



Whitetail Woods Regional Park

Development Master Plan

Dakota County, Minnesota

Adopted February 28, 2012



VISION FOR WHITETAIL WOODS REGIONAL PARK

A COLLABORATIVE RECREATION AND LEARNING PARK

Whitetail Woods Regional Park is a healthy mosaic of natural and community spaces that restore the human spirit, where people can gather, celebrate, and be inspired. Outstanding recreation and learning experiences heighten awareness and appreciation of our relationship with nature.

Strong partnerships with Empire Township, the University of Minnesota, and Minnesota Department of Natural Resources on adjacent public lands expand boundaries of all areas, with the park as a welcoming gathering place for visitors.



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Chapter 1: Introduction

BACKGROUND

Dakota County’s newest park, Whitetail Woods Regional Park, is located in Empire Township in the center of Dakota County, Minnesota, one mile north of the Vermillion River. *Figure 1* shows Whitetail Woods Regional Park in relation to the five other parks in the Dakota County Park System.

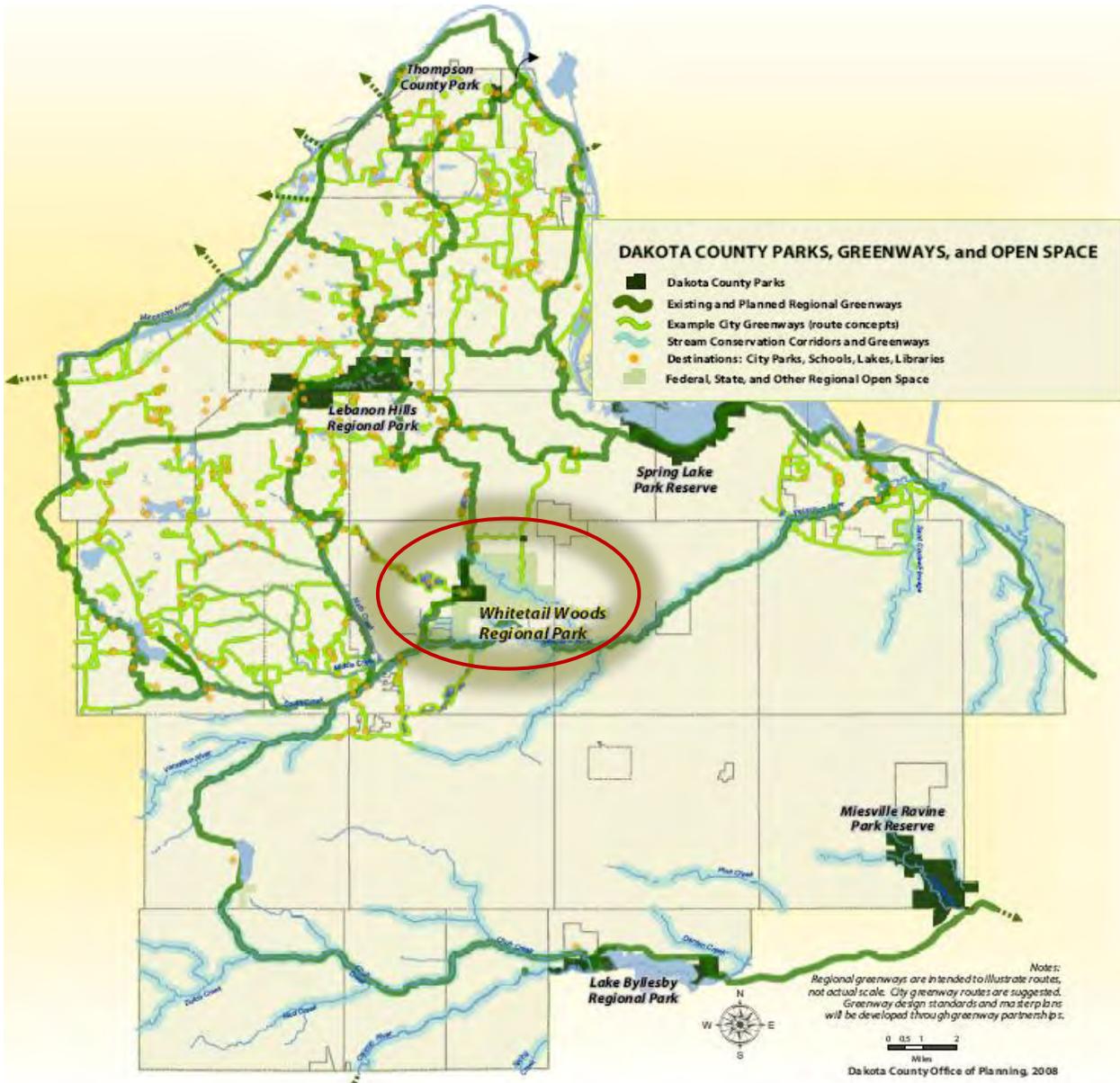


Figure 1: Whitetail Woods Regional Park and Dakota County Park System

The park is bounded by the Vermillion Highlands Modified Wildlife Management Area (MWMA) to the east and the Vermillion River Wildlife and Aquatic Management Areas to the south. UMore Park, the University of Minnesota’s planned sustainable community, lies directly north of the park.

In its 2001 Park System Plan, Dakota County identified a park service gap in the rapidly growing areas of Farmington, Lakeville, and Rosemount. The County's 2002 park siting study identified land in Empire Township for a new park, based on location, natural qualities, and possible partnership opportunities with the University of Minnesota (UM) and Minnesota Department of Natural Resources (MDNR). Per Metropolitan Council guidelines, Dakota County prepared an Acquisition Master Plan for the Empire Wetlands Area in 2005, proposing the site as a new regional park and identifying future needs related to boundary, resource management, facility development, operations, and public services.

With the UM, MDNR, and Empire Township, Dakota County participated in concept master planning for the larger public land complex that includes the new park and the adjacent Vermillion Highlands in 2007. Vermillion Highlands was created by the Minnesota Legislature in 2006. *Creating Common Ground*, a 2007 legislative report, outlines joint management of the 2,822-acre Vermillion Highlands property by the UM and the MDNR, in conjunction with the County, as a modified research, recreation and wildlife management area (MWMA) that balances University research, education and public engagement; public access for diverse, high-quality recreation; and wildlife management and hunting.

The approved Vermillion Highlands Concept Master Plan defines preferred uses and use intensity throughout the MWMA. High intensity uses are focused in the northwestern corner of MWMA, next to the new Regional Park and future development in UMore Park. Low intensity uses that support habitat restoration and wildlife management goals predominate east and south. *Figure 2* illustrates general zones of emphasis for agricultural research, wildlife management, and park-based recreation.

The Concept Master Plan recognizes:

- Opportunities for environmental connections to the north through UMore Park to the Mississippi River and to the Vermillion River to the south
- Opportunities for north/south regional recreational connections from Lebanon Hills Regional Park to and along the Vermillion River, including bicycle and hiking trails, a river-use area, and fishing, all designed to complement the natural environment and wildlife
- A need for flexibility in land use management along the boundary between Vermillion Highlands, the new regional park, and UMore Park to accommodate mutually beneficial goals

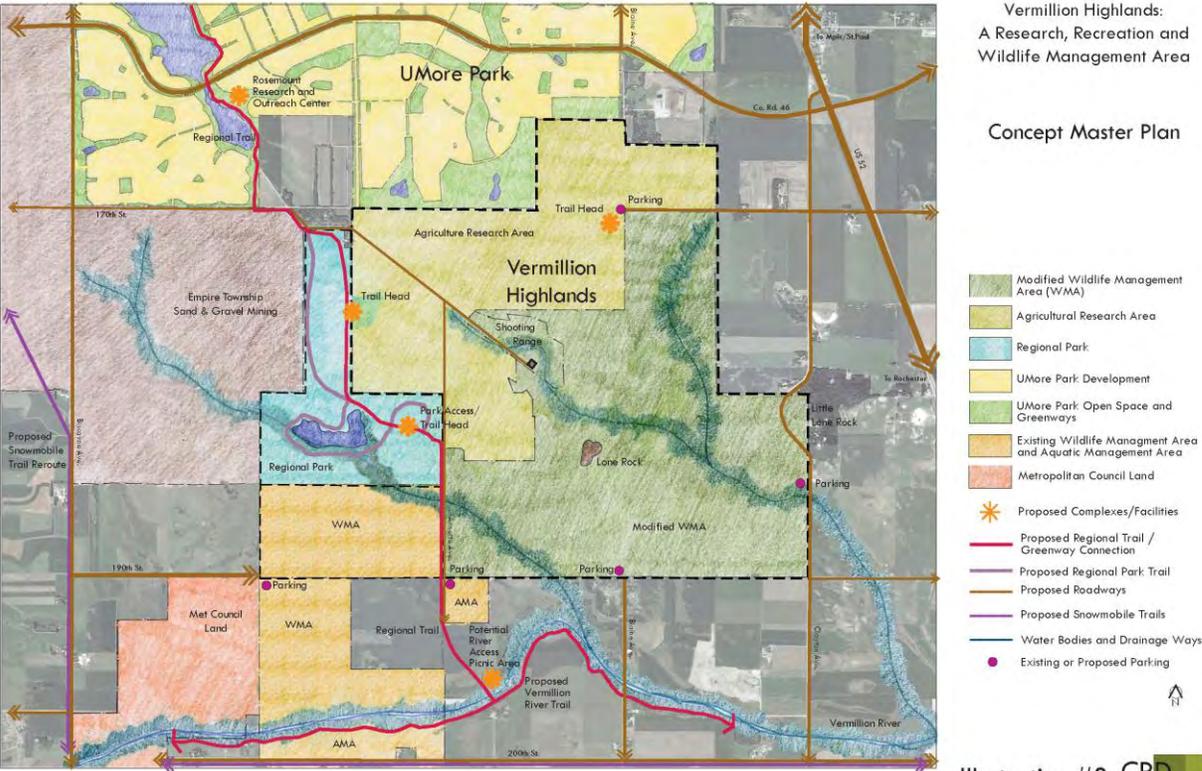


Figure 2: Vermillion Highlands Concept Master Plan

Dakota County acquired the new regional park property as a single land purchase in 2008. The County began preparing a Development Master Plan (The Plan) in 2010 to comprehensively address development and management of the new park and further evaluate opportunities for collaborative recreation on Vermillion Highlands. This Plan builds on the Concept Master Plan principles and goals, and was prepared in close partnership with representatives from the University of Minnesota, Minnesota Department of Natural Resources, and Empire Township. Dakota County formally named the park Whitetail Woods Regional Park in 2012.

