corridor mapping as a minor change (see Minor Change).

EC ELEMENT Wetland Buffers

A minimum 75-foot-wide vegetative buffer from the edge of wetlands under WDNR jurisdiction is required to be mapped as environmental corridor within urban service areas. A 75-foot buffer is also applied to wetlands under WDNR jurisdiction outside of urban service area boundaries and mapped as estimated environmental corridor. Within the 75-foot buffer, non-vegetated surfaces are prohibited, and native vegetation is strongly encouraged.

A 30-foot no-grading buffer from the wetland edge is included within the 75-foot-wide buffer strip. Within this buffer, there shall be no disturbances resulting from grading or other activities, except for the purposes of restoring natural wetland vegetation or hydrology.

As discussed further in Chapter 03, a 75-foot- wide vegetated buffer strip is considered effective for sediment or phosphorus control but could be less effective where nitrogen control or wildlife habitat functions are desired. The minimum width of vegetative buffers for shorelands and wetlands may be increased to up to 300 feet where site specific habitat susceptibility and protection needs make such an increase advisable. CARPC staff will determine the appropriate buffer width in consultation with WDNR technical staff, local government and other expert resources management professionals.

EC ELEMENT Floodplains

The 1% annual chance (or 100-year) floodplain is required to be mapped as environmental corridor within urban service areas. Outside of urban service area boundaries, floodplains are mapped as estimated environmental corridors. The modeled and mapped 1% annual chance floodplain is based on either historical data or the best available elevation data.

Floodplain boundaries are obtained from the Digital Flood Insurance Rate Map (DFIRM) Database produced by the Federal Emergency Management Agency (FEMA), or more detailed studies where available. The DFIRM Database is derived from FEMA Flood Insurance Studies (FISs), previously

published Flood Insurance Rate Maps (FIRMs), flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data, where available. Spatial data displayed on the DFIRMs is incorporated into FEMA's National Flood Hazard Layer (NFHL).

[Photo: Badger Mill Creek]

FIRMs can be changed through an administrative procedure established by FEMA referred to as a Letter of Map Change (LOMC). This process officially revises the current National Flood Insurance Program (NFIP) map to show changes to floodplains, regulatory floodways, or flood elevations. Changes which can be made include amendments (LOMA), revisions (LOMR) and revisions based on fill (LOMR-F). If granted, a LOMA would state that an existing structure or parcel of land would not be inundated by the base flood. Comparably, a LOMR-F would state that an existing structure or parcel of land has been elevated by earthen fill and would not be inundated by the base flood. In the case of a proposed project, FEMA may issue a Conditional Letter of Map Revision (CLOMR) to comment on whether a proposed project would meet minimum NFIP standards. If approved, FEMA issues a determination that officially adjusts the floodplain on the FIRM and the Environmental Corridor can be updated accordingly.

The WDNR applies for annual FEMA grants to update FEMA regulated floodplain maps. Studies are funded on a Hydrologic Unit Code 8 (HUC-8) watershed basis (additional information available on the WDNR's floodplain mapping website).

However, it can take 4-10 years to update floodplain maps with this funding. Because environmental corridor mapping can thus lag behind actual floodplain conditions, project-specific information may be necessary to properly update maps.

EC ELEMENT Wooded, Riparian Steep Slopes

Wooded, steep slopes within the riparian area of waterbodies are required to be mapped as environmental corridor within urban service areas. The primary source for mapping riparian steep slopes is 1-foot LiDAR data available from the Dane County Land Information Office. The most recent LiDAR dataset available is 2017, as of the date of this report. CARPC Staff use the Digital Elevation Model (DEM) generated from the LiDAR data to create small polygons with slope information. Any of the polygons with contiguous areas greater than or equal to 12% in the glaciated portions of the county and between 12 and 20% in the driftless portion of the county, that intersects any water resource or its required vegetative buffers are considered riparian steep slope and mapped as environmental corridor. The initial mapping of riparian steep slopes is approximate and is revised when an area is brought into the sewer service area after reviewing detailed site plans.

EC ELEMENT Lakes, Ponds, and Streams

Lakes, ponds, and streams are required to be mapped as environmental corridor within urban service areas. The type of waterbody determines the extent of the required shoreland buffer strip (see Shoreland Buffer Strips). **Perennial streams** are permanent, continuously flowing waterways which are generally navigable (see further discussion below on navigability). **Intermittent streams** are waterways that flow in response to seasonal fluctuations in the water table; a seasonal or intermittent water source, such as snowpack; or precipitation events.

[Figure 7. Shoreland buffer strip guidelines.]

Open channel drainageways are above-ground drainage systems which have been constructed to accommodate intermittent water flow, often replacing a previously natural drainageway. Drainageways included in this category may be concrete-lined channels or simply open ditches. The latter appear commonly in undeveloped areas to accommodate agriculture or recent development, while the former appear in more heavily urbanized areas. Most open channel drainageways are treated like an intermittent stream in terms of required buffers, although continuously flowing drainageways, even if lined or channelized, are considered perennial streams.

The primary source for mapping these features is the 2,400-scale GIS dataset of hydrologic features maintained by the Dane County Land Information Office or the WDNR. This data is also supplemented with the latest aerial photographs and municipal storm sewer maps. Where photographs or site survey information show changes in stream bed location or extent, the environmental mapping is altered accordingly.

EC ELEMENT Shoreland Buffer Strips

Shoreland buffer strips are required to be mapped as environmental corridor within urban service areas. Buffer guidelines differ depending on whether a waterbody is navigable based on WDNR determination and if it has recreational access. According to the WDNR, a waterway is "navigable" when water flows in a channel that has a defined bed and bank, an ordinary high water mark, and evidence of enough water on a recurring basis to support navigation by a small watercraft.

Navigable waterways are public resources protected by state regulations. Along navigable streams, a buffer strip with a minimum width of 75 feet, ideally comprised of native vegetation suitable to the conditions, must be provided to the landward side of the ordinary high water mark. This generally corresponds to the minimum building setback provided under shoreland zoning requirements and should be sufficient to accommodate vegetative bank stabilization, pollution control, and recreational trail development. This minimum width should be provided on each side of a stream, with a total minimum corridor width of 200 feet (including width of stream; need not be centered on the stream). This mapped width of 200 feet generally allows for adequate water resource protection, wildlife habitat, basic recreational trail development, and placement of utility lines.

In contrast, non-navigable waterways are not considered public resources. For non-navigable intermittent streams and drainageways, a minimum total corridor width of 75 feet is established for corridors not intended for public recreation access. In all cases, a minimum 25-foot-wide vegetated buffer strip, ideally comprised of native vegetation suitable to the conditions, should be provided on each side of the stream or drainageway. Where recreational access to the corridor is intended, the minimum total corridor width should be increased to 100 feet, depending on the degree of intended recreational use and facilities needed.

Outside of the urban service area, shoreland buffer strips are designated as estimated environmental corridors and are mapped adjacent to streams and drainageways based on flowlines from the US Geological Survey's 1:24,000-scale topographic map series. Buffers are mapped with at least 100 feet on either side of a perennial stream creating a total buffer strip width of 200 feet, centered on the perennial stream. For intermittent streams and open channel drainageways, a total buffer width of 100 feet is delineated, centered on the mapped stream.

During initial mapping for streams within estimated environmental corridors, the shoreland buffer strip must be considered tentative and is expected to be adjusted when being brought into the urban service area, and again during the process of detailed site review or plat approval within the guidelines illustrated in Figure 7.

[CALLOUT BOX – Spotlight: Navigability Determinations

A waterway is "navigable" when water flows in a channel that has a defined bed and bank, an ordinary high water mark, and evidence of enough water on a recurring basis to support navigation by a small watercraft.

Only the Wisconsin DNR can make an official determination on navigability. A third party (e.g., a community) can prepare the necessary data to support a determination, but the final determination must be made by the WDNR.]

EC ELEMENT Public Lands, Parks, and Conservancy Areas

Most public lands, parks, and conservancy areas are required to be mapped as environmental corridor within urban service areas. The locations of existing and proposed parks, greenways, and conservancy-zoned land are obtained from a variety of sources. This includes those areas with public access, whether publicly or privately owned, and those with no public access.

Open space and/or recreational land with public access is mapped as environmental corridor if it is publicly controlled through existing ownership, easement, or other regulation that provides for public access. If in private control, the land must have public access for recreational or general open space use. Land mapped under the public access category includes state, county, city, village, and town parks, drainage greenways dedicated to the public, golf courses, and public and private school playfields and open lands.

Land without public access may be undeveloped and publicly controlled in some way (e.g., easements or zoning) but lack legal provisions for access. These areas are protected from development but can be used for recreational purposes. Such land includes most drainage easements and conservancy zoning (where that is the only control on the land).

All mapped information is checked against aerial photographs to verify that only land which is actually open and undeveloped is included. The following sources are used to identify existing parks and public open space:

- Aerial photographs: Current aerial photographs are used to verify all mapped information and to obtain boundaries of open land which do not correspond with parcel boundaries.
- Land Use Inventory maps: Maps prepared by CARPC and Dane County from field inventory and aerial photos.
- City, village, and Dane County zoning departments: Zoning maps, indicating land zoned as conservancy under city, village and/or county ordinances. County exclusive agricultural zoning is not mapped.
- Recorded subdivision plats: Plat maps for recorded subdivisions filed with the Register of Deeds, City of Madison Engineering Division, and the Dane County Surveyor. These maps identify dedicated parkland and greenways in new developments.

- State and county park maps: Detailed maps of state parks and individual county parks, prepared by WDNR and Dane County Parks Department, respectively.
- City and village park plans and master plans: Plan maps from adopted plans. Where available, these plans are used for a general guide in locating existing park and open space lands.

Proposed parks are defined by the same criteria as existing parks, with the distinction that proposed park or conservancy land is not currently in public ownership or controlled by the desired regulatory means. This category represents land planned for future park or open space use by some level of government. To be included here, a proposed park must be mapped as part of an adopted plan or other document which signals public intention for the use of that land. Public access may or may not be anticipated for land mapped in this category. That distinction can be made only at the time that the proposal is implemented.

The following sources are used to identify proposed parks and public open space:

- Community plans: Plan maps, at various scales, from adopted city, village and town plans. Only specifically mapped parks or conservancy areas are included, not general recommendations.
- Adopted park and open space plans, including community park and open space plans, Dane County Park and Open Space Plan, and special plans such as Cherokee, Ice Age, Door Creek, WDNR plans, etc.
- Urban Service Area Amendment application materials.
- Land division documents, including CSMs and final plats which designate certain outlots for public park purposes.

EC ELEMENT Problem Soil Areas and Unique Geologic Formations

Some problem soil areas and unique geologic formations may require inclusion in environmental corridors. Typically, these features coincide with other elements requiring inclusion in environmental corridor. Additionally, where other environmentally sensitive elements are not present, issues presented by problem soils can be mitigated with enhanced or specialized engineering provisions, and so final determination of whether problem soil areas and unique geologic formations are included within environmental corridor is often based on site-specific conditions. Although soil with development limitations is not, by itself, included as a criterion for delineation as environmental corridor, soils found along streams, in floodplains, wetlands, and riparian steep slopes very commonly have severe limitations for development, reinforcing the need to protect these areas from development.

Soils with limitations for shallow excavations, construction of dwellings with basements, and construction of local streets and roads are obtained from the Soil Survey of Dane County, prepared by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). Spatial and tabular Soil Survey Geographic (SSURGO) data can be downloaded from the Web Soil Survey on the NRCS website.

Unique geology (such as rock outcrops and glacial features) is identified through discussion with local officials or geologists who are familiar with the area. Aerial photographs can help define the boundaries of these elements.

EC ELEMENT Archaeological Sites

The State Historic Preservation Office (SHPO) manages the Wisconsin Historic Preservation Database (WHPD) which contains records for historic buildings, archaeological sites, burial sites, and archaeological surveys in Wisconsin. The WHPD contains four databases that are updated daily: Archaeological Report Inventory (ARI), Archaeological Sites Inventory (ASI), Architecture and History Inventory (AHI), and National Register (NR). The NR contains information for historic properties listed in the State and National Registers of Historic Places. All newly identified areas listed in the abovementioned four databases are included in environmental corridor and estimated environmental corridor areas.

EC ELEMENT Endangered and Sensitive Habitats

Some endangered and sensitive habitats may require inclusion in environmental corridors. Habitats considered endangered or sensitive based on WDNR determination are mapped as Environmental Corridor within urban service areas. This may also include the habitat of endangered wildlife or areas of high-quality landscapes unaltered by human development (e.g., oak savanna and prairie remnants), based on consultation with WDNR staff, local government and other expert resources management professionals. In areas outside of urban service area boundaries, savannas and remnant prairies are mapped as Estimated Environmental Corridors.

The data behind mapping of natural communities is often very coarse, and therefore, these areas are typically not proactively mapped as estimated or voluntary environmental corridors and instead, this information is reviewed and refined on a site-by-site basis at the time of inclusion in urban service area.

Existing savanna data was compiled by the Prairie Enthusiasts and the WDNR Bureau of Endangered Resources. Remnant savanna data was created by CARPC. The location of areas with unique or native vegetation (such as remnant prairies) can also be obtained from WDNR's Natural Heritage Inventory data and from consultation with DNR staff, local government and other expert resources management professionals who are familiar with the area.

The Natural Heritage Inventory (NHI) was first established by The Nature Conservancy in 1974. The Wisconsin program began in 1985. The NHI programs all use standard methodology for collecting, characterizing, and managing rare species data. In general, NHI uses two approaches to inventorying biodiversity: locating occurrences of particular elements and assessing the components of particular areas.

The NHI list is updated as often as new information regarding the biological status of species becomes available. There are three free NHI data options that should be used for general planning and assessment purposes only: County and Township data tools and a Public Portal.

EC ELEMENT Stormwater Management Areas

Most stormwater management features which serve a regional or multi-lot area should be placed into environmental corridor, while smaller-scale features serving a single lot may be included on a case-by-case basis depending on their size and relative proximity to natural resources and other existing areas of environmental corridor. Determination of whether to include these features within environmental corridor is typically made by CARPC staff in consultation with local government and

the development team using the three criteria defined in Criteria for Non- Environmentally Sensitive Elements.