PURPOSE

The Plan provides guidance on the development, maintenance, and operations of Whitetail Woods Regional Park in Empire Township. Plan content is based on the eleven requirements for master plan content listed in the Metropolitan Council’s 2030 Regional Parks Policy Plan:

1. Boundaries and acquisition costs
2. Stewardship plan
3. Demand forecast
4. Development concept
5. Conflicts
6. Public services

7. Operations
8. Citizen participation
9. Public awareness
10. Accessibility
11. Natural resources

Recognizing that the park land is undeveloped for park use, this Plan presents a long-term vision that will be realized over the coming decades. Dakota County will periodically update this Plan as needed, but at least once every ten years.

PLANNING PROCESS AND PUBLIC PARTICIPATION

This Plan was prepared with extensive input from neighboring jurisdictions, County residents, and others (see *Acknowledgements*). An overview of the planning process and public participation follows:

1. Planning Project Start-Up

- Develop public participation and communication approaches
- Build a broadly-based Technical Advisory Group (TAG) for technical review and comments
- Establish broadly-based Focus Groups to provide feedback on specific topics
- Create a project webpage

2. Inventory and Analysis

- Meet with neighboring jurisdictions to gather input on the park and identify issues
- Conduct site visits and detailed site analysis
- Prepare and launch online community survey to explore public interests
- Convene TAG Workshop 1 to share research and explore ideas and opportunities
- Conduct Focus Group sessions to gather ideas from on diverse topics and interests
- Update Vermillion Highlands Steering Committee

3. Develop Park Concept Alternatives, Identify Preferred Concept

- Develop three master plan concept alternatives based on research and input
- Hold TAG Workshop 2 to review and comment on concept alternatives
- Review concepts with the County Parks and Recreation Advisory Committee and the County Board Physical Development Committee of the Whole
- Refine concepts based on comments
- Conduct public review of the three concept alternatives
- Review comments from partners, the public, and Parks and Recreation Advisory Committee to develop recommendation for County Board. Board identifies preferred concept for park
- Update Vermillion Highlands Steering Committee

4. Refine the Preferred Concept and Establish the Plan

- Prepare the draft plan document
- Review draft with Parks and Recreation Advisory Committee and County Board Physical Development Committee of the Whole
- Public Review: post the draft plan online, hold public open house, and present draft to partners
- Summarize public comments and seek recommendation on plan adoption from Parks and Recreation Advisory Committee
- Request plan adoption from County Board Physical Development Committee of the Whole, contingent on revisions
- Submit final plan to Metropolitan Council for review and approval

ORGANIZATION OF THE PLAN

The Plan is organized into five parts:

Introduction: provides an overview of the Plan

Inventory and Analysis: provides an analysis of the park's regional context, its natural and cultural resources, the recreation demand for the park, and the major opportunities, issues, and potential conflicts associated with the development of the park

Vision: describes the park's overarching vision and guiding principles

Development Master Plan: provides an overview of the recreation program, the conceptual layout of the park, public services, and natural and cultural resources stewardship

Implementation: discusses park boundary, operations, maintenance, improvement budget, and project phasing.

Chapter 2: REGIONAL CONTEXT

Existing and planned development (land uses, buildings, roads, and utilities) in and near the park can benefit or limit our relationship with the park's natural qualities. This chapter analyzes existing and planned development in the park area and looks at opportunities for mutually beneficial relationships. Issues and potential conflicts are also discussed.

REGIONAL LAND USE

Empire Township guides land use in the immediate park area. The City of Rosemount guides land to the north of the regional park. All planned land use is in accordance with Metropolitan Council's 2030 Regional Development Framework, and a description of existing and planned land uses follows. Refer to the Comprehensive Plans for Empire Township and Rosemount for more information.

Public/Semi-Public Uses

Whitetail Woods Regional Park

Prior to Dakota County's purchase of the new park site, the land was mostly used for hunting and farming. Hunting ceased after park purchase, but the County continues to lease roughly 130 acres of agricultural land in the park to area farmers. The County minimally manages the rest of the park, pending adoption of a Development Master Plan. As of 2011, no parking areas, trails, or other facilities were in place to accommodate park visitors. Figure 3 shows the relationship of the Whitetail Woods Regional Park to adjoining public lands.

Vermillion Highlands Research, Recreation, and Wildlife Management Area

Vermillion Highlands is a 2,838-acre research, recreation, and "modified" wildlife management area (MWMA) located east of the regional park. Created by the Minnesota Legislature in 2006, Vermillion Highlands provides for 1,000 acres of land for University research, although research can be conducted anywhere in the MWMA. Research can include agriculture, wildlife management, ecology, recreational trails, renewable energy, and climate change. Recreation in the MWMA includes horseback riding, hiking, cross country skiing, and nature observation. Wildlife management largely includes habitat improvement for game species and hunting and trapping of turkey, deer, waterfowl, coyote, raccoon, and other animals.

Little development exists in the MWMA, other than the Lone Rock Trail and trailhead, an outdoor shooting range, a communications tower, and some agricultural structures. The site consists mostly of agricultural research plots, leased agricultural fields, and wildlife management habitat. The site also contains remnants of the US War Department's Gopher Ordnance Works, a plant that manufactured and re-processed smokeless gunpowder during World War II and closed in 1945. Remediation efforts associated with the former plant are discussed later in this chapter.

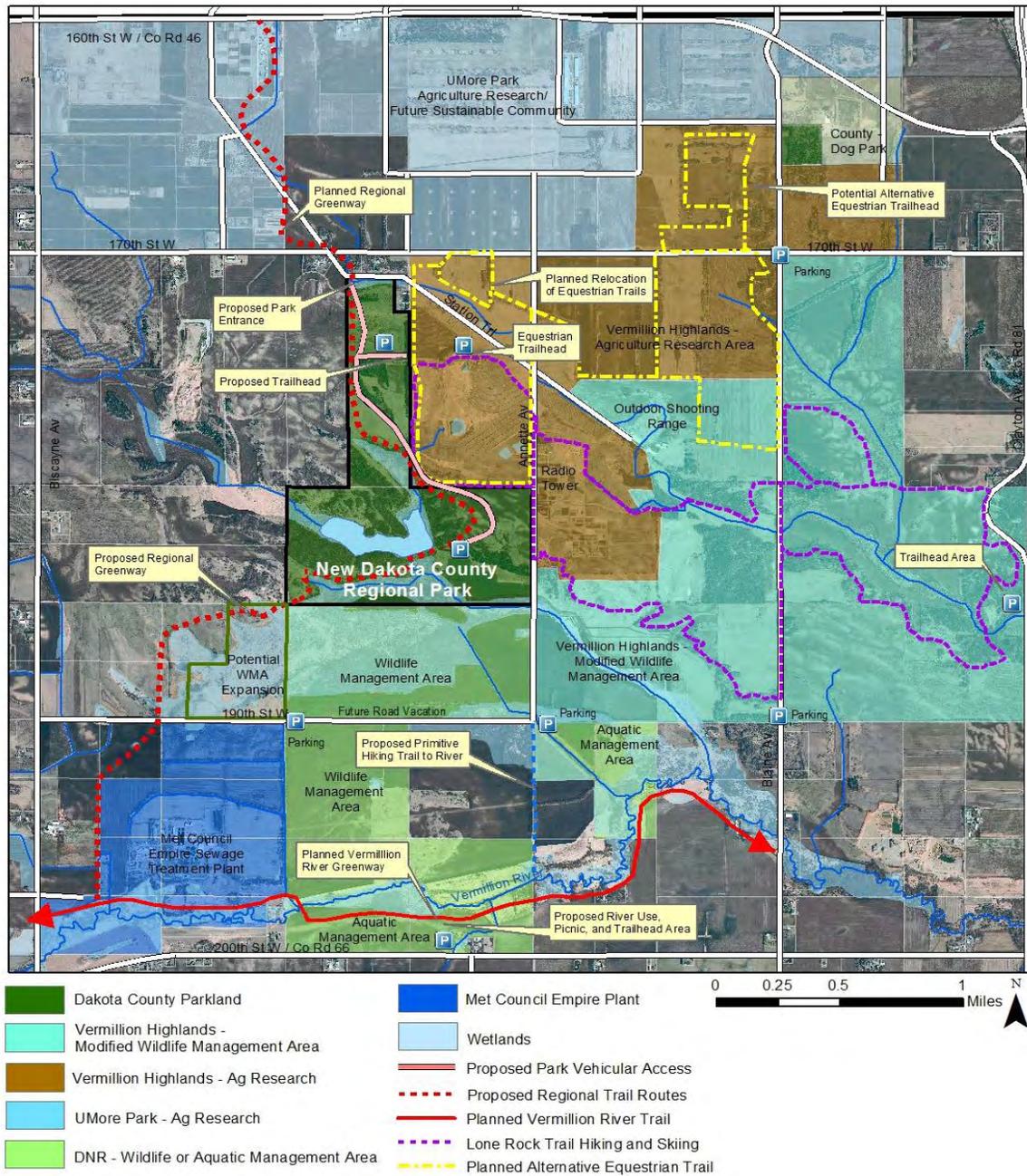


Figure 3: Regional Land Use

Vermillion Highlands is cooperatively managed by the University of Minnesota (UM) and the Minnesota Department of Natural Resources (MDNR). Dakota County serves on the Vermillion Highland Steering Committee and is a partner in the development and management of Vermillion Highlands.

The plan project team explored several park access alternatives including improving Annette Avenue from Station Trail to the park's east boundary, and modifying the Lone Rock Trailhead entry into a park entrance road. Although each alternative had merits and drawbacks, an entrance to the park from the north, off Station Trail, was selected in consultation with UM and MDNR representatives and others. From the north entrance, an internal road system travels south through the stovepipe, clips a corner of Vermillion Highlands to avoid wetlands in the park, and ends at the proposed main visitor area in the southeast part of the park. The Vermillion Highlands Steering Committee was agreeable to placing part of the park access road on UM property. A suitable instrument for providing road access will be discussed with UM staff.

Dakota County previously studied alternatives for new county road networks to accommodate expected population growth in the area. Once land west of the park develops after mining is completed, a secondary park entrance from 175th Street may be possible. Refer to *Figure 5: Recommend Regional Arterial Corridors* for additional information.

Vermillion River Wildlife and Aquatic Management Areas

The MDNR manages 837 acres as the Vermillion River Wildlife Management Area (WMA) directly south of the new regional park. WMAs are intended to protect areas for wildlife production, public hunting, trapping, fishing, and other compatible recreation, such as wildlife observation. Unlike the Vermillion Highlands MWMA (which has a broader mission than a WMA), traditional WMAs focus on protecting and enhancing wildlife habitat. By law, development in WMAs can provide access to the area, but must minimize intrusion on the natural environment. Development features such as buildings and multi-use recreation trails are discouraged in WMAs.

MDNR also manages 475 acres as the Vermillion River Aquatic Management Area (AMA) along the River, south of the park and the Vermillion River WMA. AMAs are managed to protect lakes, rivers, streams, and wetlands for water quality, biological value, fishing, and compatible recreational uses including hunting. Although state law does not specifically prohibit all development in AMAs, any potential development (such as a trail) must be carefully planned, developed, and maintained. Access to AMAs may be closed to the public at sensitive times of the year.

Potential expansion of the Vermillion River AMA and WMA could occur in the future through MDNR work with private landowners to acquire additional land. If expansion were to occur, it would be negotiated between the landowners and the State of Minnesota, but to the extent possible, it should also be coordinated with Dakota County and Empire Township.

As part of preparing the master plan for Whitetail Woods Regional Park, MDNR and Dakota County discussed and agreed to two locations for park visitors to access the Vermillion River in the WMA and AMA, as shown on Figure 3.

Primitive Hiking Trail to the Vermillion River: a 6-foot wide mowed trail heading south from the corner of Annette and 190th to the Vermillion River. A viewing area at the River would remain primitive, with modest additions, such as a bench to offer a resting and reflection point. This route is contingent on a future purchase of private property.

Drive-to River Use Area: on the south side of the Vermillion River, off of Co. Rd. 66, from the existing parking lot to the river. The gate from the existing lot to the river would be open from Memorial Day

Through August 31st. The gate may open sooner than Memorial Day depending on the spring conditions, but would need to be closed by September 1st when dove season opens. This drive would be single-lane gravel with room for five or six vehicles to park at the end. An open pavilion style building may be erected by the river (south) with a couple of picnic tables. A permanent style restroom may be erected by the existing parking lot as close to Co. Rd. 66 as possible.

Rosemount Research and Outreach Center/Future Sustainable Community at UMore Park

The Rosemount Research and Outreach Center (RROC) occupies 5,000 acres at the UM's Outreach, Research and Education (UMore) Park, just north of the regional park. (Figure 4 on following page)

The RROC supports research on agricultural production, human health, renewable energy, the environment, and other types of research. It also hosts the research and display gardens of the Dakota County Master Gardeners.

The UM plans to mine sand and gravel on the property, then develop the land into a sustainable community with housing, businesses, industries, and public amenities (*see Figure 4: Master Plan for UMore Park Sustainable Community*). Existing agricultural research uses at the RROC will be relocated. Potentially, the regional park could host some uses like the Dakota County Master Gardeners. Plans for the future community include interconnected parks, trails, and open space, which can be coordinated to provide connection to the regional park.

Outdoor Shooting Range

Dakota Gun Club operates an outdoor shooting range in Vermillion Highlands at the east end of Station Trail. The club's stated mission is to provide a quality outdoor shooting range for its members and to help teach firearm safety to the young and inexperienced. The club periodically opens the range for public events involving rifle shooting, trapshooting, and archery.

The Vermillion Highlands Concept Master Plan shows continued use of the outdoor shooting range, with a potential expansion to general public use. To minimize potential conflicts (such as noise) and to maximize potential synergies (such as education), continued use of the range should be coordinated with surrounding uses, including the regional park. Gun shots from the shooting range can be heard in most areas of the park to varying degrees.

County Off-leash Dog Area

Dakota Woods Dog Park is a 16-acre, wooded, and fenced County off-leash dog area (OLDA) southeast of the intersection of Blaine Avenue and 160th Street, and is two miles from the new regional park. The County will move the existing off-leash dog area to the new park in the future, to improve management and promote synergies between the OLDA and activities in the park and Vermillion Highlands. Moving the OLDA would integrate this popular use with complementary recreation facilities within the park.

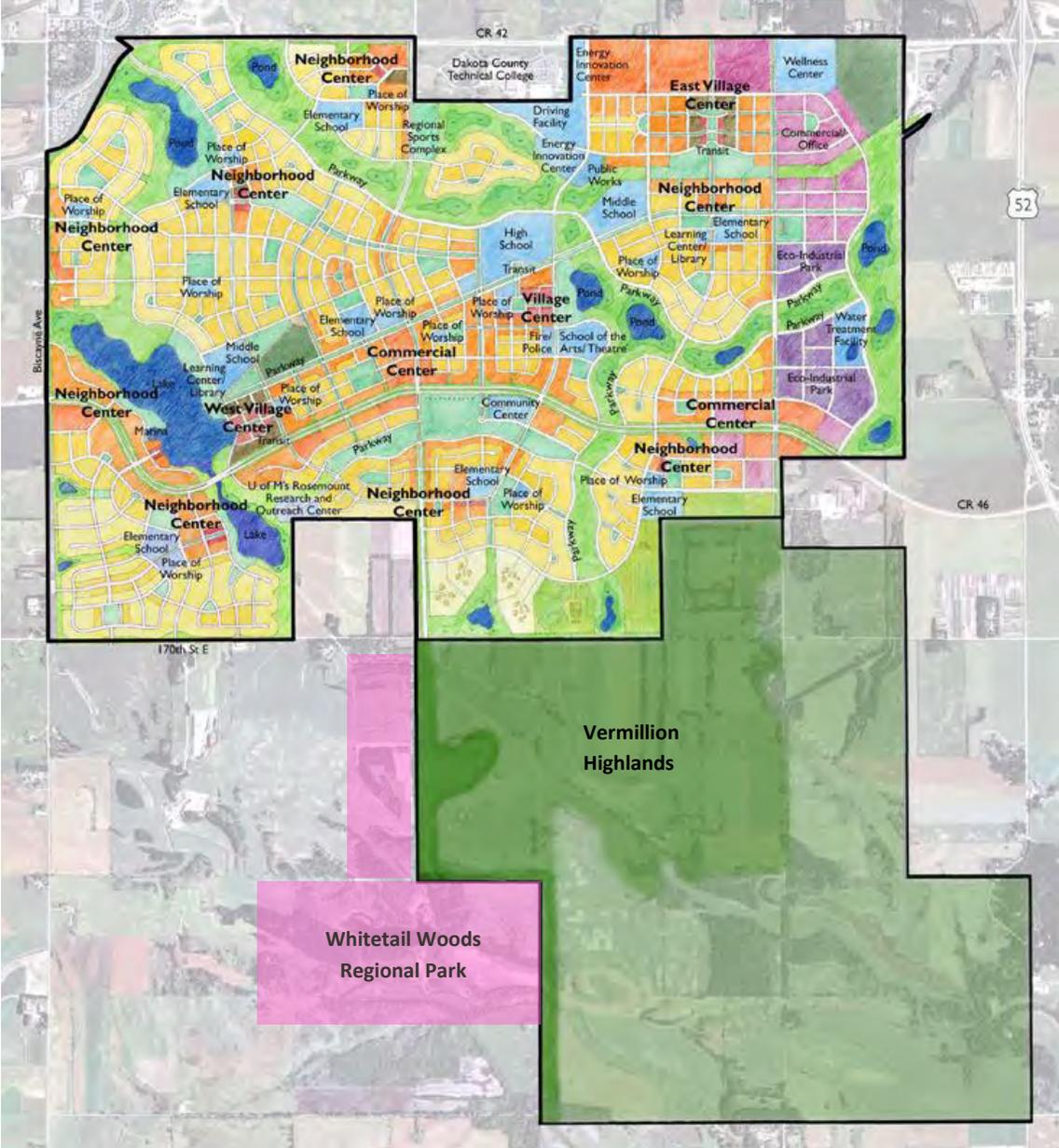


Figure 4: UMore Park Future Community Plan

Future Local Parks, Trails, and Open Space

Empire Township’s 2030 Land Use Plan identifies future parks, trails, and open space, which could inter-connect and link to the regional park via greenways. If and when land west of the park subdivides, the Township could consider parkland dedication along the western boundary of the regional park.

Private Uses

Agricultural Uses

Private land directly west of the regional park primarily consists of row crops (corn, soy beans, and wheat) and pastures. While agriculture can produce erosion and agricultural runoff, the surrounding agricultural uses are generally compatible with the regional park. Best management practices should be encouraged to ensure that the agriculture does not adversely affect the park.

Over the coming decades (through 2040 and likely beyond), much of the surrounding agricultural land will be mined for sand and gravel and may eventually transition to residential development.

Existing Residential Use

Few residences exist near the regional park for several reasons. First, the federal government removed area housing and farmsteads to construct the Gopher Ordnance Works in the 1940s and provide a buffer around the plant. After the plant closed at the end of World War II, land associated with the plant transferred to the University of Minnesota as an Agricultural Experiment Station. Buffer lands outside the plant proper, including the new regional park site, were sold to private individuals. Second, privately owned farmlands west of the park are expected to be mined before development in the coming decades and active mining has begun in only a small area zoned for aggregate extraction. Third, until this area can be logically served by municipal sewer and water, Empire Township has guided the land for agricultural use with a 40-acre minimum lot size.

One single-family residence on a five-acre parcel exists at the northeast corner of the regional park. While this house may have little or no impact the park development, it is surrounded by public land to the east, west, and south. The property owner and the County may want to discuss future opportunities for the property and monitor and mitigate potential conflicts between the uses.

Planned Residential Uses

Empire Township's Sewer Staging Plan identifies gradual and orderly expansion of the Metropolitan Urban Service Area (MUSA) to accommodate future mixed residential development at an overall density of three dwelling units per acre. By 2030, mixed residential use could be located within one-half mile of the southwest corner of the regional park. After 2030 (and after any potential mining is completed) there may be development pressure to expand the MUSA up to the western boundary of the park. Future MUSA expansion decisions will be made by the Township in conjunction with the Metropolitan Council.