Stormwater management areas are typically placed into environmental corridor as part of the sewer extension and stormwater plan review process. The primary sources for mapping stormwater management areas are proposed subdivision plats, Certified Survey Maps (CSMs), and proposed site development plans (e.g., engineering plans and stormwater management plans). In general, it is advised that stormwater management areas be contained within a public outlot, easement, or other survey instrument which includes a legal boundary description. Stormwater management areas are allowed within the required wetland buffer but not within the 30-foot no-grading buffer. If stormwater management areas are proposed within the 30-foot no-grading buffer, a major change will be required (see Major Change section of Chapter 04).

Environmental corridors can also be updated to include existing or proposed stormwater management areas at the time of urban service area amendments or at other times through staff review. Oftentimes these are conceptual, and the environmental corridor mapping should be considered approximate. These areas are then refined during the detailed sewer extension review process.

Mapping Voluntary Environmental Corridor Elements

Each of the seven voluntary environmental corridor elements described in Chapter 03 are mapped distinctly outside of urban service areas in Dane County. Within undeveloped areas within existing urban service area boundaries, these elements still provide benefits and should be considered for environmental corridor. Habitat stepping stone mapping is in development and described at the end of this section.

VEC ELEMENT: Potentially Restorable Wetlands

The WDNR uses GIS data to identify potentially restorable wetlands (PRWs). Sites that have not been mapped in the Wisconsin Wetlands Inventory are considered PRWs when they have hydric soil or hydric inclusions, have the same range of Compound Topographic Index (CTI) values as wetlands, and are in land use classes where restoration is typically practical, such as agriculture. WDNR's current PRW data layer is a result of applying the CTI to areas with multiple soil attributes. This dataset was last updated in 2016. Areas of PRWs are mapped as voluntary environmental corridors.

VEC ELEMENT: Hydric Soils

The United States Department of Agriculture Natural Resources Conservation Service maintains state and national lists of potentially hydric soils based on the National Soil Information System (NASIS) database selection criteria developed by the National Technical Committee for Hydric Soils. The annually updated national electronic list may be obtained from the USDA NRCS website. There are 12 hydric soils and three predominantly hydric soils in Dane County. Hydric and predominantly hydric soils data can also be viewed on WDNR's Surface Water Data Viewer. Areas of hydric soils are mapped as voluntary environmental corridors.

VEC ELEMENT: Old Growth Woodlands

Dane County woodlands are mapped through remote sensing techniques that use an index of red and near infrared spectral bands of light (NDVI) from current high resolution aerial photography in conjuncture with LiDAR data to generate object height and structure information.

Not all woodlands provide the same ecological and ecosystem benefits. Woodlands established though agricultural land abandonment, the most common reforestation pathway in Dane County, are much more likely to have a higher component of less desirable pioneer species, invasive tree and shrub species, potentially increased erosion, and generally less suitable habit for native fauna. Whereas woodlands which have largely been maintained throughout the course of human inhabitation in the region are considered old-growth and are generally of much higher ecological value. To differentiate potential high-quality woodlands, CARPC used historical datasets in combination with the recent mapping technologies.

The Wisconsin Land Economic Inventory conducted throughout Wisconsin in the 1930s yielded a highly detailed survey, including maps of all forest stand types, diameters, and densities at a minimum mapping unit of 1 acre. The mature, low-density oak and hickory forests considered savannas in this survey were subsequently compared to recent forest mapping data. Areas mapped as savanna in the 1930s that are still forested today are considered high quality, old-growth woodlands with minimal disturbances.

As sewer service area amendments are evaluated, a more thorough analysis of quality woodlands is required. This involves a decade-by-decade aerial photo interpretation of the woodlands of interest to ensure the area has remained forested throughout observable records. Areas determined to be old-growth woodlands are mapped as voluntary environmental corridors. CARPC has prepared a collection of data mapping tools to assist with determining what should be considered a high quality, old-growth woodlands. These tools are available to the public through the CARPC Open Data Portal.

[CALLOUT – Spotlight: CARPC High Quality Woodland Related Data Mapping

DANE COUNTY 1834 HISTORIC VEGETATION AND ORIGINAL WITNESS TREES

Dane County's landscape has continually undergone significant changes since early settlement by Euro-Americans in the 1830s. At the time of settlement, much of Dane County's landscape would have been characterized as oak savanna, oak woodland, or prairie, all of which experienced frequent ground fires but remained in a state of homeostasis. Tree species would have been dominated by bur and white oaks, and to a lesser extent red, black and pin oaks. The number of trees per acre would have been significantly less than what is seen in almost all forested areas in Dane County today.

Today, our best understanding of historic forest landscape conditions is uniquely derived from the original survey notes and observations recorded by the General Land Office surveyors. The surveyors traversed the landscaped establishing property monuments with the purpose of enabling future land distribution, through programs to homesteaders, prospectors, railroads, returning veterans, and others. For each newly established survey monument, witness tree species, tree diameters, and distance/azimuth was documented to provide the next surveyor with ample information to relocate the monument. This original witness tree dataset provides a snapshot of

historical landscape conditions now made observable through the Dane County Mature Forest web map on CARPC's Open Data Portal.

DANE COUNTY MATURE FOREST (> 100 YEARS OLD)

The Dane County Mature Forest web map shows mature forest (present since 1939), areas reforested after 1939, and previously mature forest converted to agriculture. The Wisconsin Land Economic Inventory (1939) data set was used to identify mature forested areas at the time, these areas were subsequently compared to areas identified as forest in the 2014 WISCLAND. Areas identified as forest in both time periods are considered mature forest over 100 years old. These locations highlight areas that were likely never plowed for agriculture and maintain an old growth component in addition to a remnant oak savanna.

DANE COUNTY HERITAGE OAK PROJECT

Heritage Oaks are trees estimated to be 200 years old or older. Heritage white and bur oaks have a trunk circumference of at least 10 feet (measured at 4.5 feet above ground level), while pin, black, and red oaks have a circumference of at least 14 feet.

Heritage oak trees were originally inventoried in 1976. In 2001, the Dane County Tree Board revisited the trees and added coordinates to the locations. The Tree Board collaborated with the State Cartography Office and CARPC to begin the process of updating the Heritage Oak Tree Inventory in 2022. A web portal has been developed to crowd-source this inventory.]

[Figure 6. Natural Resource Area Boundaries and Ice Age Trail Corridor. From the 2018-2023 Dane County Parks and Open Space Plan.]

VEC ELEMENT: 0.2% Annual Chance Floodplains

The 0.2% annual chance flood area boundaries are obtained from the NFHL and the WDNR. This dataset is updated every five years. The 0.2% annual chance flood area is mapped as voluntary environmental corridor.

VEC ELEMENT: Ice Age Trail Corridor

The Ice Age NST data was developed by the Ice Age Trail Alliance (IATA) in cooperation with the National Park Service's Ice Age Trail Office. The WDNR hosts a version of the data layer that includes lines representing existing sections of the Ice Age NST. The layer is a combination of GPS and digitized data, merged to represent one complete data layer for the Ice Age NST. It is updated approximately every two months and can be downloaded from the WDNR Open Data Portal. The Ice Age Trail Corridor represents an approximate 50- to 1,000-foot- wide corridor along the Ice Age NST intended for land protection, according to the National Park Service, which is mapped as voluntary environmental corridor. The data layer for the Ice Age Trail Corridor comes from the *Dane County Parks and Open Space Plan* (Figure 6).

VEC ELEMENT: Natural Resource Area Boundary

The Natural Resource Area Boundary (NRAB) dataset (Figure 5) managed by Dane County Parks is updated as needed every five years in conjunction with the Dane County Parks and Open Space Plan. The NRAB is mapped as voluntary environmental corridor.

VEC ELEMENT: Internally Drained Areas

Following recommendations from the 2017 Reducing Increased Risk of Flooding report, CARPC and Dane County initially used the WDNR EVAAL (Erosion Vulnerability Assessment for Agricultural Lands) tool to map internally drained areas. More recent mapping efforts by CARPC utilized Agricultural Conservation Planning Framework (ACPF) tools. Using a combination of datasets (WisDOT, CARPC, Dane County, and other local culverts), culverts were mapped and combined with an elevation dataset to more accurately capture flow pathways.

The internally drained areas identified on the resulting map (available on CARPC's Open Data Portal) are mapped as voluntary environmental corridor. However, this mapping should be considered preliminary and detailed review of site conditions is required during design review. As new and better data becomes available, including LiDAR elevation data and culvert information, this mapping may be updated.

VEC ELEMENT: Habitat Stepping Stones & Corridor Connections

To support biodiversity and regional ecosystem resilience, CARPC recommends mapping connecting corridors and habitat stepping stones as voluntary environmental corridor. Mapping these areas also furthers the 2050 Regional Development Framework objective of enhancing stewardship and natural resource areas.

The 2012 North Yahara FUDA Study incorporated habitat connectivity models as part of a holistic approach to natural resource planning. Building off this work, CARPC is currently evaluating locations to map as potential habitat stepping stones. The stepping stone model aims to connect larger, existing habitat patches via smaller stepping stones where a direct connection is not available through other elements requiring inclusion in environmental corridor.

Preliminary mapping identified habitat stepping stones between existing corridors that could be added as voluntary environmental corridors based on an area's resilience score, land cover, stepping stone positions of 16 native rodent and amphibian umbrella species modeled in the 2012 FUDA planning effort, and patch size. Field assessments of these potential stepping stones will be needed to determine their suitability for acquisition and/or restoration based on factors like habitat quality, patch shape, and the number of current landowners.

Once potential habitat stepping stones have been evaluated, the best candidates will be added to the voluntary environmental corridor map. Coordination amongst stakeholders (conservation groups, municipalities, landowners, etc.) will be needed to achieve regional preservation and conservation goals.

Because it is critical to focus resources where they will have the most impact, current efforts are focusing on habitat outside of current urban service areas. However, the concept and importance of connectivity via stepping stones also applies to patches within USAs. The primary hurdle there is the overall density of existing development and/or commitment of lands for future development. Nonetheless, opportunities exist to connect corridors with stormwater management features, during redevelopment, through strategic placement of parks and open spaces, and by considering the vegetation and habitat types being created in those spaces.

Applying Environmental Corridors and Voluntary Environmental Corridors

Mapping environmental corridors forms an integral part of sewer service area planning by designating areas which are generally restricted from development. These areas are intended to remain generally open and are not to receive public sanitary sewer service, with a few exemptions. To aid in planning for future development, the resource features that provide the background information for corridor delineation are mapped beyond the urban service area boundary as Estimated Environmental Corridors. This provides the information necessary for extending or expanding the environmental corridor system when the urban service area is expanded. Corridors mapped outside the service area boundary do not include all resource features, and mapping this background information does not necessarily imply approval, adoption, or inclusion (or omission) in a future environmental corridor. Environmental corridors are used to help determine whether proposed public and private sanitary sewer extensions are consistent with the adopted sewer service areas and provisions of the Dane County Water Quality Plan.

EXCEPTIONS

Most development within environmental corridors would generally not be in conformance with the Water Quality Plan and sewer extensions proposed to serve areas within the environmental corridor will generally not be approved. However, since environmental corridors are often based on natural drainage features and include low-lying areas along streams and drainageways, they are logical locations for some utilities, particularly sanitary sewers and storm sewers which drain by gravity. In other cases, the cost-effectiveness and public safety priorities of transportation systems must be accounted for; and certain recreational facilities offer a logical and valued enhancement to the function of corridors. Thus, the policies and criteria for environmental corridors contain several exemptions described below.

In all cases, such allowed utilities and facilities should be designed and located to protect corridor functions and the various elements within. Infrastructure resulting in permanent impacts to the landscape should be placed as far away from any environmentally sensitive resources as possible, impervious surfaces should be limited (e.g., the use of porous pavements is encouraged), all stormwater runoff should be properly managed to avoid detrimental impacts to water resources, and native vegetation should be used wherever feasible, especially within the immediate buffers around sensitive water resources.

Compatible Uses

Compatible uses within the environmental corridor include existing or proposed park shelters and related facilities, recreational paths, and other outdoor recreational facilities, provided they are not in conflict with other policies or legal restrictions. For example, recreational paths going through a wetland would still need to comply with all local and state regulations and adhere to applicable policies and criteria of environmental corridors. These compatible uses, where needed, are generally allowed to receive sanitary sewer service.

Encroachment by Utilities and Transportation Facilities

Environmental corridors are not intended to prevent or obstruct necessary maintenance, expansion or construction of public transportation or utilities and related facilities serving areas outside of the corridors, needed to maintain or improve continuity of those systems, or designed to serve compatible uses in the corridors. Rather, the intent is to recognize that such conflicts will occur and

to attempt to resolve these conflicts in a way that protects basic corridor functions while providing necessary utility and transportation facilities in a cost-effective manner. Utilities and transportation facilities intended to serve new sewered residential, commercial, or industrial development in the corridors are not permitted.

When designing such infrastructure, all alternatives to encroachment need to be explored. Where reasonable alternatives exist, encroachment of utility and transportation systems into environmental corridors should be avoided, particularly those encroachments which have permanent impacts, or which introduce incompatible uses into the corridors.

Where infrastructure will encroach upon environmental corridors, it is important to minimize the adverse impact of the encroachment on corridor function. Impacts to scenic beauty or environmental and natural systems can typically be lessened if an attempt is made to avoid dividing natural or physiographic units. In many cases, for example, locating a utility or transportation facility along the edge of a basic resource feature, such as a wetland or steep slope, will result in less impact than taking a direct path across or cutting a swath through the middle of a resource feature.

Locating major construction areas in less sensitive natural areas is also important, as is maximizing the compatibility of vegetative management practices in the right-of-way with adjacent natural vegetation. Roads, for example, increase the spread of exotic plants (Forma et al. 2003), therefore a road near a prairie remnant area or a wetland will have adverse impact on the health of that habitat. Likewise, roads that cross streams can turn into a barrier for the passage of fish when the culvert design does not provide for daylighting.

In general, surface facilities such as streets and highways will result in more serious and longer-term disruption and impacts than will underground utilities. In some cases, expansion of an existing facility presently located in an environmental corridor may be a more cost- effective and reasonable solution than relocating the facility outside of the environmental corridor. Where alternatives are considered from the standpoint of reasonableness and cost-effectiveness, however, it is suggested that the cost of land not be the overriding factor in this determination since corridor lands often reflect lower property values inherent to the limitations of these lands for development. Furthermore, the value of the ecosystem services provided by the elements within the environmental corridor should be considered to provide a more comprehensive cost analysis. Where encroachments into the corridor by utilities and transportation facilities are necessary, impacts should be minimized through careful location and design techniques.