The sustainable community at UMore Park is expected to develop in phases following completion of phased mining, which is expected to completely finish near 2040. The post-development scenario includes housing for 20,000-30,000 residents, who will be within a few miles of the regional park. This gradual housing expansion will contribute to increased use of the park over time.

Commercial/Industrial Uses

Sand and Gravel Mining

Sand and gravel mines currently operate just a mile from the regional park. Mine operations are monitored for compliance with laws and currently have little impact on park noise and the park's visual, water, and air quality. When future mining expands toward the western and northern park boundaries, impacts will become more evident in the park. As mining concludes on the UMore property to the

north, mining will likely occur on land directly to the west of the park, and will be a significant land use in the surrounding area for decades.

The County should coordinate with Empire Township and the property owner to ensure proper mitigation of potential mining concerns including noise, poor views, dust, heavy truck traffic, excessive grade change differences between the park and mined area, and surface and groundwater concerns. Although these concerns are monitored and often reasonably mitigated through the permitting process, the County should strive to coordinate with others to ensure that the mining end-use plans can provide for high quality land-use adjacent to the park that provides community access and ecological connectivity to the park. As mining occurs near the park, it can offer interpretive opportunities associated with local glacial geology.

Communications Tower

Minnesota Public Radio maintains an 800-foot radio transmission tower, equipment, and a building at 17979 Annette Avenue, east of the park in Vermillion Highlands. Although the tower is a prominent feature in the landscape, it provides an orientation and way-finding landmark in a relatively undeveloped area.

Commercial Equestrian Ranch

Several equestrian ranches operate east of Vermillion Highlands and riders have been able to access Lone Rock trail from Clayton Avenue without having to trailer their horses to the Lone Rock Trailhead off Station Trail. Future equestrian access to Lone Rock Trail will be coordinated with the Minnesota Department of Natural Resources. The Transportation section of this chapter provides more detailed information on equestrian access.

REGIONAL TRANSPORTATION

Existing Roads and Access to the Regional Park

Roughly 1,000 feet of Station Trail forms the northern park boundary and roughly 2,640 feet of Annette Avenue form the eastern park boundary. Both are gravel roads maintained by Empire Township. Station Trail (also known as Patrol Road) was constructed in the 1940s to serve as a guard road for the Gopher Ordnance Works. A guard tower was located on the north side of Station Trail across from the northwest corner of the park. Station Trail is under University of Minnesota jurisdiction just east of the park and serves the Lone Rock Trailhead, Dakota Gun Club, and Vermillion Highlands.

Annette Avenue is under federal government jurisdiction, a holdover from the Gopher Ordnance Works era. Annette Avenue serves Vermillion Highlands, Dakota Gun Club, the radio communications tower on Vermillion Highlands, and the WMA and AMA. South of the communications tower, Annette Avenue is a low maintenance road, typically closed during the winter months. Annette Avenue was not designed, nor is it maintained, in a manner to accommodate the level of vehicular traffic typically associated with a regional park.

Future Roads and Access to the Regional Park

Future park access and roads emerged as major discussion issues during master planning for the park. Representatives from the University of Minnesota (UM) and the Minnesota Department of Natural

Resources (MDNR) expressed concern about park access via Annette Avenue (and via 190th Street), which would require roads improvements to handle traffic associated with the regional park. Road improvements would negatively affect operations of the wildlife management and research areas. The Vermillion Highlands Concept Plan supported the closure of 190th Street – preventing access to the regional park via 190th Street to Annette Avenue.

The plan project team explored several park access alternatives including improving Annette Avenue from Station Trail to the park’s east boundary, and modifying the Lone Rock Trailhead entry into a park entrance road. Although each alternative had merits and drawbacks, an entrance to the park from the north, off Station Trail, was selected in consultation with UM and MDNR representatives and others. From the north entrance, an internal road system travels south through the stovepipe, clips a corner of Vermillion Highlands to avoid wetlands in the park, and ends at the proposed main visitor area in the southeast part of the park. The Vermillion Highlands Steering Committee was agreeable to placing part of the park access road on UM property. A suitable instrument for providing road access will be discussed with UM staff.

Dakota County has studied alternatives for new county roads to accommodate expected population growth in the area. Once land west of the park develops after mining is completed, a secondary park entrance from 175th Street may be possible. (*Figure 5: Recommend Regional Arterial Corridors*)

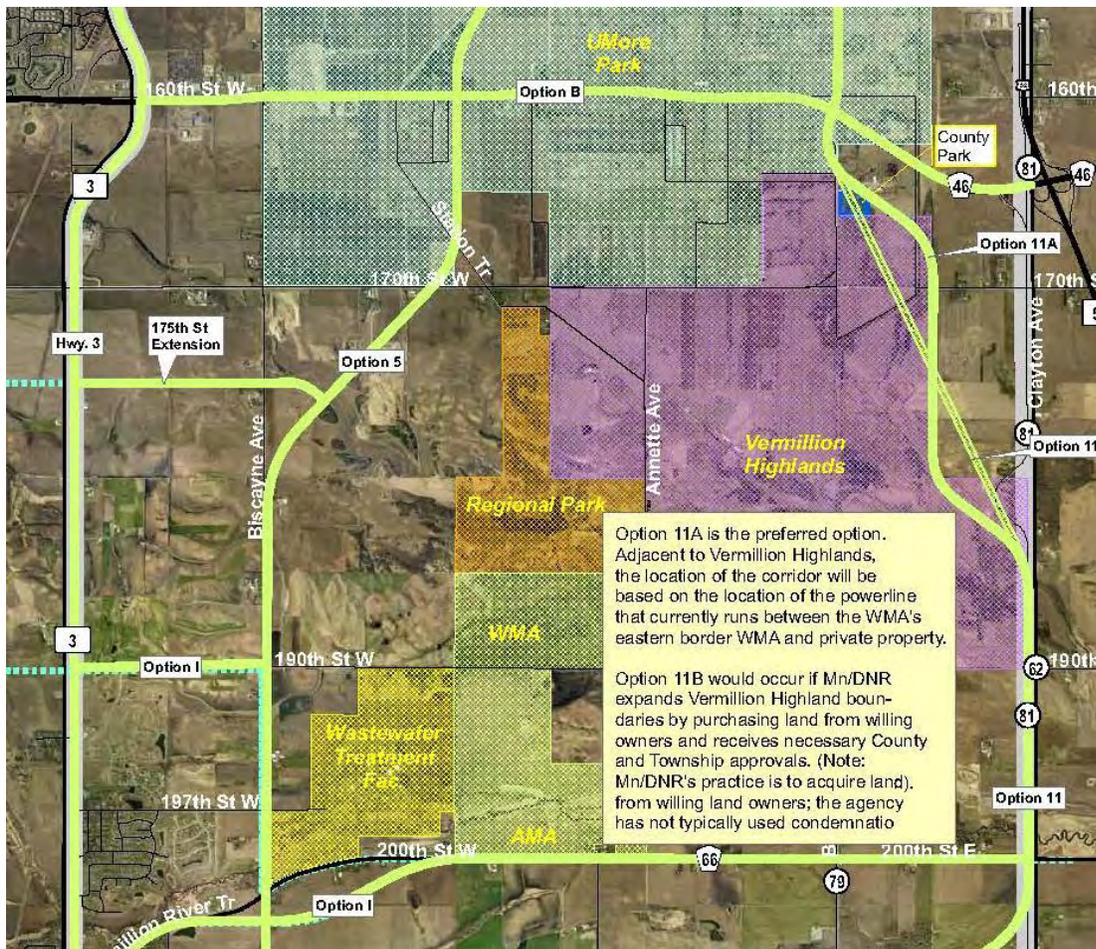


Figure 5: Recommended Regional Arterial Corridors

Greenway and Trail Connections

Dakota County's Greenway plans include a regional greenway from Lebanon Hills Regional Park to the Vermillion River, traveling through UMore Park and the new regional park. With representatives from the MDNR and Empire Township, the County explored alternative routes for the greenway segment that will connect the park to the Vermillion River. MDNR worked with landowners to provide greenway access as shown in *Figure 3: Regional Land Use*. Empire Township has expressed interest in local trail connections when the area west of the regional park develops.

SITE CLEAN-UP CONSIDERATIONS

Several studies have evaluated possible contamination in the park, UMore Park, and MWMA area from the former Gopher Ordnance Works and past University of Minnesota research. This section provides a brief overview of potential clean-up considerations that may affect development of the regional park.

Potential Clean-Up in Vermillion Highlands

Land north and east of the park housed the Gopher Ordnance Works, a World War II-era gunpowder plant, later transferred to the UM agricultural research. Extensive environmental studies on the type and extent of the contaminants have found a broad variety of contaminant issues, including physical hazards related to demolition debris, asbestos, heavy metals from sewage sludge, polycyclic organic chemicals, and other contaminants.

Because the park was outside of the Ordnance Works site, concerns for contamination of park lands from gunpowder manufacturing and processing are relatively small. The more immediate concern relates to past research involving land spreading of sewage sludge on Vermillion Highlands just east of the park. Over time, soil levels of heavy metals contained in sewage sludge that is land-spread can accumulate to levels that pose health risks. Surface drainage patterns from this area of Vermillion Highlands connect to the park. The existing Lone Rock Trail currently crosses a portion of this area.

The University of Minnesota is developing plans to address the contaminant issues. Any change in use patterns will require investigation and remediation of contaminant issues, so development in the contaminated area will be limited until an action plan is completed. Potential collaborative recreational and educational uses could occupy this area in the future.

Potential Remediation in the Regional Park

The regional park site was previously used for conventional farming and hunting purposes, and no major structures, such as houses or barns, exist on the site beyond a deteriorated storage structure in the park stovepipe (north). The County is not aware of contamination associated with the deteriorated storage structure, which is partially collapsed and could collapse further. The storage structure contains various materials that could require special clean-up. Parts of the structure could be salvaged and reused and recycled, and the rest of the structure and stored material should be managed with proper waste disposal. The storage structure and scattered debris should be abated before opening the park to public visitation.

Chapter 3: NATURAL RESOURCES

Knowing how a site works as a natural system helps inform how we can best plan the site for park use. Working *with* the land, instead of against natural processes, can maintain and restore degraded natural systems and enrich our experience of the land. Working *with* the land and its natural processes can reduce time, investments, and effort we expend in altering land to meet our needs. This chapter analyzes the environment and resources of the park and surrounding area. More detailed analysis should be conducted as part of future development design development and construction.

LAND

Geology

Bedrock geology and surficial geology reveal the basic history of the park area and provide the foundation to understanding the topography, mineral resources, soils, hydrology, vegetation, and wildlife of Whitetail Woods Regional Park.

Bedrock Geology

Two major bedrock formations exist in the park, shown in *Figure 6: Bedrock Geology*.

1. **Saint Peter Sandstone:** sandstone with layers of shale. This formation is closest to the surface in the higher elevations of the park and is prone to erosion.
2. **Prairie Du Chien:** sandstone, chert, and dolostone. Below the Saint Peter Sandstone formation, this formation is closest to the surface in the lower elevations of the park.

Both are sedimentary formations laid down on the bed and shores of shallow oceans that covered this area 400 to 600 million years ago. Oceans receded and glacial advancements and weathering eroded the bedrock, which is mostly covered by glacial sediments (sands and gravels) today.

Lone Rock (see *Photo 1: Lone Rock*) in Vermillion Highlands offers a view of this bedrock. It is a “lone”



Figure 6: Bedrock Geology

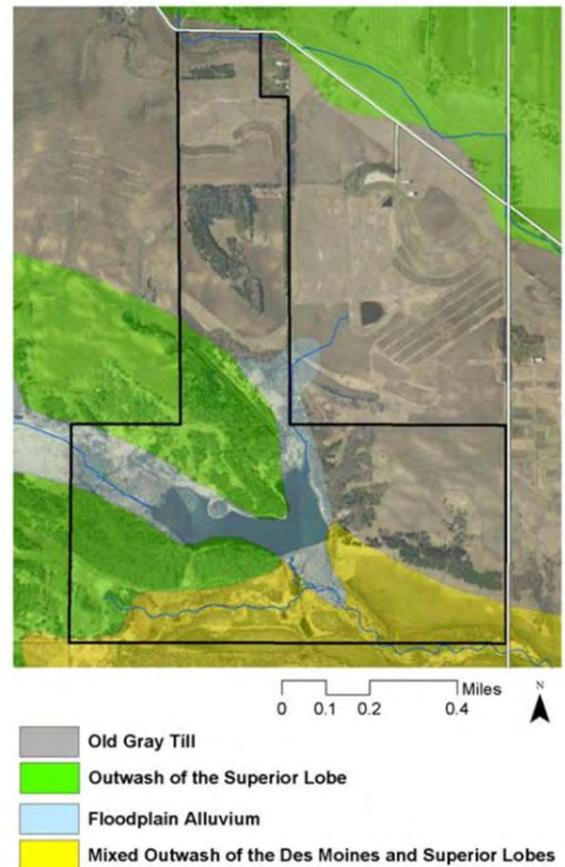


Figure 7: Surficial Geology

column of Saint Peter Sandstone that was protected by a limestone cap and has withstood glacial advancements and thousands of years of weathering. Today, vegetative growth, human activities, and continued weathering are hastening the breakdown and eventual demise of Lone Rock.

Dakota County and the Minnesota Department of Natural Resources should coordinate on best management practices that can help protect Lone Rock, including potentially managing the woody vegetation on the rock as well as managing and/or potentially limiting public access to the rock.

Surficial Geology

Glaciation, weathering, and sediment transport by water, wind, and gravity formed the park's surficial geology, which consists of three types of till (glacially-deposited sand, gravel, and rocks) and floodplain alluvium material (fine grained material deposited by flooding events). See *Figure 7: Surficial Geology* for more information.

- 1. Old Gray Till:** Uplands in the north park consist of pre-Wisconsinian "old gray till", deposited between 600,000 and 700,000 years ago. *Photo 2: Old Gray Till* represents this geology in the northern park.
- 2. Outwash of the Superior Lobe:** Higher elevations in the south park consist of till from the Superior Lobe of the Laurentide Ice Sheet 20,000 years ago. This till is found throughout the region and is a valuable sand and gravel resource that likely will be mined. *Photo 3: Superior Lobe Outwash* represents this geology at the outwash edge.
- 3. Outwash of the Superior and Des Moines Lobes:** Lower elevations of the south park have mixed till from the Superior lobe and more recent Des Moines lobe, which passed through the area 14,000 years ago. Sand and gravel from the Des Moines lobe is less valuable than that of the Superior lobe. *Photo 4: Mixed Superior and Des Moines Lobes Outwash* represents this geology in low areas of the southern park.
- 4. Floodplain Alluvium Material:** Low areas of the park, deposited during flooding events since the retreat of the last glaciers. See *Photo 5*.



Photo 1: Lone Rock in Vermillion Highlands



Photo 2: Old Gray Till



Photo 3: Superior Lobe Outwash



Photo 4: Mixed Superior-Des Moines Lobes Outwash

Soils

Soils affect site suitability for vegetation, buildings, roads, trails, onsite sewage treatment, and other uses. Although soils can be amended and engineered to address development needs, it is generally best to match uses to existing soils. The following overview relates park soils to potential development and uses. Prior to development, detailed soil surveys should be completed.

Soil Series

The park includes 36 distinct types of soil, which group into three series (broad categories) based on physical and chemical qualities, topography, and drainage (*Figure 8: Soil Series*):

1. **Tallula, Port Byron, and Bold:** Level to steep, these loamy and silty soils occur in upland areas of the north park where elevation varies by 20 to 60 feet. Deep and well-drained, these soils formed in deep loess (wind-blown silt deposited after glaciers melted) and are well-suited to cultivation, except where steep slopes contribute to erosion. They are well-suited for buildings and onsite sanitary facilities if not on steep slopes.
2. **Waukegan, Wadena, and Hawick:** Level to very steep, these silty, loamy, and sandy soils occur on outwash plains and terraces in the northwest corner of the south park. Deep and well drained, they overlay sand and gravel till deposits on outwash plains. Generally well-suited for building, most are poorly-suited for onsite sanitary facilities. These soils can be cultivated or grazed, but because they are so well-drained, crops may not have sufficient moisture during hot and dry summers.
3. **Marshan and Cylinder:** These nearly level, silt-loam soils occur on outwash plains in low, poorly-drained areas in the south park where the seasonal water table is a foot to two and one-half feet below the surface. With high organic content, they are suited for cropland if drained, and are good for pasture and hay. Extensive grazing can compact these soils. They are poorly suited for buildings, septic fields, roads, and development due to poor drainage and high water table.



Photo 5: Floodplain Alluvium

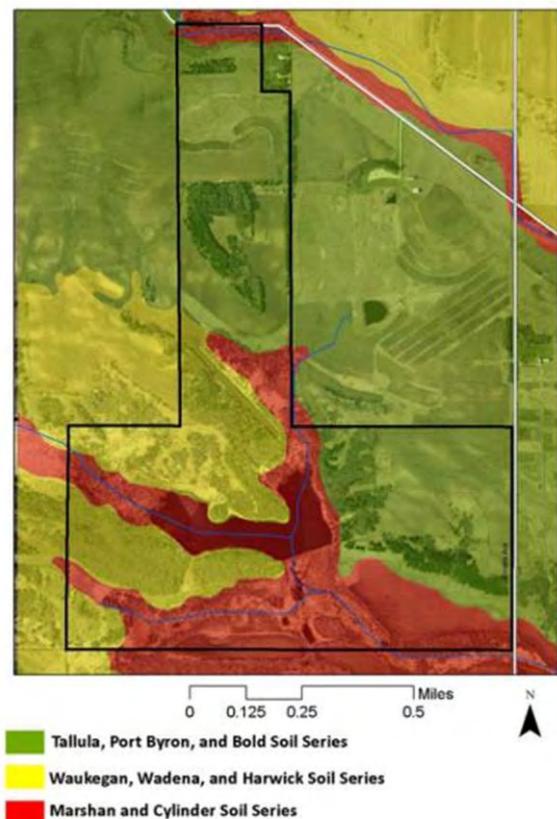


Figure 8: Soil Series

Agricultural Soils

The park site has been used for agriculture since the mid- to late-1800s. Based on aerial photography, 250 acres were in cultivation in the early- to mid-1900s. Uncultivated uplands were grazed. In 2011, 130 park acres were cultivated for corn, soy beans, and wheat. The site is no longer used for grazing.

The Natural Resources Conservation Service (NRCS) identifies the following farmland types in the park (*Figure 9: Farmland Classifications*):

- 1. Prime Farmland:** has the best quality for food, feed, forage, fiber, and oilseed crops. Soil quality, growing season, and moisture supply can economically produce high crop yields when managed according to acceptable farming methods. Many of the park's prime farmland areas can be reasonably farmed. Size, location, and configuration may limit its use for conventional farming.
- 2. Farmland of Statewide Importance:** good quality for food, feed, forage, fiber, and oilseed crops. While not prime, these lands can produce high quality crops if conditions and practices are favorable. Some of the park's land in this class can be farmed, while some is on moderate to steep slopes and is forested.
- 3. Prime Farmland if Protected from Flooding:** Within the park, most of this land is covered by wetlands and is not suitable for farming.
- 4. Prime Farmland if Drained:** Most of this land is covered by wetlands and is not suitable for farming. A small percentage of this land was being farmed in 2011.
- 5. Not Prime Farmland:** Park areas with steep slopes and erodible soils are not considered to be prime farmland. Virtually none of these areas were being farmed in 2011.