Any necessary facilities constructed in the environmental corridors should be limited to the specific needs of that facility. The guidelines suggested in Chapters NR 103.08 and NR 117.05(2), Wis. Adm. Code provide reasonable considerations for the construction or maintenance of roads, as well as other utilities within environmental corridors. NR 117 indicates that the construction or maintenance of roads is permitted in wetlands if the roads are necessary for the continuity of the city street system, the provision of essential utility and emergency services, or to provide access to uses permitted in the wetland, provided that the following criteria are met:

- The road cannot practically be located outside of the wetland.

- The road is designed and constructed to minimize adverse impacts on the natural functions of the wetland.
- The road is designed and constructed with the minimum cross-sectional area practical to serve the intended use.
- Road construction activities are carried out in the immediate area of the roadbed only;
- Any filling, flooding, drainage, dredging, ditching, tiling or excavating is done only as necessary for the construction or maintenance of the road.

[Photo: BB Clarke Beach]

Although these criteria pertain specifically to locating a road within a protected wetland under NR 117, Wis. Adm. Code, the same considerations are appropriate when considering the encroachment of any utility or transportation facility into an environmental corridor. The following guidelines are also noted in NR 117, Wis. Adm. Code for the construction and maintenance of electric and telephone transmission lines, water, gas, and sewer distribution lines, and related facilities:

- Such lines cannot practically be located outside the wetland.
- Any filling, excavating, ditching, or draining necessary for such construction or maintenance is done in a manner designed to minimize adverse impacts on the natural functions of the wetland.

Prior to the placement of any such facilities within the environmental corridor, it must be demonstrated that the above criteria have been met. This is generally demonstrated by providing CARPC staff with appropriate permitting for the work being done within a regulated water resource.

Changing Environmental Corridors

Environmental corridors are mapped based off the best available information at the time of delineation. The environmental corridor mapping (and estimated and voluntary environmental corridor mapping) is continually being refined and updated to reflect the most accurate and up-to-date information available. Nonetheless, there may be instances where the mapping is outdated and does not reflect the most accurate conditions and information. In this case, the policies and criteria of environmental corridors still apply. Prior to any planned development activity, CARPC staff should always be consulted to review accuracy of mapped environmental corridors.

It is necessary to update and revise mapped Environmental Corridor boundaries and basic resource information for a variety of reasons, including:

- To correct errors or omissions in the mapped resource information and corridor delineations;
- To reflect additional, improved, or updated background or resource information gained from field reconnaissance, more detailed studies, or detailed site surveys and plans for specific areas;
- To accommodate changes resulting from review of specific development plans and plats;
- To reflect changes in plans or policies of local units of government regarding intended land use and open space uses; and

- To refine design and resolve conflicts between utility or transportation systems and environmental corridor delineations for specific sites or projects.

To maintain a flexible but principled administration of environmental corridors, the policies and criteria for environmental corridors in the Dane County Water Quality Plan includes provisions for changes to corridors. Changes to environmental corridors can be classified into two general categories: (a) **minor changes** and refinements that do not require prior action by the Regional Planning Commission or approval by the WDNR; and (b) **major changes** to the corridors which have the potential for significant impacts on water quality and that require concurrence by the Regional Planning Commission and approval by the WDNR. All changes must be coordinated with CARPC staff prior to implementation. Procedures and criteria applicable to both types of changes are outlined in the following sections.

Major changes must be initiated or sponsored by the affected local units of government (city, village, town) or by the Regional Planning Commission in consultation with the affected local government; minor changes are also recommended to be, or may be required to be, sponsored by the local unit of government. Such initiation may occur through formal action by the affected local government, such as adoption by resolution or approval of a plat or development plan. For minor changes, unrecorded plats, draft site plans, or in some cases a simple email acknowledgement of the change, can be acceptable alternatives to official action or approved plats or plans. This ensures that the local public body responsible for land use decisions and pollution prevention is aware of minor changes and allows opportunity for local input on corridor changes. Some minor changes, such as updates based on basic background information from resource datasets, are handled by CARPC staff without involvement by the local unit of government.

MINOR CHANGES

Minor changes, also referred to as refinements, do not require ~~prior~~ CARPC Commission action ~~by the CARPC Commission~~ or WDNR approval ~~by the WDNR~~. However, CARPC staff do need to be informed of the change before it becomes effective for the purposes of determining eligibility for sanitary sewer service and maintaining accurate mapping.

Refinements and minor changes are generally of two types: changes resulting from revised, improved, or more detailed background resource information; and minor adjustments or changes which would not affect water quality.

The following examples illustrate revisions resulting from changes in basic background resource information:

- Improved or revised WDNR-approved floodplain delineations resulting from revised flood studies or availability of more detailed topographic information.
- Revised wetland boundaries shown on Wisconsin Wetland Inventory maps resulting from the availability of more detailed information, field checks by regulatory agencies, or approved rezoning.
- Changes in water bodies, riparian steep slopes, or other resource features resulting from availability of more detailed studies or site maps or from field reconnaissance by regulatory agencies.

- Additions to existing or proposed parks, greenways, or conservancy lands resulting from purchase, dedication, zoning changes, official map changes, or changes in adopted plans or approved site plans and plats, provided proper statutory procedures have been followed.
- Additions of stormwater management facilities during the sanitary sewer extension review process.

The following examples illustrate minor changes which generally do not have the potential for significant impacts on water quality:

- Changes resulting from WDNR-approved changes in floodplain or wetland delineations, or WDNR-approved rezoning (this may include WDNR-approved wetland fill permits or exemptions).
- Relocation or shortening of an environmental corridor based solely on intermittent streams or drainageways, or adjustment of the buffer strip width where still meeting minimum width requirements.
- Addition to, or removal from, the corridors of public or private lands which do not include water bodies, floodplains, wetlands, minimum buffer strips, or steep wooded slopes adjacent to water bodies.
- Changes resulting from utility or roadway maintenance or construction ~~which~~ that meet Wis. Adm. Code Chapter NR 117 ~~the~~ criteria ~~set in Chapter NR 117~~ (state shoreland-wetland protection programs and permitted uses within the shoreland zone~~.~~) ~~above within Exceptions section.~~

MAJOR CHANGES

Major changes have the potential for significant adverse impacts on water quality. These changes require action by the Regional Planning Commission and WDNR approval following a public hearing and detailed staff analysis of the impacts of the change and the likelihood that proposed mitigation measures will be successful. Major change requests must be initiated or supported by the municipality that governs the area in question. Major changes include the following:

- Removing any mapped floodplain or wetland area, unless exempted by state administrative rules or state-approved rezoning or permitting.
- Removing any area below the ordinary high-water mark of a stream, pond, or lake.
- Any change resulting in the elimination or interruption in the continuity of any corridor segment which includes woodlands with resources determined to be endangered or sensitive, floodplains, wetlands, shoreland buffer strips, sensitive habitat areas, or steep wooded slopes adjacent to water bodies (defined as slopes over 12 percent lacking at least 75 feet of vegetated buffer strip between the base of the slope and the ordinary high water mark or top of bank of streams, ponds, and lakes).
- Any change that reduces the width of vegetated shoreland buffer strips along streams, wetlands, and drainageways below the minimum guidelines.
- Grading (or other similarly soil disturbing activities) within a wetland vegetative buffer and within 30 feet of the wetland edge, where the buffer has been delineated in environmental corridors, unless the grading is intended to re-establish natural grades or to restore wetland habitat.

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Appendix A: Summary of Previous and Existing Plans

History & Evolution of Open Space Policy

This appendix summarizes previous plans with the intent to demonstrate how open space policies have evolved since 1971. A summary of the *2050 Regional Development Framework* is included at the end.

1971 PLAN FOR PARKS AND OPEN SPACES

Dane County's first park plan addressed long-term needs for recreational land as well as natural resources. The intent of the plan is summarized in its six objectives:

1. To utilize open space, whether for active or for non-recreation purposes, as a major device or element for directing urban growth and influencing the overall environment of the region.
2. To locate parks and open spaces in such a way as to assist in water pollution abatement, water quality improvement, flood control, regional drainage, and environmental enhancement.
3. To meet the outdoor recreation needs of the people of Dane County.
4. To develop a coordinated system of parks and open spaces for the region" (i.e., coordinated local, county, and state roles).
5. To provide park and open spaces as effectively and economically as possible.
6. To preserve for posterity, where possible, some of the heritage of Dane County.

As a first statement of policies for Dane County, the 1971 plan was significant in recognizing the recreational and non-recreational functions of open space. The plan also recognized that open space areas should be an integral part of the land use plan and should help to carry out the overall settlement policies of the region. The plan's policies produced recommendations to acquire major parks along shorelines and in areas threatened by development, and to acquire wetlands as resource protection areas.

1973 LAND USE PLAN FOR DANE COUNTY

Adoption of the *Dane County Land Use Plan* put park and open space policies into the context of overall county development policies. The plan articulated broad objectives and detailed policies in six subject areas: population growth and distribution; environmental protection and enhancement; regional development; public services; agricultural land; and open space.

Policies regarding open space appear explicitly in four of these subject areas. The plan policies in each subject area are summarized in the following sections.

Open Space

The single objective in this category is "to provide permanent open space throughout the region for public recreation, resource preservation, and community separation." This statement outlines three general functions of open space, clarifying what was implied in the 1971 *Plan for Parks and Open Spaces*. Most of the open space policies in the 1973 Land Use Plan emphasized the preservation of a countywide system of open space corridors, which were mapped as the open space element of

the plan. The countywide open space corridor system in the 1973 Land Use Plan has since been refined and detailed, providing the basis for the present environmental corridors.

Environmental Protection and Enhancement

The objective relating to open space in this category is "to recognize that the natural environment is an integrated unit composed of interacting land, water, and air resources; and to ensure that the health and stability of this resource system are maintained." Implicit in the policies for environmental protection is the use of open space to meet resource protection needs and shape urban development to maintain environmental quality and integrity.

Regional Development

The broad objectives for regional development contained in the Land Use Plan speak to the "community separation" function of open space. They include the following:

1. "To attain a pattern of regional development that includes living environments suited to a variety of human needs including privacy, community, productivity, convenience, beauty, and diversity."
2. "To promote compact urban communities that are visually distinct from each other and both visually and functionally distinct from surrounding agricultural areas."

The accompanying policies speak to the need for compact development, the creation of balanced communities, and efficient use of land for urban purposes. Such objectives and policies recognize that maintenance of open space is integral to achieving desirable development patterns.

Agricultural Land

The agricultural land objectives of the plan largely call for preservation of productive farmland, but one objective specifically sets the goal "to maintain open space provided by agricultural land to guide urban development." Agricultural land, therefore, contributes to the open space function of community separation.

1979 DANE COUNTY WATER QUALITY PLAN

The *Dane County Water Quality Plan* incorporated the Land Use Plan policies for environmental protection and enhancement. Applicable policies from the 1971 Plan for Parks and Open Spaces were also incorporated in the Water Quality Plan to support a recommendation giving priority to acquisition of water-oriented parks and ~~water related~~water-related resource protection areas.

The *Water Quality Plan* supported the incorporation of natural drainage systems into developing areas and underscored the value of protecting multipurpose open space corridors by noting that a "system of … corridors, centered around stream valleys, wetlands and lakes, is a concept with substantial water quality benefits."

1983 PARK, OPEN SPACE AND OUTDOOR RECREATION PLAN FOR DANE COUNTY

This plan updated the 1971 *Plan for Parks and Open Spaces*. It incorporated the policies of the 1973 *Land Use Plan*, the priorities expressed in the 1975 Short Range Open Space Program, the objectives of the 1977 E-Way report and the 1981 *Cherokee Marsh Long Range Open Space Plan*. The plan also made specific reference to the development of environmental corridors to address

the functions of water resource protection, public health and safety protection, outdoor recreation, shaping urban form, and enhancing scenic beauty, among others.

The six major objectives of the 1971 Park and Open Space Plan are restated in the 1983 plan, but the policies to meet those objectives are intended to complement and be consistent with the open space policies of the 1973 Land Use Plan. This new policy orientation is largely seen in an emphasis on the open space corridor system. All land acquisitions are encouraged to support the corridors, and natural resource land is given the highest priority. Generally, recreational development is to be non-intensive and focused on using open space corridors to provide trail-oriented activities which are in high demand.

1984 ENVIRONMENTAL CORRIDORS REPORT

The first *Environmental Corridors Report* was published in 1984 to document the need to delineate these corridors as part of sewer service area planning and the water quality planning effort which had started in 1975 with the designation of the Dane County Regional Planning Commission (DCRPC) as the water quality planning agency for the region. The report explained the features which were being included in environmental corridors and the policies which were being established for the corridors. The report was produced concurrent with the detailed delineation of environmental corridors and their adoption by local units of government and DCRPC.

1985 REGIONAL DEVELOPMENT GUIDE FOR DANE COUNTY, WISCONSIN

The *Regional Development Guide* (RDG) was adopted in 1985 to replace and expand upon the 1973 *Land Use Plan* and has been continually revised and updated since. While retaining the basic intent and policy thrust of the plan, the RDG modified and added to the plan to provide a policy framework and set of principles for decision making, so decisions from a wide variety of boards, councils, commissions, and committees could reinforce one another.

On issues related to open space planning, the RDG adopts the following objectives:

1. Promote development patterns which encourage compact, contiguous development adjacent to existing communities as well as balanced communities that provide a variety of commercial, industrial, residential, and open space land uses.
2. Promote a two-pronged environmental protection strategy which incorporates both pollution control and resource protection. Pollution control is not limited to waste treatment facilities. Land design and management is recognized as one of the most effective and important approaches to preventing and controlling pollution. Appropriate location and siting of development, vegetation management, erosion control, utilization of natural drainage systems and buffer areas are included in this strategy. Resource protection recognizes that land and natural resources perform important environmental functions such as ground-water recharge, water quality improvement, erosion control, storage of floodwaters, wildlife habitat, and scenic beauty. Some lands are particularly vulnerable in urban and developing areas. It is important that these critical and vulnerable lands and resources be identified and their environmental functions protected.
3. Promote the acquisition and preservation of lands along rivers, streams, and lakes; and continue resource protection, park development, and open space acquisition consistent

with local and regional plans. Promote the use of some areas within environmental corridors for recreational purposes.