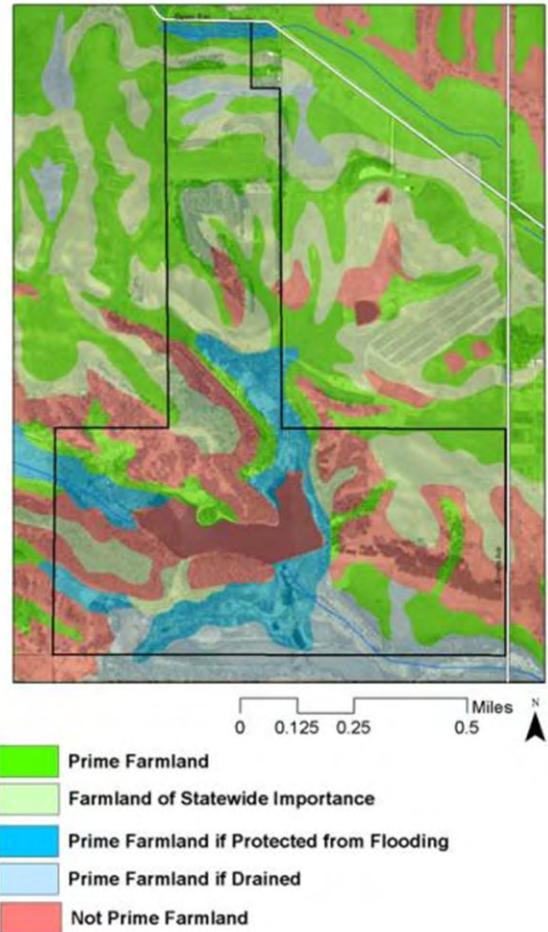


Figure 9: Farmland Classifications

The best land for conventional agricultural production was used for corn, soy beans, and wheat in 2011. Other types of food production, such as orchards or permaculture gardens, could be successful in many other areas of the park. It is possible to enhance the quality of agricultural soils for specific agricultural uses by adding compost and employing other best management practices.

Hydric Soils and Soils Prone to Compaction

Hydric soils form when saturation during the growing season promotes anaerobic conditions in the upper soil profile. Hydric soils are poorly suited for buildings, septic fields, roads, and trails; and may be best suited for native habitat and some types of agriculture. *Figure 10* shows hydric soils in the park.

Hydric soils compact easily with repetitive foot, animal and vehicle traffic. Compaction eventually removes soil air pockets and vegetation growing in these soils often dies. Care is needed when planning park uses in areas with compaction-prone soils.

Soils Prone to Erosion

Several park soils on moderate to steep slopes will erode when vegetative cover is disturbed. Based on historic imagery, little protection of erodible soils occurred in the early farming years. In the 1970s, conifers were planted on disturbed erosion-prone soils. Although erosion is not a major problem in the park today, development should avoid erodible soils and ensure that erodible soils have appropriate vegetative cover. See *Figure 11: Erosion Prone Soils*.

Soils Conducive to Onsite At-Grade Septic

The park is outside of the Metropolitan Urban Services Area (MUSA) served by public sanitary sewer. Sanitary waste will be handled onsite until sewer service reaches the area, or indefinitely. At-grade septic fields are often used for onsite treatment. *Figure 12* identifies soil limitations for at-grade septic based on NRCS soil classifications. Low-lying wet soils are the most constrained for at-grade septic systems. Most of the park has moderate constraints.

Slopes, vegetative cover, and land uses affect at-grade septic systems and can limit their use. The least-constrained areas for at-grade septic are north of the conifers in the stovepipe and level uplands of the southeast park. Alternatives for at-grade systems include constructed wetlands for low-lying park areas, composting toilets, and recycling gray water. *Figure 12* shows limitations for at-grade



Figure 10: Hydric Soils

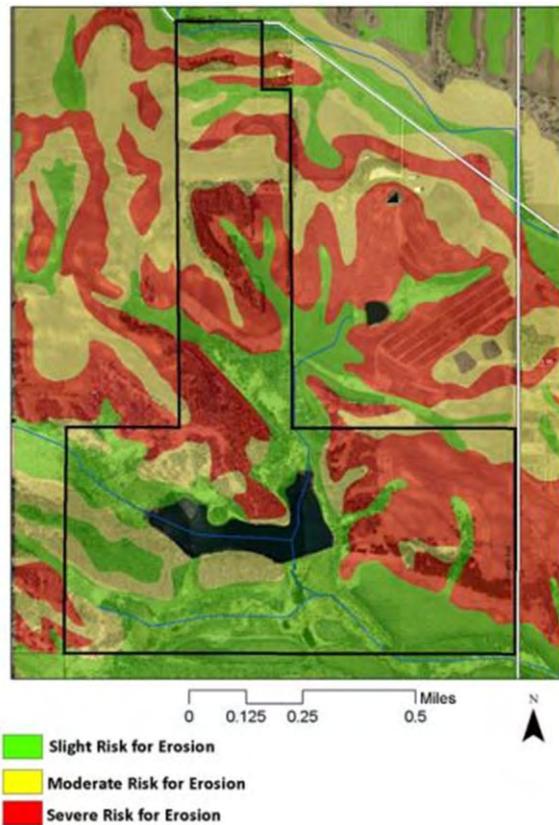


Figure 11: Erosion-Prone Soils

septic. Sanitary sewage options are discussed in more detail in *Chapter 9: Public Services*.

TOPOGRAPHY AND LANDFORMS

The park's hills, ridges, valleys, and plains offer varied landscape experiences and opportunities and constraints for park development. Topography affects the park's local microclimates, vegetation, and surface drainage patterns. With the park boundaries, landforms divide the park into distinct areas. This section analyzes topographic relief, slope gradients, slope aspects, and landforms as they relate to park development.

Topographic Relief

The park and the surrounding area generally slope downward from north to south, with surface water draining to the Vermillion River, roughly one mile south of the park. The park's highest elevation, 993 feet above mean sea level, is just north of the conifer plantings in the park stovepipe. The park's lowest elevation, 870 feet above mean sea level, is its southeast corner where surface water leaves the park. The park has a total elevation change of 123 feet. See *Figure 13: Topographic Relief* for a sense of slopes and landforms.

Slopes

Park land ranges from nearly level to steep 50-percent slopes (see *Figure 14: Slopes*). Slopes can be modified to meet specific needs, but it is generally best to match proposed uses with existing slopes. Recommendations for potential park uses related to existing slopes follow:

- **Less than 1 percent:** Poorly drained, these slopes mostly occur in park wetlands, which may be most suitable for restoration, habitat, constructed wetlands, and boardwalks.
- **1-5 Percent:** Generally suitable for buildings, parking lots, roads, lawns, festival areas, septic fields, and trails (including accessible trails).
- **5-10 Percent:** Generally suitable for buildings, roads, and trails. May present constraints for uses needing large, level areas (like parking lots and festival areas) and accessible trails.
- **10-15 Percent:** Generally suitable for buildings with a walkout basement and some trails and roads. May

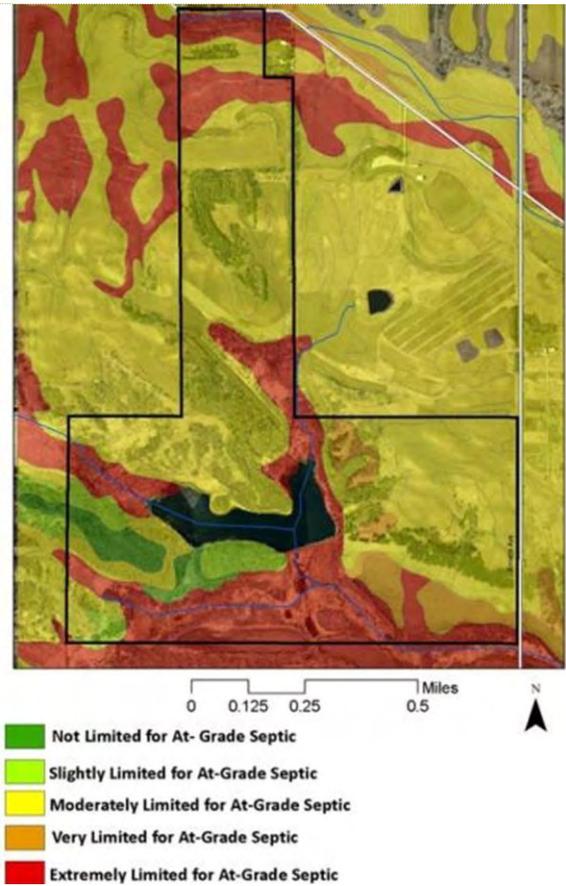


Figure 12: Soil Limitations for At-Grade Septic

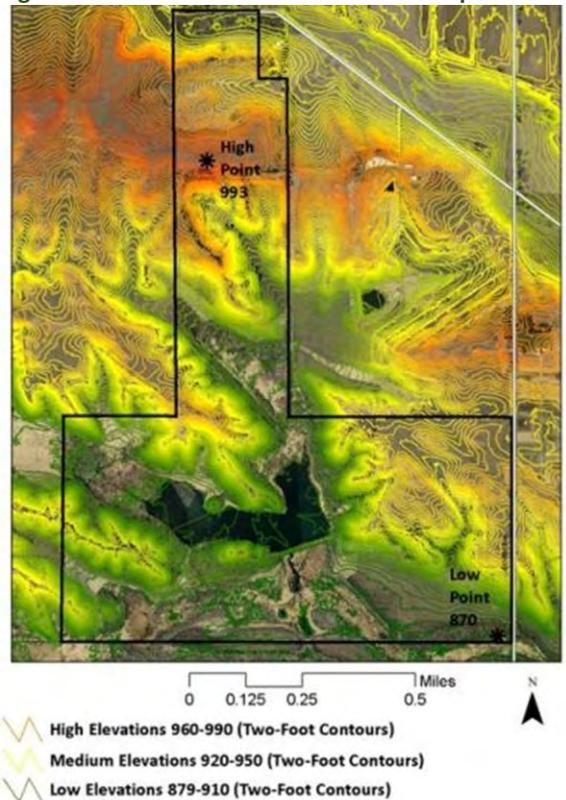


Figure 13: Topographic Relief

present significant constraints for uses needing large, relatively level areas, like parking lots and festival areas.

- **15-20 Percent:** May be acceptable for buildings with walkout basements, some trails and winter uses such as a gentle sledding hill or portions of a ski trail. Moderate to severe constraints for most other uses.
- **Greater than 20 Percent:** Development should be avoided. Few uses, such as a sledding hill, could be suitable.

Potential Development Based on Slopes

Figure 15: Potential Development Areas based on Slopes shows large upland areas in and near the park that are suitable for conventional development based on slopes. Areas outside the park show potential relationships among the park and neighboring areas.

Highlighted areas can accommodate a mix of uses, such as festival areas, large picnic grounds, an off-leash dog area, disc golf, and other uses that need large areas with little slope.

Areas 1, 1A, and 1B

High, relatively level areas in and near the north park, accessible from 170th Street or Station Trail. Good views of lower elevation areas to the south.

- Area 1: 30-35 acres in the north park stovepipe, providing minimal area for conventional development.
- Area 1A: If park expansion to the west is desirable to the County and the adjacent landowner, the park development area could increase by 100-120 acres.
- Area 1B: Collaborative uses could benefit the park and Vermillion Highlands. This 40-45 acre area has good south views and good access from Station Trail.

Areas 2, 2A, and 2B

Southeastern park areas are accessible from Annette Avenue with good views of lower areas to the south. Close to wetlands and woodlands.

- Area 2: 40-45 acres within the park. Few slopes exceed ten percent; most of the area is suitable for

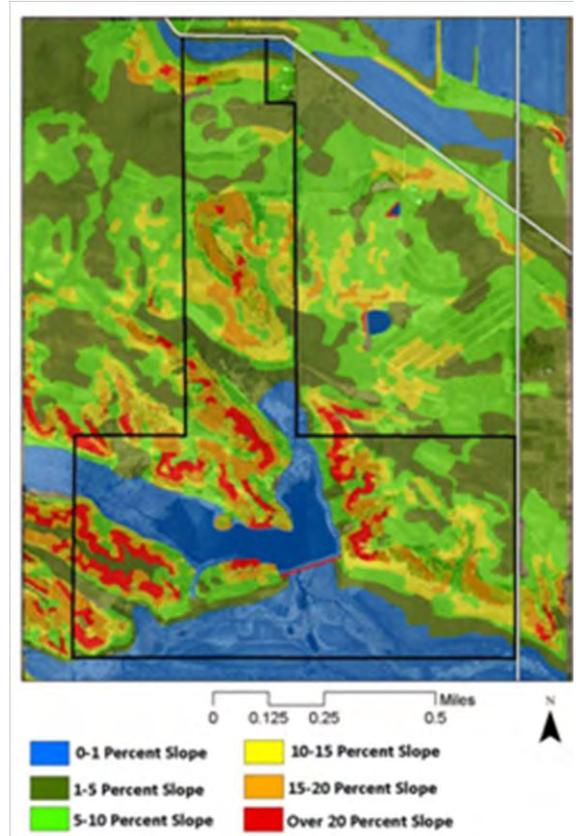


Figure 14: Slopes

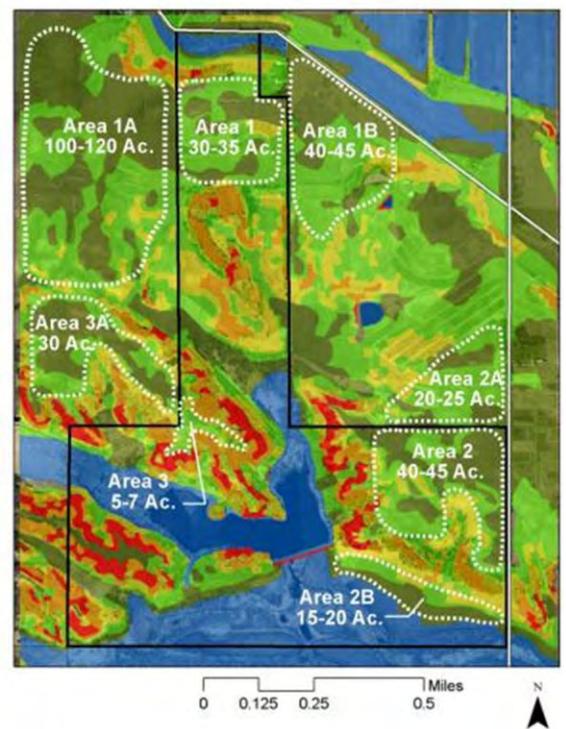


Figure 15: Potential Development Areas Based on Slopes

development. A valley dividing the area provides topographic interest.

- **Area 2A:** 20-25 acres in Vermillion Highlands. Collaborative uses could benefit the park and Vermillion Highlands.
- **Area 2B:** 15-20 acres in a narrow land strip with a high water table. Not suitable for buildings and parking lots, but may be suitable for other uses.

Areas 3 and 3A

Close to future development in the west, could minimize potential conflicts with hunting in Vermillion Highlands. Area has significant slope and space constraints.

- **Area 3:** five to seven in-park acres suitable for development. Topography and boundaries limit development layout. Access is severely limited.
- **Area 3A:** Contingent on acquiring land from a willing landowner, this area could provide 30 acres for park development. Area is narrow, which limits layout options. Potential access from the west post-development, or the north.

Slope Aspects

Slope aspect refers to a slope’s facing direction, a consideration in planning uses and development. The following describes potential uses associated with slope aspects in the park. *Figure 16: Slope Aspects* shows major slopes aspects in the park.

North Facing Slopes: are suited for sledding and skiing hills as they receive less direct sun, are less prone to icing, and maintain snow longer. They are beneficial for some plants (like fruit trees) because blossoms open later and are less susceptible to late spring freezes, but are less desirable for some buildings and activities, as they are exposed to winter winds and receive less sun.

South Facing Slopes: are well-suited for buildings designed to use solar radiation, and activities needing exposure to sun and summer breezes. Often poor for winter uses as the daytime sun causes snow melt with ice refreezing at night. Can also be hot and dry, unless planted or shaded.

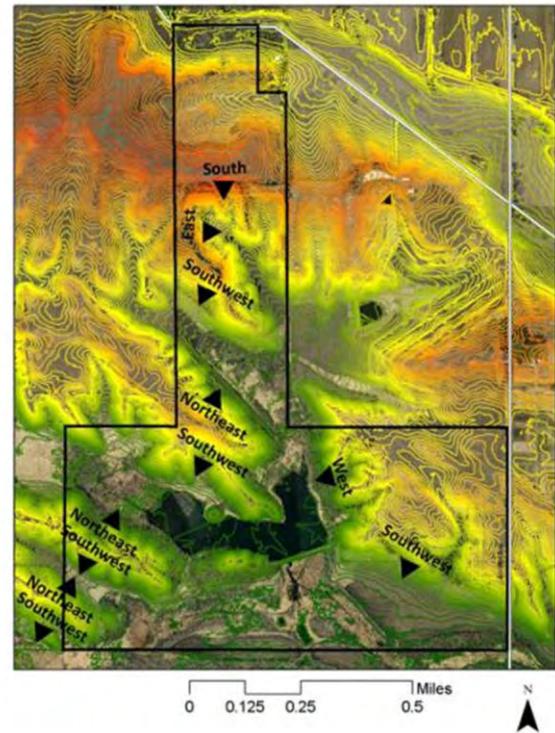


Figure 16: Slope Aspects

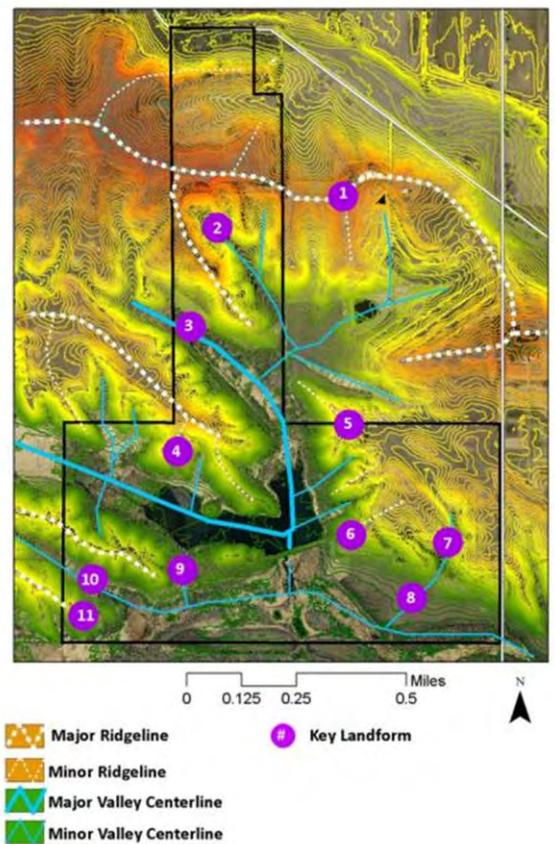


Figure 17: Major Landforms

East Facing Slopes: have good morning sun, are shielded from hot afternoon sun, and are suitable for most uses.

West Facing Slopes: offer sunset views, which benefits some uses. Hot afternoon sun may limit some activities.

Landforms

Hills, ridges, valleys, plains, and other landforms contribute to the park's unique sense of place and provide opportunities as well as constraints for park development.

Figure 17: Major Landforms shows the park's major ridgelines and valleys, and identifies key landforms near the park that contribute to views or a unique sense of place. Other significant areas are not shown, but discussed elsewhere in this plan.

Landform Area 1: Ridgeline at the Lone Rock trailhead in Vermillion Highlands with excellent views in all directions. Open to prevailing summer breezes. (*Photo 6*)

Landform Area 2: Enclosed upper end of a valley, surrounded by densely planted pines to the north, east, and west. (*Photo 7*)

Landform Area 3: Sweeping valley views, with striking contrast between valley grasslands and trees along valley walls. (*Photo 8*)

Landform Area 4: Ridgeline overlooking the lake with impressive park views. Open to the summer breezes and offers opportunities to interpret glacial outwash patterns. (*Photo 9*)

Landform Area 5: Ridgeline with good views of the park's major valley and Vermillion Highlands.

Landform Area 6: Excellent views of the lake and shrub wetlands. Open to prevailing summer lake breezes.

Landform Area 7: Valley/ravine is nestled into hillside with scenic relief not found elsewhere in this immediate area.

Landform Area 8: Expansive plain with outstanding views of the existing cropland and wetlands.

Landform Area 9: Emergency spillway for the dam, with interpretive value and scenic access to the lake.



Photo 6: Lone Rock Trailhead Ridgeline View



Photo 7: Upper Valley Plantation View



Photo 8: Park Stovepipe Valley View



Photo 9: Northwest Corner, Lake View

Landform Area 10: Narrow level valley contrasts with hills to the north and south. (Photo 10)

Landform Area 11: End of a ridgeline with outstanding views in all directions. Open to the summer breezes.

Park Areas

The park contains five distinct park areas, based on its boundaries and the natural qualities discussed earlier in this chapter (Figure 18). Each area has distinct qualities and a unique sense of place.

Area 1

Generally well-suited for conventional park development:

Surficial geology consists of old gray till and soils include the Tallula, Port Byron, and Bold series. Most slopes are 1 to 10 percent, but range from 15- 50 percent where Area 1 transitions into Area 2. With mostly south or southwest slopes, the uplands provide good views of the wetlands.