4. Protect the role of agricultural lands as open spaces by promoting the preservation of these lands through the Farmland Preservation Program and limiting non- farm development in rural areas.

The RDG established the system of open space corridors as the backbone of open space and environmental planning for the county. Open space corridors were divided into two distinct components: Urban Environmental Corridors within urban service areas; and Rural Resource Protection Areas outside urban service areas. These corridors included concentrations of important environmental resources and functions needing the most protection. The urban environmental corridors are based on natural features and environmentally important lands such as streams, lakes, shorelands, floodplains, wetlands, steep slopes, woodlands, parks and publicly owned lands. Where a natural feature occurs in isolation and lacks a natural linkage with the continuous system of environmental corridors, an "Isolated Resource Feature" was delineated. All of the policies and protection applied to environmental corridors were also applied to Isolated Resource Features (~~no longer mapped by CARPC~~currently mapped by CARPC as environmental corridors~~,~~ and not as a separate element). Rural resource protection areas were based primarily on floodplains, wetlands and shoreland areas, lands protected through zoning or other regulations together with existing or proposed publicly owned or controlled lands.

The RDG included several policies on open space and environmental resource protection. The following are some selected policies:

1. To protect shoreland, floodplain and wetland areas throughout the county and emphasize their value as focal points of natural beauty and recreation.
2. To preserve the role of wetlands and woodlands as essential components of the hydrologic system as well as valuable wildlife habitat and restore or improve degraded wetland and woodland resources where possible.
3. To recognize the interrelationship of adjacent landscape types and avoid dividing natural units or breaking important linkages.
4. To develop and promote a countywide system of open space corridors as a basic structure and framework for resource protection and open space planning.
5. To minimize adverse impacts of necessary encroachment of utilities and transportation facilities into open space corridors by: (a) avoiding encroachment when reasonable alternatives are available; (b) where encroachment is necessary, select routes which minimize environmental impacts, and avoid dividing natural units; and (c) incorporate design considerations which minimize impacts and contribute to compatibility with corridor functions.
6. To protect the quality and supply of groundwater as the principal source of water supply in Dane County.
7. To guide urban development to those locations where adverse impacts on ground and surface water quality are minimized.
8. To incorporate in the design of urban development natural drainage patterns and measures to minimize or entrap pollutants before they enter surface waters.
9. To guide urban development to areas where soils are suitable for such development.

10. To protect the scenic values of the Dane County land scape by preserving and enhancing vegetative cover, particularly on steep wooded slopes and stream and lake shorelands.
11. To protect and maximize public enjoyment of the scenic qualities of Dane County by preserving views of landmarks, assessing visual impact of proposed developments and facilities, and improving public access to scenic areas and views, particularly urban lake and stream shorelines.
12. To acquire or preserve lands along rivers, streams, lakes, and in wetlands as well as areas of significant topography and woodlands.
13. To use open space preservation as a means for protecting the historic, aesthetic, and cultural heritage of Dane County and as a tool for shaping the form of urban growth.
14. To recognize the countywide open space corridor system and encourage continued preservation of the resources within the corridors.
15. To develop a full range of programs for the preservation of open space corridors using various devices such as purchase, dedication, zoning, easement, acquisition and other equitable means.
16. To recognize and protect natural resources and linkages outside the open space corridors such as scientific areas, glacial features, and other isolated environmentally sensitive areas.

1989 DANE COUNTY GREENSPACE PLAN

In 1989, the Greenspace Committee of the Dane County Board of Supervisors was formed to further open space preservation efforts, approve open space plans, develop implementation proposals, and report its recommendations back to the County Board. The *Greenspace Plan* was developed and adopted in 1991, fulfilling the Committee's tasks.

The Plan included the following goals:

1. To develop and promote a countywide system of open space corridors, as shown on the *Regional Development Guide* plan map, as a basic structure and framework for resource protection and open space planning.
2. To provide permanent open space throughout the region for resource preservation, public recreation, and community separation to prevent sprawl and encourage orderly community development.
3. To preserve agricultural land as a resource and promote its use as part of the linkage of lands that constitutes Dane County's Greenspace Plan.
4. To recognize and protect natural resources and link ages outside the open space corridors such as scientific areas, prominent glacial features and other isolated environmentally sensitive areas.
5. To use open space preservation as a means for protecting the historic, aesthetic and cultural heritage of Dane County and as a tool for shaping the form of urban growth.
6. To develop a full range of programs for the preservation of open space using various devices such as purchase, dedication, zoning, easement, acquisition and other equitable means.
7. To encourage greater private sector action in the preservation and acquisition of park and open space lands.

8. To seek and maximize the use of a variety of funding sources to implement the Greenspace Plan and provide for equitable compensation for acquired lands.

The Plan identified several resource protection study areas which it recommended for further study to develop detailed acquisition plans. These recommendations were incorporated in the *Park and Open Space Plan 1990-1995* as an amendment. As detailed acquisition plans are prepared and finalized, the detailed acquisition areas will be incorporated in the rural resource protection areas and the environmental corridors.

1990-1995 PARK AND OPEN SPACE PLAN FOR DANE COUNTY, WISCONSIN

This plan served as an update to the 1983 *Park, Open Space and Outdoor Recreation Plan*. It retains the objectives which were developed in the 1983 plan and adds an assessment of the needs of the existing park and open space lands as well as the need for additional parklands and conservation and open space acreage. The overall goals of the *Park and Open Space Plan* are the following:

1. To preserve key natural resources of the county in permanent open space.
2. To provide sufficient parks and recreation areas to meet the needs of the people of Dane County.
3. To preserve for posterity some of the heritage of Dane County.
4. To use open space to achieve separation of communities and help guide urban growth when the land is appropriate for park purposes.

The following policies from the plan have particular implications for environmental corridors:

- Continue the preservation of the resources within the countywide open space corridor system as adopted in the Regional Development Guide.
- Support the detailed delineation and implementation of the system of environmental corridors within urban service areas.
- Acquire and preserve lands along rivers, streams, lakes, and in wetlands as well as areas of significant topography and woodlands.
- Allow for only low-impact recreational uses of natural resource protection areas.

1990, 1995, AND 2004 SUMMARY WATER QUALITY PLAN UPDATES

The resource management element of these Summary Water Quality Plan updates are based on the environmental corridor policies of the Regional Development Guide and incorporate these policies in the Water Quality Plan.

The Summary Plans identify several environmentally important functions and community concerns which are protected through the delineation and protection of a continuous open space corridor system. These include the following:

- Protection of water resource, drainage and hydrologic functions
- Pollution control
- Protection of public health, safety and property
- Provision of outdoor recreation and education opportunities
- Protection of wildlife habitat

- Enhancement of scenic beauty and shaping of urban form

The delineation and protection of a continuous areawide open space corridor system is based on the recognition of the interrelatedness of adjacent landscape types and the importance of protecting valuable ecological units and linkages. The corridor system, therefore, is primarily associated with stream valleys and water features, and emphasizes the importance of continuity of environmental systems and protection of the land/water edge.

The open space corridor system shown on the Regional Development Guide Plan Map represents the basic skeleton of an areawide open space network. It is expected that this basic system will be expanded by adding buffer areas, areas for protecting scenic views and community separation, and areas desired for active recreation or public use. Adjacent or contiguous upland areas important for wildlife habitat, groundwater recharge, or protection of unique or valuable resources (unique vegetation, geologic features, archaeological sites, etc.) should also be considered for addition to the corridors.

The most important current issues and priority needs regarding open space and environmental corridor protection are noted in the Summary Plans as:

1. Using the adopted open space/ environmental corridor system as a consideration in all local land use and siting decisions and planning.
2. Continuing to emphasize the use of the open space corridor network as basic guidance and priorities for open space acquisition and protection programs.
3. Providing an emergency acquisition fund to ensure protection of important corridor lands and critical environmental resources which are endangered or threatened by development which cannot be adequately protected through other means.

1996 ENVIRONMENTAL CORRIDOR REPORT

This report documented the rationale and process for developing environmental corridors. It outlined planning background and issues, and protective mechanisms, process for mapping, and procedures for updating and revising environmental corridors.

1996-2000 PARKS AND OPEN SPACE PLAN FOR DANE COUNTY, WISCONSIN

This plan serves as an update to the *Park and Open Space Plan, 1990-1995* and includes an inventory of the progress made in park and open space development and acquisition since 1990 when the previous plan was formulated.

More significantly, it includes a number of policy additions, some of which are listed below:

1. Adds upland areas adjacent to wetlands, stream headwater areas and springs to the list of areas to be considered for acquisition and preservation.
2. Restoration of upland prairies, woodlands, and wetlands.
3. Link public lands and trails of various political jurisdictions to communities and population centers to amplify the availability and recreational use of these lands.

4. Provide access to lakes and streams and water-based recreational trails. These water-based trails would be designed for use by canoes, kayaks, and similar watercraft.
5. Provide for year-round multiple uses, particularly trail-oriented activities, in siting and designing parks.
6. Charge fees in order to provide funding for operation, land acquisition, and development of the county park system.
7. The Regional Transportation Plan for Dane County should plan for safe trail crossings across county roads and highways as well as reduce the impact of transportation corridors on county park and open space areas.
8. Adds policies for the role of the private sector in assisting the county in the acquisition and management of parks and open spaces.
9. Adds policies which would address the impacts of removing lands from tax rolls when the county acquires lands for recreational use and resource protection.

2001-2005 PARKS AND OPEN SPACE PLAN FOR DANE COUNTY, WISCONSIN

The 2001-2005 Parks and Open Space Plan contained four main goals:

1. Preserve key natural resources of the county in permanent open space.
2. Provide sufficient parks and recreation areas to meet the needs of the residents of Dane County
3. Preserve for posterity the nature and diversity of the natural and cultural heritage of Dane County
4. Use open space to achieve separation of communities and help guide urban growth when the land is appropriate for park purposes

2006-2011 PARKS AND OPEN SPACE PLAN FOR DANE COUNTY, WISCONSIN 2006-2011

This plan seeks to identify significant cultural, historical, and natural resources that should be considered for possible protection, preservation, or restoration over the next five years. It includes the following five general goals:

1. Provide sufficient park land and recreation facilities to meet the demand of Dane County residents without adversely affecting existing natural resources.
2. Preserve for posterity the characteristics and diversity of the natural, cultural and historical resources of Dane County.
3. Preserve large tracts of natural and agricultural rural landscapes at urban fringe areas that will provide regional resource protection and recreation benefits.
4. Provide volunteer opportunities and stewardship education to county residents of all ages.
5. Protect lakes, rivers and streams, including shorelines, wetlands, high infiltration areas and associated vegetative buffers to maintain high water quality, manage water quantity and sustain water-related recreation throughout Dane County.

This plan included two new elements: Regional Resource Protection Initiatives and Partner Projects.

2012-2017 PARKS AND OPEN SPACE PLAN FOR DANE COUNTY, WISCONSIN

This plan has a vision of connecting people to the land and water resources of Dane County and includes the five goals from the previous plan. It includes several new initiatives: “Agriculture, Gardening, and Foraging” and “Art in Parks”.

2018-2023 PARKS AND OPEN SPACE PLAN FOR DANE COUNTY, WISCONSIN

This plan has the same vision as the previous plan and adds a sixth general goal:

6. Provide an inclusive parks system for all Dane County residents, regardless of age, race, gender or gender identity, national origin, ethnicity, culture, religion, sexual orientation, political affiliation, place of residence, veteran status, physical ability, cognitive capacity, or family, marital, or economic status.

2050 REGIONAL DEVELOPMENT FRAMEWORK

CARPC’s *Regional Development Framework* (RDF) lays the necessary foundation to support continuing growth by pinpointing opportunities and mapping realistic planning concepts. The Framework draws on public priorities, local government input, and growth projections to establish goals, objectives, and strategies for accommodating future growth in the Dane County region.

The strategies outlined in the RDF will promote regional development that:

- Reduces greenhouse gas emissions and fosters community resilience to climate change
- Increases access to jobs, housing, and services for all people
- Conserves farmland, water resources, natural areas, and fiscal resources

The Framework proposes six broad strategies to help us meet our climate, access to opportunity, and conservation goals:

1. Focus growth in centers and corridors
2. Prioritize growth in already developed areas
3. Plan areas for quality business growth
4. Plan complete neighborhoods
5. Protect farming areas
6. Preserve stewardship areas (now called voluntary environmental corridors)

Appendix B: Dane County and Capital Area Regional Planning Commission Open Space Planning Terms

Regional Open Space Terminology

Prepared by CARPC Staff, in Consultation with Dane County Planning & Development and Dane County Parks Staff (last revised 10/17/2024)

Dane County Elements

RESOURCE PROTECTION CORRIDOR

Resource protection corridors are areas unsuitable for development due to environmental sensitivity or the presence of fragile, irreplaceable resources as defined and mapped in the Dane County Farmland Preservation Plan and the Dane County Comprehensive Plan. Resource protection corridors are defined outside of urban service areas (as identified in the Dane County Water Quality Plan).

Resource protection corridors include the following categories of lands:

- Wetlands, as defined in state statute and including both the shoreland wetland and inland wetland districts under Chapter 11, Dane County Code of Ordinances
- Shoreland setbacks and wetland buffers required under Chapter 11, Dane County Code
- 1%-annual chance regional floodplains, including the general floodplain district, floodway district and flood storage district, as described in Chapter 17, Dane County Code
- Other areas (varies by community) specifically planned to protect natural or cultural resources, and where structural development is strictly limited, as identified in the Dane County Comprehensive Plan, or its component town, city, village, or extraterritorial cooperative plans

Source: 2022 Dane County Farmland Preservation Plan, Dane County Planning & Development

NATURAL RESOURCE AREA

A Natural Resource Area consists of land that is specifically set aside for the protection of valuable natural environments and/or greenbelt corridors that were identified through a public process. This can include habitat protection and open space preservation. Recreation at Natural Resource Areas is a secondary objective, and users are encouraged to enjoy the resource as is. Passive recreation activities dominate the site use and active recreation, if any, takes place only on the fringes or in small pockets (areas) of a natural resource area. Natural Resource Areas may include lands belonging to another Park System Classification category, such as trails, recreation parks or wildlife areas.

Source: Dane County Parks and Open Space Plan 2018-2023, Dane County Parks

NATURAL RESOURCE AREA BOUNDARY (NRAB)

These are lands prioritized for voluntary protection through public purchase and/ or acquisition of conservation easements. This designation typically identifies large, contiguous blocks that may

include a mixture of agricultural working lands, water, wetlands, steep topography, prairie, and forests. Protection of larger areas can provide space for limited recreation use without impacting the resource and enable native vegetation management practices such as prescribed burns. Some of these lands may be protected through fee title purchase, however much of the protection of larger landscapes and buffer zones is achieved through purchase of agriculture/conservation easements and continue to remain under private ownership. Decisions to protect lands in this category, whether through easement or fee-simple purchase, is a voluntary decision by the landowner – land or easements are only purchased from willing sellers. This designation has no regulatory effect when a zoning change or land development is proposed. Lands designated within Natural Resource Areas are often owned by multiple public agencies, therefore it is critical that the County work jointly with these other agencies to ensure cohesive resource and recreation management.

Source: Dane County Parks and Open Space Plan 2018-2023, Dane County Parks

CARPC Elements

ENVIRONMENTAL CORRIDOR

Environmental corridors are generally contiguous systems of open space and natural areas within urban service areas (lands that are developed for urban use or planned for such development). This designation is part of the Dane County Water Quality Plan and is primarily intended to protect water resources in and near urban areas. The designation is also applied to lands with other regulatory protections (archeological sites and endangered/sensitive habitats) and other lands expected to be open spaces in perpetuity (parks and stormwater management facilities). The following policies and criteria for Environmental Corridor designation are adopted in the *Dane County Water Quality Plan*.

Resources that must be included in environmental corridors are:

- Wetlands under WDNR jurisdiction with a 75-foot minimum vegetative buffer
- 1%-annual chance (100-year) floodplains and floodways
- Riparian, wooded steep slopes (where the base of slope is not greater than 75 feet from the ordinary high-water mark or top of bank of perennial streams, ponds and lakes). Steep slopes are defined as having 12% gradient and higher in the glaciated portions of the county; or 20% gradient and higher for the driftless portion of the county.
- Navigable water bodies based on WDNR determination of navigability (plus minimum 75-foot shoreland buffer on each side of the waterway and a 200-foot minimum total width)
- Non-navigable waterways based on WDNR determination of navigability (plus minimum 25-foot shoreland buffer on each side of the waterway and a 75-foot minimum total width)
- Public lands, parks, and conservancy areas
- Problem soil areas and unique geologic formations (such as Karst features and known critical recharge areas)
- Archaeological sites
- Endangered/Sensitive habitats, such as savanna and prairie
- Stormwater facilities

Source: Environmental Corridors Report, CARPC

ESTIMATED ENVIRONMENTAL CORRIDOR (FORMER NAME: PROTECTION AREA)

This is a preliminary estimate of lands that would be required to be designated as Environmental Corridor if brought into an urban service area. It is mapped based on limited data and therefore the boundaries should be considered as approximations. Mapping of streams and wetlands (plus required buffers) is refined as better data becomes available, especially at the time of consideration for inclusion in the urban service area. The criteria for inclusion in this designation are the same as for the Environmental Corridor designation (see above). This designation has no regulatory effect prior to consideration for urban service area amendment.

Source: Environmental Corridors Report, CARPC

VOLUNTARY ENVIRONMENTAL CORRIDOR (FORMER NAME: STEWARDSHIP AREA)

These are lands that provide important benefits to the region but do not have legal protection from development or disturbance. Preserving these benefits requires stewardship by landowners and local government, and protection may be achieved through methods such as fee-simple public ownership, dedication to the public, or by conservation easement.

These lands are recommended for voluntary inclusion in Environmental Corridors, but lands with this designation are not required to be included under the policies and criteria adopted in the Dane County Water Quality Plan. Lands with this designation include:

- Potentially restorable wetlands and hydric soils
- Old-growth woodlands
- 0.2%-annual chance (500-year) floodplains
- Ice Age Trail corridor
- Natural Resource Area Boundaries
- Internally drained areas

Source: Environmental Corridors Report, CARPC

Appendix C: Protective Mechanisms for Environmental Corridors

Protecting Environmental Corridors

This appendix briefly describes techniques and mechanisms available for protecting environmental corridors. Environmental corridors can be protected from incompatible development and undesirable impacts through a combination of regulation and acquisition. Protection through regulation is appropriate where public access is not needed and allows lands to remain in private ownership. Regulations available include zoning, subdivision regulations, official mapping, and state and local permit processes.

It is necessary to acquire lands through dedication or purchase where public access is required for recreation, for provision of structures such as detention basins, or where access is needed for public maintenance of stream channels and structures. In addition, public ownership may be required to protect important resource areas vulnerable to development and not adequately protected through zoning or other regulatory means. Conservation easements may also be used in instances where fee-simple title is not needed.

Protective Mechanisms for Environmental Corridors

The protective mechanisms for environmental corridor features can be classified into those which are required or mandatory under federal or state law and those which are optional or discretionary approaches. A further distinction is made between primary mechanisms and techniques which are most important or commonly used, and supplemental or alternative approaches which may be used in combination with primary mechanisms or where primary mechanisms are not appropriate or adequate.

It is often the case that a single approach or protective mechanism is not sufficient to adequately protect environmental corridors from incompatible development and undesirable impacts. It is important that local, regional, and state governments utilize the full array of mechanisms and tools to protect environmental corridors.

FEDERAL REGULATIONS

Section 404 of the Clean Water Act

A federal permit program was established under Section 404 of the Clean Water Act (Public Law 95-217), authorizing the Secretary of the Army, acting through the Chief of Engineers (U.S. Army Corps of Engineers), to regulate the discharge of dredged or fill materials into all waters of the United States. Generally, the Corps (USACE) jurisdiction applies to all lakes, rivers, streams, and wetlands. The term “discharge of fill material” under Section 404 means the addition of any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a water body, including excavation or dredging of wetland soils.

Some activities with minor adverse impacts on the environment are regulated through a system of nationwide general permits. However, the state may require special conditions and management

practices for general permit activities. General permits may apply to non-tidal rivers, streams, and their lakes and impoundments, including adjacent wetlands, that are located above the headwaters; in addition to isolated water bodies. General permits may also apply to utility crossings within primary environmental corridors, with 30 days prior notification to the WDNR. (In the Capital Region, all environmental corridors are primary environmental corridors.)

However, in Wisconsin the following are not applicable for nationwide general permits, unless WDNR permits, approvals, or coordination is required for the entire project:

1. Calcareous fens
2. State-designated natural and scientific areas
3. Trout lakes, including wetlands within 1,000 feet of the lake's edge (in Dane County, Stewart Lake and Salmo Pond are currently classified as trout lakes)
4. State and federally designated wild and scenic rivers, including wetlands within 1,000 feet of the ordinary high water mark (OHWM) of the river
5. Class I, II, and III trout streams identified in the WDNR publication 6-3600(80) (Wisconsin Trout Streams), including wetlands within 1,000 feet of the centerline of the stream

It is important to note that the federal wetland definition is not the same as the state. Consequently, areas not mapped by WDNR as wetlands could fall under federal wetland jurisdiction. It is recommended that the USACE be consulted for activities in all low-lying areas.

Approval must be obtained from the USACE prior to the initiation of any activities regulated under Section 404. Permit application evaluations include a detailed analysis of anticipated impacts on the environment and public interest. The U.S. Fish and Wildlife Service (USFWS), EPA, SHPO, and other interested groups may also be involved in evaluation of the proposed activity. The review process allows conservation agencies to make recommendations to the USACE, to minimize adverse effects of the regulated activity. State water quality certification must be obtained from the WDNR after the USACE approval has been obtained.

Section 401 Water Quality Certification

Section 401 of the Clean Water Act (Public Law 95-217) requires that federal permits comply with state water quality standards. Chapter NR 299 of Wis. Admin. Code has been adopted to implement Section 401 certification requirements. In addition to other applicable standards, Wis. Admin. Code Chapter NR 103 has been adopted in 1991 to establish water quality standards for wetlands and activities which impact wetlands. These and other standards are considered in evaluating water quality certification. The proposed project cannot begin without state certification.

Under NR 299, the WDNR conducts Section 401 water quality certifications. Water quality certification is usually one of the conditions of a 404 permit. Consequently, if the WDNR (generally the district water management coordinator) finds that a proposed federal permitted activity will adversely affect water quality or is not in conformance with a water quality plan, the 404 permit would be invalid.

Chapters 30 and 31, Wisconsin Statutes

Many activities affecting navigable waters require permits or approvals from the WDNR under Chapters 30 and 31 of the Wisconsin Statutes. The water laws of Wisconsin are based on the

English Common Law, the Northwest Ordinance, and the State Constitution. Based on these legal documents, the courts have developed the "public trust doctrine" which maintains that all navigable waters are protected (held in trust) by the state for the public. Generally, navigable waters in Wisconsin include lakes, streams, and flowages that have a defined bed and bank and are of sufficient size to float the smallest recreational craft on a regularly recurring basis. (This definition is different from the federal definition of navigable waters, so identified by the Congress.)

The activities requiring permits under Chapter 30 include: the placement of structures (pipelines, piers, etc.) and deposition of materials (riprap, sand blankets) in navigable waters; diversions of water from lakes and streams enlargement or straightening of existing waterways; construction of an artificial waterway within 500 feet of the OHWM; grading or otherwise removing topsoil from the bank of any navigable water in excess of 10,000 square feet; and, dredging or removal of material from beds of a waterway. Chapter 31 requires permits for construction, operation, maintenance or removal of dams, and bridge construction.

Approval must be obtained from the state prior to conducting regulated activities in or adjacent to navigable waters of the state. A person should contact the nearest WDNR office for assistance in initiating the permit application process. A field investigation of the project site is usually conducted after permit application submittal. The water management specialist and other WDNR staff evaluate the permit application based on criteria for each activity, including impact on fish and game habitat, environmental pollution, public rights and interests, etc. Fines or forfeitures and correction of any undesirable condition may be required of any person initiating, continuing, or completing a regulated activity without first obtaining a permit.

WATER QUALITY MANAGEMENT PLANS - SANITARY SEWER EXTENSIONS

Pursuant to Section 208 of the Clean Water Act (Public Law 95-217), areawide water quality management plans are required for designated areas having substantial and complex water quality control problems. Chapter NR 121 of the Wis. Admin. Code outlines the requirements for this planning process. ~~The area of~~ Dane County is a designed area for which ~~designated water quality planning agencies (e.g., CARPC) have~~CARPC (and its predecessor, the Dane County Regional Planning Commission) has developed an areawide water quality management plan~~s~~. ~~As part of t~~The plan~~,~~ identifies areas which are to receive public sanitary sewer service and areas which are not to receive such service ~~are designated~~identified. Prior to receiving a permit for a sanitary sewer extension, an area must be determined to be in conformance with the sewer service plan. ~~Chapter NR 121 of the Wis. Admin. Code outlines the requirements for this planning process.~~

Delineation of the sewer service area for any community requires two steps:

1. Delineation of the outer boundary of the area where the community intends to provide sanitary sewer service in the planning period (~~this is called~~i.e., the urban service area boundary).
2. Delineation of those areas within the USA boundary which are not intended to receive public sanitary sewer service.

[Table C-1. Protective Mechanisms for Environmental Corridor Features]

These excluded areas are referred to as environmental corridors and include lands (as discussed earlier) ~~with sensitive environmental features~~ that are to be excluded from sanitary sewer service areas and are intended to remain open and undeveloped. It is ~~the~~ CARPC policy to work with communities towards defining mutually agreeable urban service area boundaries and environmental corridors while still providing minimum required levels of protections for sensitive resources.

Once established ~~adopted~~ by CARPC in accordance with applicable policies and criteria~~and approved by WDNR~~, the environmental corridors are used, along with urban service area boundaries, ~~for review and approval of~~to review all ~~public~~ sanitary sewer extensions.

~~Since 1979, the WDNR has required applicants for public sanitary sewer extensions (in Dane County and other areas under the jurisdiction of an RPC) to submit proposed sewer extensions to CARPC for review. CARPC was created to become the designated water quality planning agency for Dane County. Currently, under contract with WDNR,~~ Applicants for a public sanitary sewer extension permit from WDNR must include a letter from CARPC stating that the proposed sewer extension is consistent with the Dane County Water Quality Plan. As such, CARPC reviews and advises the WDNR as to the consistency of the proposed extensions with the ~~sewer service areas designated in the~~ Dane County Water Quality Plan, including the sewer service area and designated environmental corridors. A public sewer extension designed to serve areas outside of the urban service area boundary, or new development within environmental corridors, will not receive approval.

~~The applicant for WDNR approval of a public sanitary sewer extension must include a letter from CARPC stating that the proposed sewer extension is consistent with the Dane County Water Quality Plan. If it is found that the proposed sewer extension is designed to serve (within a 20-year period) areas outside of the USA boundary, or new residential, commercial, or industrial development within environmental corridors, WDNR can approve the sewer extension but only areas within urban service boundaries can connect to sewer.~~

Review for private sanitary sewer extensions is performed by the Wisconsin Department of Safety and Professional Services (DSPS). Under an agreement between DSPS and the WDNR, the DSPS also requires that applicants for private sanitary sewer extensions within Dane County submit proposed sewer extensions to CARPC for review (per SPS 382). ~~Similarly to~~As with public sewer extensions, CARPC reviews these extensions and advises the DSPS as to their consistency with the Dane County Water Quality Plan. ~~Similar to public sewer extensions, a~~ Likewise, a private sewer extension designed to serve areas outside of the urban service area boundary, or new development within environmental corridors, will not receive DSPS approval.

The use of environmental corridor ~~and isolated resource feature~~ delineations in the review process for sewer extensions avoids residential, commercial, and industrial development within environmental corridors. Sanitary sewer extensions which are proposed to serve new development in environmental corridors inside urban service areas ~~will~~ should not be approved by the WDNR or DSPS. Activities not requiring sewer service, though, are not included in this review process (e.g., clearing vegetation, filling or dredging)~~—~~. ~~:t~~Therefore, this implementation measure needs to be utilized in conjunction with other mechanisms for protection of environmental corridors and ~~isolated~~ environmentally sensitive resource features.

FLOODPLAIN ZONING

Wis. Stat. § 87.30 requires counties, cities and villages to adopt reasonable and effective floodplain zoning ordinances for areas where flooding is likely to occur. NR 116 of the Wis~~c~~. Admin. Code states the minimum criteria for these regulations. The ordinance must contain maps reflecting the best available data on the 100-year floodplain (floodway and flood fringe) and define the land use restrictions in these areas. Floodplain zoning must include those areas covered by waters during the 100-year regional flood.

To assist counties and communities in establishing or improving floodplain zoning ordinances, the WDNR has prepared a model floodplain zoning ordinance. County regulations regarding floodplains are not for environmental protection or concerns, they are for a public safety concern. This is also true for environmental corridors. Permitted land uses in the floodway are generally restricted to open space uses or minimal development which does not obstruct flood flows, has a low flood-damage potential, and does not increase the height of the regional flood. Any fill, obstruction, structure, etc., which interferes with the discharge of floodwaters is prohibited. Any developments in the flood fringe may be permitted only when filled or protected to above the regional flood level, and then only if such filling or protection does not cause a rise in the regional flood. Increases in the regional flood elevation may be permitted only if amendments are made to the ordinance, official floodplain zoning maps, and water surface profiles. Special fill and construction, floodproofing, and sanitary regulations must be followed when building structures in the flood fringe.

Zoning regulations are administered by counties, cities, and villages. In the unincorporated areas of the County, floodplain zoning is administered through Chapter 17: Floodplain Zoning.

Floodplain zoning is designed to reduce flood damages but does not protect flood fringe areas from development. It can be used to identify the flood fringe lands, and, if the community desires, deter development from these areas. Implementation of other protective mechanisms in conjunction with floodplain zoning would be recommended for more complete protection of flood fringe areas.

GENERAL SHORELAND ZONING

Wis. Stat. § 59.692 requires that all counties regulate and enforce shoreland zoning in unincorporated areas. This requirement was ~~done~~ enacted as part of a comprehensive approach to water quality. The purposes of the shoreland zoning regulations are to further the maintenance of safe and healthful conditions; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structure and reserve shore cover and natural beauty. By 1971, all counties had adopted shoreland zoning.

Shoreland~~s~~ ~~means~~ refers to the area within the following distances from the ordinary high-water mark of navigable waters: 1,000 feet from a lake, pond, or flowages; 300 feet from a river or stream or to the landward side of the floodplain, whichever distance is greater.

The WDNR has developed a model shoreland zoning ordinance, based on statue and code, to assist counties in regulating shoreland zoning ordinances in a consistent and compliant manner. Local county shoreland ordinances set minimum standards: lot sizes; shoreland setbacks; vegetation removal; filling, dredging, grading, etc.; impervious surfaces; height; and nonconforming structures and uses. A shoreland-wetland district is also regulated which is based on the

Wisconsin wetland inventory. Counties can regulate other matters provided they further the purpose of shoreland zoning.

Shoreland zoning regulations are administered by the county in a manner similar to the floodplain zoning administrative process. The shoreland zoning ordinance, in conjunction with other mechanisms, can be effective in protection of environmental corridors in shoreland areas.

SHORELAND-WETLAND ZONING

In addition to the general shoreland management requirements of NR 115, Wis. Adm. Code, the code requires zoning of shoreland-wetlands, providing substantial protection measures for wetlands located within shoreland areas. Wisconsin Administrative Code Chapter NR 117 has been created to implement Wis. Stat. §s 61.351 and 62.231, which require villages and cities also to adopt shoreland-wetland zoning ordinances. The permitted uses and administrative procedures for both NR 115 and NR 117 are nearly identical. The following discussion, then, refers to the responsibilities of each unit of government in implementing shoreland-wetland protection measures.

Zoning regulations are required through establishment of shoreland-wetland districts for all shoreland areas identified as wetlands greater than five acres in size on the WWI maps prepared by the WDNR. In Dane County, wetlands of two acres or larger are shown on these maps. Dane County has adopted the required general shoreland zoning, shoreland-wetland zoning, and floodplain zoning for the unincorporated areas of the county. Most of the villages and cities in Dane County with areas subject to flooding have adopted floodplain zoning. All of the villages and cities with shoreland-wetland areas have also adopted shoreland-wetland ordinances protecting wetlands two acres and larger.

NR 115 and NR 117, Wis. Adm. Code specify permitted uses within shoreland-wetland districts under state law. Generally, these activities include, among others, various recreational, silvicultural, agricultural, and grazing uses. However, a land use permit may be required from the local unit of government. Activities which involve draining, tiling, ditching, dredging, excavating, filling, or flooding are, for the most part, prohibited without a zoning change. NR 115 and NR 117 make the provision, however, for a unit of government to rezone specific shoreland-wetlands, if the applicant can prove that the activity would not have a significant adverse impact upon the hydrology of the wetland, or on the ability of the wetland to filter and store nutrients and sediments, protect against shoreline erosion, provide fish and wildlife habitat, and to maintain special recreational, scenic, or scientific interest. Wetland protection standards and criteria are included in NR 115 and NR 117 to aid zoning officials in determining whether an application for rezoning is to be approved. Existing uses are generally permitted to continue.

Shoreland-wetland zoning regulations are administered by the same parties and through the same process as floodplain and shoreland zoning.

Shoreland-wetland zoning can prevent the conversion of wetlands to inappropriate uses in the shoreland zone. This is particularly true if draining, ditching, dredging, etc. is involved. Although NR 115 and 117 extend added protection to wetlands in shoreland zones, it does not protect wetlands beyond the shoreland zone, isolated wetlands, or wetlands along non-navigable streams. However, counties, cities and villages have the power, under home rule authority, to expand wetland

protection zoning districts beyond the limits of shorelands, thereby providing more comprehensive protection of wetlands in that municipality. Under this provision, Dane County amended its Code of Ordinances in 1994 to expand wetland zoning to all wetlands over two acres in the county (shoreland wetlands as well as inland wetlands).

CONSERVANCY ZONING

Under Wis. Stat. §s 62.23(7), 61.35, and 59.97, cities, villages, and counties, respectively, have the authority to enact zoning ordinances. Required floodplain and shoreland-wetland zoning, described earlier, regulates development in floodplain and shoreland areas, providing protection for lands adjacent to lakes and streams. Dane County and several local communities have recognized the need for additional zoning to protect environmentally sensitive areas. Certain floodplains, shorelands, wetlands, steep slopes, and other resource areas beneficial to the community have been included in conservancy zoning districts. The rationale for inclusion of certain resource-based lands in conservancy districts is not only to preserve and protect those lands, but also deter costs to the unit of government resulting from development in unsuitable areas. For example, development on steep slopes may result in accelerated erosion and runoff, or emergency vehicle access problems. Faced with these hazards, a community may enact restrictive regulations to discourage or limit development in these hazard-prone areas.

The usual approach is to indicate permitted and conditional uses within a conservancy zoning district. Generally, permitted uses are limited to open space uses such as agriculture, silviculture, education, or recreation. Other uses usually either require a conditional use permit or are prohibited. Conditional use permits may be used to permit some uses in a conservancy zone, subject to detailed review of a specific proposal by the local zoning body, which may result in limitations or conditions being placed on the proposed use.

Like the floodplain and shoreland zoning process, conservancy zoning is administered through the zoning office of the local unit of government. Certain open space land uses compatible with the intent and purpose of the ordinance (e.g., recreational or educational facilities) may be permitted and subject to controls specified in the ordinance. Other land use proposals requiring a permit or zoning change (zoning appeal) must undergo a process like that described under floodplain zoning.

Present conservancy zoning regulations range from prohibiting any development to allowing agriculture or limited compatible urban development under conditional use permits. However, the lands presently zoned conservancy in Dane County are mostly publicly owned parklands, and little, if any, development pressure is expected.

Existing regulatory measures are somewhat effective in protecting streams, floodplains, and shorelands. However, a modified conservancy overlay zoning technique could provide an even higher level of protection to these areas, along with providing a regulatory measure for corridor lands not currently protected.

Suggested Approach to Conservancy Zoning for Environmental Corridors

If a local unit of government wishes to utilize conservancy zoning to protect environmental corridors, the following recommendations should be considered.

Overlay zoning, like floodplain or shoreland zoning, is probably the most appropriate approach to using conservancy zoning to protect environmental corridors. Overlay zoning has the effect of placing additional restrictions on land located in the overlay zone. The basic zoning district (residential, commercial, industrial, agricultural, etc.) remains in effect for the parcel. That portion of the land parcel within the conservancy or environmental corridor overlay zone would be permitted the same uses as the basic zoning district but would be subject to additional restrictions on the permitted uses. These could include more restrictive density requirements, setback or buffer strip requirements, erosion and runoff control requirements, vegetative management requirements, land or easement dedication requirements, and other similar restrictions. In addition, detailed review of specific development or use proposals will be desired in many cases and can be a feature of overlay zoning through conditional use permit or planned unit development procedures.

If an overlay conservancy zoning approach is used to protect environmental corridors, the best and most legally defensible approach would be to relate specific limitations and restrictions to the particular environmental corridor element (riparian steep slopes, wetland, floodplain, buffer strip, etc.) so that the restrictions or limitations are clearly based on and related to protecting the corridor functions and valid public and community concerns. Thus, the limitations and restrictions on riparian steep slopes in the overlay zone would probably be different than those applicable to wetlands.

To accomplish this, it will be necessary to map the individual resource features making up the corridors, or at least classes or categories (uplands, shorelands, etc.) having common or similar limitations and appropriate restrictions.

The question is often raised as to the extent zoning can be applied in restricting the use of private property. By restricting the use of property, in some cases, the property owner may believe the value is thereby lowered, resulting in a "taking" without compensation. The landmark case in Wisconsin, *Just v. Marinette County* (56 Wis. 2d 7) (1972), addressed just such an issue and has set precedence in Wisconsin. The plaintiffs argued that Marinette County unjustifiably depreciated the value of their property, as the county issued a fine to the plaintiffs and ordered restoration of a wetland filled without a permit in a shoreland- conservancy zoning district. The Wisconsin Supreme Court, however, upheld the zoning ordinance, ruling that a "taking" had not occurred, and that the ordinance was not confiscatory or unreasonable. The court ruled that the loss of value claimed was not based on the land in its natural state, but on what it might be worth if the property were filled and used for residences.

HISTORIC OVERLAY DISTRICT/ PRESERVATION ZONING

Expanding upon protection afforded in Wis. Stat. Ch. 157, the Historic Overlay District Zoning Ordinance was signed by the Dane County Executive in 1989. Its purpose is to effect and accomplish the protection, enhancement, and perpetuation of sites and structures that represent or reflect elements of the county's cultural history and protect the county's historic and cultural heritage as embodied in such sites and structures. Wisconsin Act 39 (1991) required SHPO to prepare and distribute to all cities, villages, and counties a model historic preservation ordinance. In 1994, a law was passed by the Wisconsin State Legislature requiring cities and villages with properties on the State Register or National Register of Historic Places to draft historic preservation

ordinances. Historic preservation ordinances are certified by SHPO. Several municipalities in Dane County have adopted historic preservation zoning or have long-term plans to develop and adopt one.

Restricted activities for historic sites include building and disturbance of soils, except the approved removal, replacement, or addition of vegetation designed to preserve the site. The Historic Overlay District Zoning ordinance also establishes a clear area extending 25 feet in all directions from any historic site. Municipal historic preservation ordinances regulate construction, reconstruction, and exterior alteration.

As with other zoning processes, historic overlay/preservation zoning is administered through the zoning office of the local unit of government.

According to SHPO, a historic preservation ordinance enables a community to protect its sense of place, maintain and revitalize its downtown and older neighborhoods, increase community pride, and reinforce overall economic development. Individuals and/or private non-profit organizations in communities without a historic preservation ordinance can approach their elected officials to create one. Existing regulatory measures can also be effective in protection of environmental corridors mapped for open space found in conjunction with National Register of Historic Places sites.

SPECIAL ZONING REGULATIONS

Other local zoning applications can be used in order to develop a comprehensive approach for protection of open space and environmentally sensitive areas. At the discretion of the community the need to maintain significant environmental resources can be addressed by fashioning ordinances to regulate development and maintain certain conditions at the site, such as: waterfront development zoning districts, planned unit development districts, environmental corridor ordinances, or more extensive use of conditional use permits. Cities, villages, and counties can employ these special zoning regulations under the authority of Wis. Stat. §s 62.23(7), 61.35, and 59.971, respectively.

Waterfront Development Districts

Similar to county shoreland zoning ordinances, cities, villages and counties can employ the use of waterfront development zoning districts. This type of zoning, particularly with the application of conditional use permits, could provide the community with a level of control over how a development is to occur. Establishing building setbacks, and limits or standards on filling, excavating, grading and removal of vegetation on lake and stream shorelines should be considered minimum components of such an ordinance (e.g., City of Madison Zoning Code, Chapter 28, ss. 28.04(13) and 28.04(19)).

Planned Unit Development (PUD) Districts

A PUD district is normally established as a special zoning district to accommodate large-scale mixed-use (residential, commercial, or industrial) developments which should be planned and designed as a unit. This type of zoning is intended to encourage improved environmental design in land development by providing opportunities for flexibility in site plan design not possible with standard zoning districts. To this end, the PUD district may allow for diversified permitted uses; mixed use development; density trade-offs; and variations in the size and height of structures,

while still requiring substantial compliance to the general plan for community development. The PUD approach can result in land development which is more compatible with the environment by facilitating conservation of natural features and open space.

The administrative process involves the application of general standards and criteria in the detailed review of proposals by the planning commission. The review process usually involves an overall and stage-by-stage examination of site plans and may result in specific requirements or performance standards being placed on the design. This is of concern particularly with respect to the protection of environmental features at the site.

Environmental Corridor Ordinances

Another implementation tool that can be used to combine the mandatory protection of natural and historic resources with the permanent protection of green space areas is the enactment of an environmental corridor ordinance. The City of Sun Prairie enacted one in 2006 that defines environmental corridors, outlines the purpose of environmental corridor protection requirements, determines environmental corridor boundaries, sets forth mandatory environmental corridor protection requirements (including minimum buffer widths), and includes procedures for amending environmental corridors. Other communities mention environmental corridors under traditional neighborhood development district land use regulations (e.g., City of Middleton Zoning Code, Chapter 10, ss. 10.38(4)). An ordinance specific to environmental corridors can help formally preserve private parks or open spaces.

Development within urban service areas will be required to follow the more protective requirements contained within the adopted policies and criteria for environmental corridors in the Dane County Water Quality Plan and the respective local ordinances.

Special Exemptions (Conditional Use Permits)

The application of zoning ordinances is based on the premise that the county or municipality is divided into zoning districts, with permitted land uses established within each district. There are often other uses and activities which may be compatible with permitted uses within that zoning district if certain conditions and limitations are observed. These uses may be listed as conditional uses in a zoning district and are permitted if a special exemption (conditional use permit) is obtained.

A special exemption (conditional use permit) is obtained by submitting a specific site plan or development proposal to the local planning and zoning body for review. The review establishes whether the proposed activity or use is compatible with other uses in the zone, and usually imposes special conditions on the proposed use or activity to ensure compatibility and to reflect applicable public concerns and policies (such as protecting environmentally sensitive areas).

In relation to environmental corridors, special exemption (conditional use permit) provisions requiring review for specific projects are particularly important for protection of shorelands, drainageways, buffer strips, wetlands, floodplains, and riparian steep slopes. During the plan development process, negotiations between the community and developer could determine critical areas to be reserved for environmental protection or open space, as part of the requirements for obtaining the conditional use permit.

SUBDIVISION REGULATIONS

The subdivision of land involves the division of a tract of land into separate parcels. A survey and an approved and properly recorded plat are required by Wis. Stat. Chapter 236, for any division of land for the purpose of sale or building development, where the act of division creates, within five years, five or more parcels or building sites of 1.5 acres each or less in area (§ ~~Section~~ 236.03). Under Wis. Stat. § 236.45, any city, village, or county which has established a planning agency may adopt ordinances governing land division which are more restrictive than the provisions of Chapter 236. The purposes of land division regulation include promoting public health, safety and general welfare; facilitating adequate provisions for water, sewerage, parks, playgrounds, and other public requirements; and encouraging the most appropriate use of land. In addition, local ordinances may include environmentally oriented objectives, such as providing for stormwater drainage facilities, parklands, and erosion control.

Land divisions at a smaller scale than a subdivision of land are referred to as certified surveys (Wis. Stat. § 236.34). Local subdivision ordinances often require certified surveys to comply with provisions relating to general requirements, design standards, and required improvements which are applied to subdivisions.

Many subdivision regulations address environmental and open space considerations. The existing location of streams and drainageways, wetlands, lakes, rock outcrops, and other natural resource and environmental features are often required to be mapped as part of subdivision plat submittal. Regulations frequently require that the site design for plats recognize these and other environmental features and use these factors in the site design process. For example, the regulations may prohibit or severely restrict development in hazardous and sensitive areas with ~~severe~~ limitations ~~for development may be identified in the regulations (areas with~~such as poor soils, inadequate drainage, unfavorable topography, or flooding hazards~~d) as areas which are prohibited or with have severe development restrictions~~.

In less hazardous yet environmentally sensitive areas, permitted development may be subject to added controls. Subdivision regulations often include specific design standards for width and alignment of parkways and drainageways, and public easements adjacent to streams of adequate size and grade to accommodate potential flow volumes. Besides easements, the regulation may require dedication of land to the public for resource protection, open space, or recreation purposes. Often plat approval is conditioned upon compliance with design standards for critical areas, or adequate protection or preservation of certain environmental features in the site development plan.

Subdivision regulations furnish general development and design standards based on local plans, official mapping, and policies which the local planning commission applies in review of preliminary and final plats. There are usually three stages for review of subdivision plats.

1. **The Preapplication Conference**. A discussion should be held, prior to submittal of a preliminary plat, between the developer and community staff and/ or local planning commission. The primary purpose of such communication is for the developer to inform the community of the intended land use and general design scheme. It also allows the staff and planning commission to review and suggest revisions early in the site design process, since this is the most flexible and least costly time to influence development plans.

2. **Preliminary Plat**. The preliminary plat generally incorporates the revisions suggested in the pre-application conference and includes all data required by the ordinance. Upon formal application to the county, city, or village, the plan commission refers the preliminary plat to appropriate staff for review. The plan commission reviews, and then approves, conditionally approves, or rejects the preliminary plat. For the first two stages, the ordinance specifies what information is to be supplied, how it is to be submitted, who is to be involved in the review process, and the time allowed for each step.
3. **Final Plat**. In the final stage, legal commitments, dedications, financial guarantees, and special agreements should be finalized. Final plats are usually reviewed again by the county, city, or village staff, and sent to the legislative body for final action.

Subdivision regulations can be an effective tool to ensure recognition and protection of natural resource and environmental features in the land division and development process. Planning and design standards incorporated into subdivision regulations can be particularly important in protecting streams and drainageways, floodplains, wetlands, shoreland buffer strips, and riparian steep slopes. Often a degree of flexibility is provided to enable the planning body to negotiate design considerations with the subdivider or developer, and a firm grasp of and commitment to the principles underlying the planning and design standards is needed to avoid compromising adequate protection in the negotiations. Subdivision regulations can also provide for or require dedication of land or easements for drainage, parks and open space, or environmental protection.

OFFICIAL MAPPING

Wis. Stat. §s 62.23(6) and 61.35, give cities and villages, respectively, the authority to establish an official map of the city or village, or any part thereof, showing existing and proposed public facilities, including (in addition to streets, highways, railroads, and transit facilities) parks, parkways, and playgrounds. Section 62.23(6) provides cities and villages with authority to include waterways or drainage features on the official map (if the waterway is included in a comprehensive surface water drainage plan). One purpose of official mapping is to express the community's intent to reserve areas adequate for parks, parkways, and waterways. Official mapping may extend beyond the corporate limits of the municipality to the extent of its extraterritorial plat jurisdiction area.

The focus of official mapping is to protect future public lands and document these areas systematically. To this end, official map ordinances state that no permits may be issued for any building in the bed of any parkway or waterway shown on the official map, with certain exceptions. The placement of lands upon the official map, however, does not constitute the opening or establishment of a park, parkway, or waterway, or the taking or acceptance of any land for these purposes by a city or village.

The governing body of a city or village may establish and amend an official map showing the exterior boundaries of existing and planned streets, highways, parkways, railroads, public transit, parks, playgrounds, and waterways. Amendments require notice and public hearing, except for amendments made as part of subdivision plat approval if adjacent lands are not affected.

Building permits, normally issued by the community building inspector, may not be issued for any building in the bed of any street, highway, waterway, railroad right-of-way, public transit facility, or parkway shown on the official map. In the extraterritorial plat review jurisdiction, a person desiring to construct a building in the bed of any street, highway, railroad right-of-way, public transit facility

or parkway may apply to the authorized official of the city or village for a building permit. Unless such an application is made, and the building permit granted or not denied, the person is not entitled to any compensation for damage to the building caused by construction of the officially mapped facility. (It should be noted that Wis. Stat. § 62.23(6)(c), does not include officially mapped waterways under the building permit stipulation in the extraterritorial zone.)

The Zoning Board of Appeals (or equivalent body handling zoning variances or appeals) may review the administrative authority's decision for permit denial. If the finding is that the land in question within the officially mapped area is not yielding a fair return, the Board would have to grant a variance under terms of the statute and allow for a building permit to be issued.

Otherwise, the land would have to be acquired and compensation paid. The Board may impose reasonable permit restrictions as a condition of granting the building permit, in order to minimize the increase in cost of opening a park or waterway. If the finding is that the applicant would not be substantially damaged by placing the building outside the officially mapped area, the Board may refuse to grant a building permit.

Official mapping is a method for municipalities to declare public intent to reserve lands for future public acquisition. The successful application of official mapping can serve to guide sound and orderly development by reserving sites for public improvements in anticipation of actual need. For example, the official map can represent a useful planning tool for reserving land areas for future stormwater management practices and facilities, and for linking local plans with the comprehensive water resources planning process.

The denial of building permits for buildings in officially mapped areas provides the community with the opportunity to acquire the site, prior to construction of a building, through dedication or purchase.

Acquisition

Public rights in environmental corridors must be acquired, through purchase or dedication, where public access is required for recreation, for provision of structures, such as stormwater detention basins, or where access is needed for public maintenance of stream channels and structures. In addition, public acquisition may be indicated in some instances for environmentally sensitive areas which cannot be adequately protected by regulation.

FEDERAL AND STATE FUNDING PROGRAMS

State Stewardship Fund

The State Stewardship (Knowles-Nelson Stewardship Program) fund was originally created by the Wisconsin Legislature in 1989. Since its creation, the program has been reauthorized several times. The Knowles- Nelson Stewardship Program was renewed in 2021 for four additional years at $33 million per year. The program is administered by the Department of Natural Resources and has eight subprograms to help fund the acquisition of land and conservation easements. Four subprograms are only available to nonprofit conservation organizations (NCOs). Activities which are eligible for funding include the following:

- Planning and development of new trails and maintenance of existing trails.

- Habitat restoration through the restoration of wetlands and grasslands. Recreational development through the maintenance and upgrading of existing parks and other properties.
- Aid to local units of government for the development of community parks and acquisition of land for public outdoor recreation.
- Establishment and expansion of urban green space through the purchase of open, undeveloped land or the purchase of rights to open lands.
- Streambank protection through fee-simple acquisition or purchase of easements along stream banks. A special allocation of funds has been made under the Stewardship Program to acquire land which is on or adjacent to rivers in urban areas.

Housing and Community Development Act of 1974

The U.S. Department of Housing and Urban Development (HUD) administers a grant program for the purpose of, among others, protecting open space and natural resources, for providing recreational facilities, and development of scenic areas. Although these types of projects are eligible for community development block grants (CDBG), economic development projects currently have higher priority. Cities with populations greater than 50,000 administer their grants locally, whereas the state Department of Commerce, through the small cities CDBG program, administers projects for small cities and villages (with population less than 50,000) and counties.

ACQUISITION TECHNIQUES

Cities, villages, towns, and counties are authorized under Wis. Stat. §s 62.22(1) and (lm); 61.34(3) and (3m); and 60.10(2)e; and 59.07(1); respectively to acquire and develop property for a variety of purposes including (among others) parks, recreation, public use, and natural resource protection. Acquisition of property rights or partial rights may be accomplished in several ways, such as: gifts or donations, dedication of lands by developers, purchase of fee-simple interest in a property, purchase of lesser interest in the property (e.g., easements), or acquisition of development rights.

Gifts or Donations

Landowners may give land or partial rights to the land for public use to a local unit of government. Voluntary gifts or donations are a preferred method of acquisition since this is a least-cost method for acquiring property rights and for preserving the land in open space. Gifts are usually granted because the landowner desires to preserve the natural qualities and values of the land. In addition, the benefits to the grantor may include a reduction in the property tax burden along with providing for a charitable deduction on income tax returns for the value of the land or property rights given to the unit of government.

Another type of agreement establishes a life estate condition on the property. Through this, a property could be donated (or sold) to a unit of government when the donor or direct heirs die.

Dedication of Lands by Developers

Local subdivision and PUD ordinances often require that a portion of subdivisions or PUDs be dedicated by the developer for the purpose of park, open space, stormwater management and drainage greenways, and access to navigable lakes and streams. In lieu of dedication of lands to a unit of government, the developer may provide a payment of fees during the land development

process. Besides providing for needed recreation areas, dedication is a commonly used tool (in conjunction with official mapping) to preserve and protect drainageways on developing lands.

The adopted environmental corridor delineation may be used by the community as a basis for negotiating with subdividers and developers on land dedication, particularly of sensitive environmental features, such as wetlands, floodplains, drainageways, and riparian steep slopes. During the negotiation process, the environmental corridor could be used by the community to direct development away from these kinds of features. Density trade-offs could be suggested to the developer to enhance the development or protect a particular re~~-~~source feature, while minimizing any loss in development potential for the area.

The dedicated environmental corridors can be used by the locality for the open space and recreation needs of its citizens. However, it must be noted that not all environmental corridor land dedications will be suited to or entirely satisfy the ordinance requirements for recreation and open space land dedication needs.

Fee-Simple Purchase

Traditionally, local units of government have acquired public parklands and parkways for recreational purposes through the purchase of fee-simple interest in the property. Fee-simple acquisition is the purchase of all rights to a specific property. The county or community may also purchase particularly sensitive resource areas not adequately protected by regulatory mechanisms for conservancy or passive recreation areas. As referred to earlier in this section, local units of government have commonly sought financial assistance for purchase and development of parklands from federal and state cost-share funding programs (e.g., State Stewardship Fund, CDBG, WDNR matching funds).

Private sector involvement ~~in~~in the purchase of critical environmental resource recreation and open space lands has increased in recent years. For example, it is not uncommon for a local volunteer fire department, veterans organization, or civic group to purchase land and to develop and maintain it as a public park or to donate it to a community for operation. In addition, several private environmental groups, such as The Nature Conservancy, the Audubon Society, and the Wisconsin Wetlands Association, actively seek to acquire and protect sensitive natural resource areas through donation or purchase. Private foundations, such as Groundswell Conservancy (originally named the Dane County Natural Heritage Foundation), are also becoming increasingly active in acquisition and protection of open spaces.

Besides easements, a unit of government may seek a first right of refusal agreement with the owner of an environmentally valuable property. With this agreement, the county, or community is offered the first opportunity to purchase when the land is sold.

Purchase of Easements

In instances where fee-simple title is not needed, the purchase of less-than-fee-interest in a property may be more appropriate. Such acquisition of less-than-fee-interest grants the possessor of the interest only partial control and rights in the land, while the original owner retains partial interest. The most common less-than-fee-interest purchase by units of government is the easement, whereby limited land use rights are acquired.

Common examples of easements include the following:

- Access easements to allow public access to private lands for hiking, fishing, or other recreational purposes, or for maintenance of drainage facilities.
- Conservancy easements to preserve environmentally sensitive sites without allowing public access.
- Purchase of easements may be appropriate where public access is needed only for construction or maintenance of drainage facilities, but they also can be used for recreation access if costs would be substantially lower than fee-simple purchase.

Acquisition of Development Rights

A transfer of development rights (TDR) program allows the transfer of future development potential from properties in "sending" areas. Sending areas are designated areas where the community desires preservation of lands or limitation of development. Productive farmlands and environmentally sensitive areas are examples of sending areas. The future development potential is allowed to be transferred to "receiving" areas, designated as appropriate for new or additional development. They are usually in areas well served by transportation networks and public sewer and water systems.

A variant of this preservation tool is the purchase of development rights (PDR) program. Under a PDR program, a landowner sells his or her development rights to a parcel of land. The buyer, usually a public agency or a conservation organization, pays a price which is less than the outright purchase price of the land, and the seller retains the title to the land and can sell it or pass it on to other family members; however, the use of the land is forever restricted to agriculture and open space.

Recommendations

Units of government and non-profit groups to provide emergency acquisition funds to ensure protection of important corridor lands and critical environmental resources which are endangered or threatened by development, and which cannot be adequately protected through other means.

Appendix D: Adopted Policies and Criteria for Environmental Corridors

The current Policies and Criteria for Environmental Corridors adopted on 2/28/2008 as part of the Dane County Water Quality Plan are included here without edit.

III. Environmental Corridors

A. Major areas unsuitable for installation of waste treatment systems because of physical or environmental constraints are to be excluded from the service area (Environmentally Sensitive Areas in NR 121, Wis. Adm. Code and known in Dane County as Environmental Corridors). These Environmental Corridors include the following elements and criteria:

1. Wetlands under WDNR jurisdiction.
2. Vegetative buffers for wetlands and shorelands (75-feet minimum and excluding impervious surfaces). The minimum width of vegetative buffers for shorelands and wetlands may be increased to up to 300 feet where site specific habitat susceptibility and protection needs make such an increase advisable. CARPC staff will make the determination of needed buffer width in consultation with WDNR staff and the Natural Resources Technical Advisory Committee of the CARPC.
3. 100-year floodplains and floodways.
4. Steep wooded slopes (12% gradient and higher in the glaciated portions of the county; 20% gradient and higher for the driftless portion of the county) within 75 feet of the ordinary high water mark of water bodies or from the top of each bank. Steep slopes between 12% and 20% in the driftless portion of the county and adjacent to water bodies receive conditions for stringent site plan review and inspection by the local unit of government aimed at maintaining the stability of the slope. Steep slopes (12%-20%) in the driftless portion of the county that are not adjacent to water bodies receive recommendations for stringent site plan review and inspection by the local unit of government.
5. Navigable water bodies based on WDNR determination of navigability (plus the 75-foot shoreland buffer).
6. Non-navigable streams based on WDNR determination of navigability (within a ~~75-foot wide~~75-foot-wide ~~corridor, and~~corridor and maintaining at least 25-feet from the edge of the corridor to the ordinary high water mark or top of bank).
7. Open drainageways (within a ~~75-foot wide~~75-foot-wide corridor~~s~~ and maintaining at least 25-feet from the edge of the corridor to the ordinary high water mark or top of bank).
8. Public lands, parks, and conservancy areas (related structures can receive sewer service), except isolated (small) neighborhood parks.

9. Proposed public parks and conservancy areas; except isolated (small) neighborhood parks.

10. Problem soil areas and unique geologic formations (such as karst features and known critical recharge areas).

11. Archaeological sites on the National Register.

12. Endangered and sensitive habitats based on WDNR determination.

13. Stormwater facilities (stormwater facilities should be located outside environmentally sensitive areas when feasible).

14. Known or documented significant or sensitive groundwater recharge areas.

B. Existing development (impervious area) is exempted from inclusion in corridors.

C. Local units of government are in charge of the local implementation and protection of environmental corridors, and shall have programs to ensure the integrity of the corridors based on the criteria of the Dane County Water Quality Plan (zoning, plat design review, building permitting and inspections, conservation design requirements, etc.).

D. The minimum criteria for delineating environmental corridors represent a basic skeleton, and local units of government are encouraged to build upon this skeleton and expand it.

E. Higher minimum standards for environmental corridors will be considered where site specific habitat susceptibility and protection needs make such higher standards advisable (based both on current habitat quality and potential habitat quality if rehabilitative measures are undertaken). CARPC staff will make the determination if higher corridor standards are needed in consultation with WDNR staff and the CARPC Natural Resources Technical Advisory Committee.

To maintain a flexible but principled administration of the environmental corridor concept, the Water Quality Plan includes provisions for changes to these corridors as follows:

F. "Major changes" to the environmental corridors are those changes that have the potential for significant adverse impacts on water quality (determined through a technical analysis by the RPC staff). These changes require the approval of the RPC after a public hearing, staff analysis of the impacts of the encroachment and the likelihood that the mitigation measures will be successful, and the approval of the WDNR. These "major changes" include the following:

1. Removing any mapped wetland area unless exempted by state administrative rules or state-approved rezoning.

2. Any change that would remove any area below the ordinary high water mark of a stream, pond, or lake.

3. Any change resulting in the elimination or interruption in the continuity of any corridor segment which includes woodlands with significant ecological or water resources

functions, floodplains, wetlands, shoreland buffer strips or steep slopes adjacent to water bodies.

4. Any change that reduces the width of vegetated shoreland buffer strips along streams, wetlands, and drainageways below minimum guidelines.

5. Grading in a wetland vegetative buffer and within 30 feet of the wetland edge, where the buffer has been delineated in environmental corridors, unless the grading is intended to re- establish natural grades or to restore wetland habitat.

G. "Minor changes" to the environmental corridors are changes that do not have the potential for significant adverse impacts on water quality (as determined by the RPC staff). These changes do not require RPC approval, though they are reviewed by the RPC staff to ensure that they meet the definition of a "minor change."

"Minor changes" include the following:

1. Changes resulting from WDNR-approved changes in floodplain or wetland delineations, or WDNR-approved rezoning.

2. Relocation or shortening of a corridor based solely on intermittent streams and drainageways, or adjustment of the buffer strip width within the guidelines.

3. Addition to or removal from the corridors of public or private lands which do not include water bodies, floodplains, wetlands, minimum buffer strips, or steep slopes adjacent to water bodies.

4. Changes resulting from utility or roadway maintenance or construction which meet the criteria set in NR 117, Wis. Adm. Code (this chapter of Wisconsin Administrative Code outlines the state shoreland-wetland protection program and includes permitted uses within the shoreland zone). (It is not the intent of the environmental corridors to prevent or obstruct necessary maintenance, expansion or construction of transportation or utility facilities intended to serve areas outside of the corridors, needed to maintain or improve the continuity of those systems, or designed to serve compatible uses in the corridors, such as park shelters or facilities. Facilities intended to serve new residential, commercial or industrial development in the corridors are not permitted.)

H. Grading or the installation of stormwater management measures and practices in an environmental corridor should not appreciably reduce or harm the ecological functions of the environmental corridor.

Appendix E: Environmental Corridors Fact Sheet

Overview

Environmental Corridors are generally contiguous systems of open space and natural areas in places that are otherwise urbanized or planned for urban development. These corridors include environmentally sensitive lands such as drainageways and stream channels, floodplains, wetlands, riparian steep slopes, natural and cultural resources requiring protection from disturbance and development, and lands needed for open space, stormwater management, and recreational use. Together, Environmental Corridors form a network of concentrated natural resources that are generally connected by open space and protected from urban development.

Placing lands in environmental corridors protects and preserves certain natural resources critical to water quality and healthy ecosystems, helps protect our rich cultural history, provides scenic beauty and recreational opportunities, and makes the region more climate resilient.

Delineating Environmental Corridors

Delineating environmental corridors is a key component of sewer service area planning and implementation of the *Dane County Water Quality Plan*. When identifying areas suitable for urban development, it is critically important to also identify sensitive areas where development should be avoided. Environmental Corridors have been mapped for all Urban and Limited Service Areas in Dane County. Corridor boundaries are continually revised, updated, and expanded based on best-available information.

The *Policies and Criteria for Environmental Corridors* document was adopted in 2008 as part of the *Dane County Water Quality Plan*. This policy sets the basic, minimum criteria for resources that **must** be included in environmental corridors, including:

- Wetlands under WDNR jurisdiction with a 75-feet minimum vegetative buffer
- 1% annual chance (100-year) floodplains and floodways
- Riparian (within 75 feet of the ordinary high water mark of water bodies or from the top of each bank) steep, wooded slopes (12% gradient and higher in the glaciated portions of the county; 20% gradient and higher for the driftless portion of the county)
- Navigable water bodies based on WDNR determination (or confirmation) of navigability (plus the 75-foot shoreland buffer on each side of the waterway and a 200-foot minimum total width)
- Non-navigable waterways based on WDNR determination (or confirmation) of navigability (plus the 25-foot shoreland buffer on each side of the waterway and a 75-foot minimum total width)
- Public lands, parks, and conservancy areas
- Problem soil areas and unique geologic formations (such as Karst features and known critical recharge areas)
- Archaeological sites
- Endangered and sensitive habitats (such as savanna and prairie remnants)

- Stormwater facilities

[Figure: TYPICAL ELEMENTS This diagram depicts the resource elements found in a typical environmental corridor. Often one or more elements occur together, such as woodlands and steep slopes.]

[Figure: CORE FUNCTIONS AND VALUES OF OPEN SPACE]

FUTURE ENVIRONMENTAL CORRIDORS

Outside of urban service areas, most of these same areas are mapped as **Estimated Environmental Corridors** which represent areas that will likely require mapping as Environmental Corridor if/when they are added to an urban service area. However, this mapping does not include all resource features and does not necessarily imply approval, adoption, or inclusion (or omission) of lands in a future environmental corridor.

Other natural resources do not have legal protection from development or disturbance, yet still provide important benefits to the region. These resources are recommended for voluntary inclusion in environmental corridors and are mapped as **Voluntary Environmental Corridors**, and include:

- Potentially restorable wetlands and hydric soils
- Old-growth woodlands
- 0.2% annual chance (500-year) floodplain
- Ice Age Trail corridor
- Natural Resource Area Boundaries
- Internally drained areas

Implementation

Environmentally sensitive features associated with surface waters must always be included in environmental corridors; meanwhile, the requirements for inclusion of other non-sensitive elements (parks and stormwater management areas) or elements not associated with surface waters (problem soils and unique geologic formations, archaeological sites, and endangered and sensitive habitats) allow for site-specific considerations. Lands in environmental corridors are generally restricted from development and are ineligible to receive public sanitary sewer service.

EXCEPTIONS

Certain exceptions may be allowed for compatible uses (e.g., recreational paths, park facilities) and public utility and transportation facilities necessary to serve areas outside of the Environmental Corridor. For any such development within the environmental corridor, the following best practices should be followed:

- Design and locate improvements to protect corridor functions and the elements within.
- Place improvements as far away from any environmentally sensitive resources as possible.
- Impervious surfaces should be limited (e.g., the use of porous pavements is encouraged).
- Stormwater runoff should be properly managed.

- Native vegetation should be used wherever feasible, especially within the immediate buffers around sensitive water resources.

CHANGING ENVIRONMENTAL CORRIDORS

To maintain a flexible but principled administration of environmental corridors, the Policies and Criteria for Environmental Corridors include provisions for changes to corridors which can be classified into two general categories: minor changes and major changes. All changes must be coordinated with CARPC staff prior to implementation.

Minor Changes

Minor changes (refinements and administrative changes) do not have the potential for significant adverse impacts on water quality and are handled at the CARPC staff level. Minor changes are generally of two types: changes resulting from revised, improved, or more detailed resource information; and minor adjustments or changes supported by the local municipality which, in the judgement of CARPC staff, would not seriously affect water quality.

Major Changes

Major changes have the potential for significant adverse impacts on water quality. These changes constitute a formal amendment to the Dane County Water Quality Plan, and require action by the Commission and WDNR approval following a public hearing and detailed staff analysis of the impact of the change and the likelihood that proposed mitigation measures will be successful in meeting water quality standards (typically a 90-day process). Major change requests must be initiated or supported by the municipality that governs the area in question. Major changes may include:

- Removing any mapped floodplain or wetland area, unless exempted by WDNR-approved rezoning or permitting (e.g., wetland fill permit, artificial exemption, or LOMC).
- Removing any area below the ordinary high-water mark of a stream, pond, or lake.
- Any change resulting in the elimination or interruption in the continuity of any corridor segment which includes woodlands determined to be endangered or sensitive, floodplains, wetlands, shoreland buffer strips, sensitive habitat areas, or steep wooded slopes adjacent to water bodies (defined as slopes over 12 percent where the base of the slope is within 75 feet of the ordinary high water mark or top of bank of streams, ponds, and lakes).
- Any change that reduces the width of vegetated shoreland buffer strips along streams, wetlands, and drainageways below the minimum criteria.
- Grading (or other similarly soil disturbing activities) within a wetland vegetative buffer and within 30 feet of the wetland edge, where the buffer has been delineated in environmental corridors, unless the grading is intended to re-establish natural grades or to restore wetland habitat.

[FIGURE: WETLAND AND STREAM BUFFER STRIPS Configuration of common scenarios to meet buffer strip requirements for waterways.]

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LEARN MORE

View the adopted Policies and Criteria for Environmental Corridors and complete Environmental Corridors Report at **capitalarearpc.org**.

[QR CODE SCAN TO LEARN MORE]

Appendix F: GIS Datasets of Natural Resource Features

Data for many of the natural resource features described or referred to in this report are available for download from the following websites:

CARPC Open Data Portal
data-carpc.opendata.arcgis.com

- Environmental Corridors
- Sewer Service Areas
- Future Environmental Corridors (Estimated and Voluntary Environmental Corridors)
- Dane County Internally Drained Areas
- Groundwater Recharge
- Potential Karst & Bedrock Depth

WDNR GIS Open Data Portal
data-wi-dnr.opendata.arcgis.com

- 24k Hydro Flowlines (Rivers/Streams)
- 24k Hydro Waterbodies (Open Water)
- Wetlands (Wisconsin Wetland Inventory)
- Potentially Restorable Wetlands

Dane County GIS Catalog
gis-countyofdane.opendata.arcgis.com

- Lakes and Ponds
- Rivers and Streams

Wisconsin View
wisconsinview.org

FEMA

- National Flood Hazard Layer: www.fema.gov/flood-maps/national-flood-hazard-layer
- NFHL ArGIS Viewer: msc.fema.gov/nfhl

Ice Age National Scenic Trail

- Hiker Resource Map: https://experience.arcgis.com/experience/df81ecf850ec44e199e031d880d278e9/
- Ice Age Trail Corridor in Dane County: https://parks-lwrd.countyofdane.com/documents/PDFs/ plans/posp/2018-2023-Dane-County-Parks---Open-Space-Plan-Regional-Trails-Map.pdf

The above list represents current resources and URLs available at the time of writing. If you encounter broken links, please contact the provider of the information. For CARPC-derived information, please contact info@capitalarearpc.org for assistance.