Area 2

High ecological importance, but poorly suited for conventional park development:

Low lying and wetland areas divide the park into four separate upland areas. Surficial geology consists of floodplain alluvium and mixed outwash from the Superior and Des Moines lobes. Soils include the Marshan and Cylinder series and slopes are nearly level.

Area 3

Scenic area with great potential for trail and natural uses, but does not provide large level areas:

Surficial geology consists of Superior lobe outwash and slopes vary from nearly level to over 20 percent.

Area 4

Limited development potential in sensitive remote park area confined by wetlands and boundary:

Surficial geology is Superior Lobe outwash and soils include the Waukegan, Wadena, and Hawick series. Except for narrow ridgelines, most slopes are too steep for development. Slopes face primarily south and northeast. Remnant mesic prairie in this area should be protected to extent possible.

Area 5

Generally well-suited for conventional park development:

Area 5 has similar surficial geology and soils as Area 1, although wetlands and park boundary physically separate these two areas.



Photo 10: Narrow Southwest Valley View



Figure 18: Distinct Park Areas Based on Surficial Geology, Soils, and Topography

WATER

From a planning and resource management point of view, it is important to understand the how hydrological cycles interact with park development and landscapes. This section provides a brief overview of the park's groundwater and surface water resources and the interaction between the two resources. It identifies surface water bodies, watersheds, and floodplain, and analyzes the effect of existing and future development on water resources.

Groundwater

Located below of the ground surface in soil pores and rock fractures, groundwater interacts with surface water (lakes, rivers, and wetlands) and both are integral components of the hydrological cycle. Groundwater is found in two zones beneath the surface of the earth:

1. **Vadose Zone:** the upper zone, not continuously inundated but can saturate after large rainfalls or snowmelts. Water in this zone can infiltrate to aquifers, move laterally, evaporate, or be taken-up by plant roots.
2. **Saturated Zone:** the lower zone. Its upper limit is the water table, which fluctuates due to changes in climatic conditions and groundwater withdrawal.

Shallow Groundwater Flow

Throughout the park, most shallow groundwater flows in east/southeast toward the Vermillion River. A shallow groundwater divide crosses the north part of the park, and shallow groundwater north of this line flows in east/northeast toward the Mississippi River. Shallow groundwater flow associated with the former Gopher Ordnance Works (northeast of the park) likely does not flow through the park.

Groundwater Recharge and Discharge

Groundwater *recharge* occurs when precipitation infiltrates to lower aquifers. The main recharge source for the deeper aquifers in this area comes from the downward movement of water in glacial outwash areas. Groundwater *discharge* returns to the surface, feeding wetlands, streams, and rivers. The water table in many of the park's Type 1 wetlands (seasonally flooded basins) is within one or two feet of the ground surface, and the high water table in these areas can limit development and use.

Groundwater Studies and Monitoring

Several groundwater studies have been conducted in the park area over time, and can help inform best practices related to the mitigation of past, present, and future uses in the area that affect groundwater resources. Of special concern are the former Gopher Ordnance Works plant, agricultural experimentation plots, private agricultural operations in the area, and existing and planned mining operations. Growing urban development will also impact groundwater resources.

Groundwater Use in the Park

Much of Dakota County is supplied by groundwater sources through municipal or private wells. The park is outside of the 2040 MUSA (metropolitan urban service area) boundary and will not be served by public sewer and water until after 2040. The park will need its own source of water, likely starting with installation of wells. No operating or abandoned wells exist in the park today. In addition to a well, rain water, or surface water could be captured and used.

Surface Water

Surface water in the area includes a variety of wetlands, perennial and intermittent streams, the Vermillion River, drainage ditches, and several impoundments.

Wetlands

Abundant and diverse wetlands exist in the park, have tremendous ecological value, and provide the park with a strong sense of place. Two wetland inventories pertain to the park:

1. **National Wetland Inventory (NWI)** mapped park wetlands from aerial photography taken between 1979 and 1988.
2. Dakota County Soil and Water Conservation District mapped the **Vermillion River Wetland and Waterways Inventory** in 2007, with improved boundary accuracy.

Both inventories provide valuable information (see *Figure 19: Surface Water*).

Wetland Types

The following describes parks wetland types as defined by the Minnesota Wetland Conservation Act. For more information about the wetlands, contact Dakota County Soil and Water Conservation District.

Type 1: “Seasonally flooded basins or flats covered with water or waterlogged during variable seasonal periods but well-drained during much of the growing season.”

The park’s Type 1 wetlands historically were used for crops or grazing. Type 1 wetlands may have standing water after spring snowmelt or a large rainstorm. With a high water table they are not well-suited to development. The primary Type 1 wetland is a cultivated area in the southeast park (*Photo 11: Type 1 Wetland Used for Cultivated Crops*).

Type 3: “Inland shallow fresh marshes in which soil is waterlogged early during a growing season and often covered with six or more inches of water. Vegetation includes grasses, bulrushes, spikerushes, and various other marsh plants such as cattails, arrowheads, pickerelweed, and smartweeds.”

The park’s Type 3 wetlands lie near the northeast arm

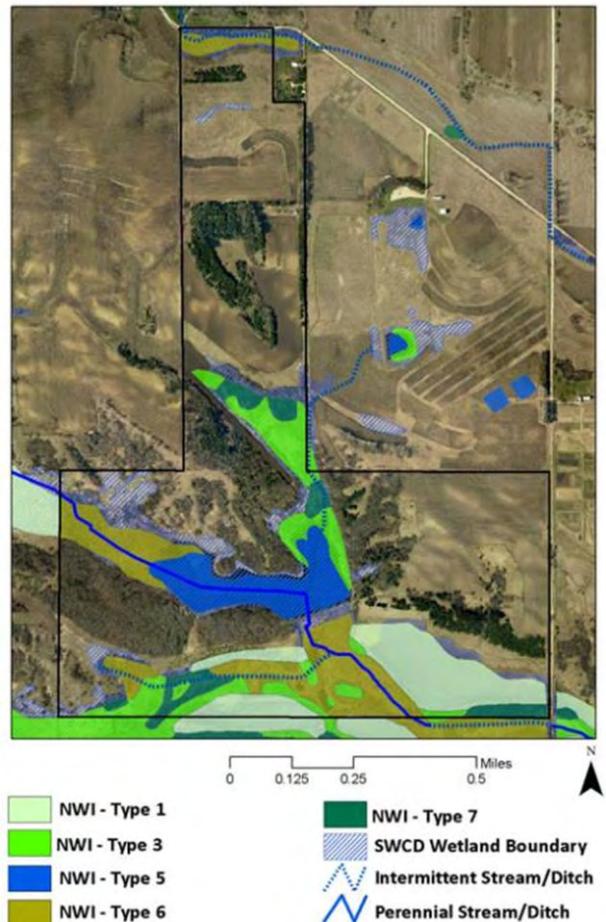


Figure 19: Surface Water



Photo 11: Type 1 Wetland Used for Cultivated Crops

of the lake and in scattered areas in the southern park (Photo 12: Type 3 and Type 7 Wetlands).

Type 5: *“Inland open fresh water, shallow ponds, and reservoirs in which water is usually less than ten feet deep and is fringed by a border of emergent vegetation.”* Also referred to as a palustrine open water area (and the “lake”). Refer to the Empire Lake subsection for more information (Photo 13: Type 5 Wetland (Empire Lake)).

Type 6: *“Shrub swamps in which soil is usually waterlogged during the growing season and often covered with as much as six inches of water. Vegetation includes alders, willows, buttonbush, dogwoods, and swamp privet. Occurs along sluggish streams and occasionally in floodplains.”*

The park’s Type 6 wetlands occur near the inlet and discharge areas of the lake (Photo 14: Type 6 and Type 1 Wetlands).

Type 7: *“wooded swamps in which the soil is waterlogged to within a few inches of the surface during growing season and often covered with as much as one foot of water. Occurs mostly along sluggish streams, on floodplains, on flat uplands, and in shallow basins. Trees include tamarack, arborvitae, black spruce, balsam, red maple, and black ash.”*

These wetlands are intermingled with other wetland types in the park (Photo 12: Type 3 and Type 7 Wetlands).

The Lake (Open Water Wetland): The Lake is a 20- to 25-acre, Type 5, open water wetland, created in the late 1960s by the previous landowner who built a dam to connect two separated upland areas. Dam construction likely converted Type 3 and Type 6 wetlands into Type 5. The dam probably has not increased the area of wetlands in the park.

By definition, a Type 5 wetland is usually less than ten feet deep. During the summer of 2010, the park planning consultants spot-checked water depths in several locations (see Figure 20: Water Depth in the Type 5 Open Water Wetland). The deepest recorded level was 5.5 feet, and average depth is roughly feet. A control structure allows water levels to be adjusted. However, if the depth of wetland were to be raised, it could potentially affect properties outside the park.



Photo 12: Type 3 (Foreground) and Type 7 (Background) Wetlands



Photo 13: Type 5 Wetland (Lake)



Photo 14: Type 6 (Left) and Type 1 (Right) Wetlands

The wetland has enough depth to provide limited opportunities for kayaking or canoeing. Soils associated with this wetland are silt and have a high organic content. Unless the bottom of the wetland was modified, it would provide a poor setting for swimming activities. Potential fishing opportunities are discussed in the wildlife section of this chapter.

The wetland has several areas four or more feet deep and does not freeze solidly in winter. Ice thicknesses can vary, and may be too thin in spots to adequately support people. Underwater springs may be responsible for thin ice. Based on observations during the winter of 2010/2011, the wetland outlet was always flowing, which suggests that underwater springs are in or near the wetland.

The wetland's watershed is over 3,000 acres (*Figure 21: Watersheds*). Perennial and intermittent streams feed the wetland from the north and northwest. While many agencies and individuals are working hard to protect water resources in the area, the long-term impact of development on the wetland needs further study. It will be important to study sedimentation in the wetland and whether the lake is likely to transform into a shallow marsh or swamp over time. The County and others should continue to monitor the wetland and implement best management practices to protect the quality of this important natural feature in the park.

Intermittent and Perennial Streams/Drainage Ditches

Drainage in and around the park occurs through intermittent and perennial streams and ditches (*Figure 19: Surface Water*). Portions of many streams in the park and surrounding area have been straightened and their gradient increased so that they function as drainage ditches, as seen in the wildlife management area directly south of

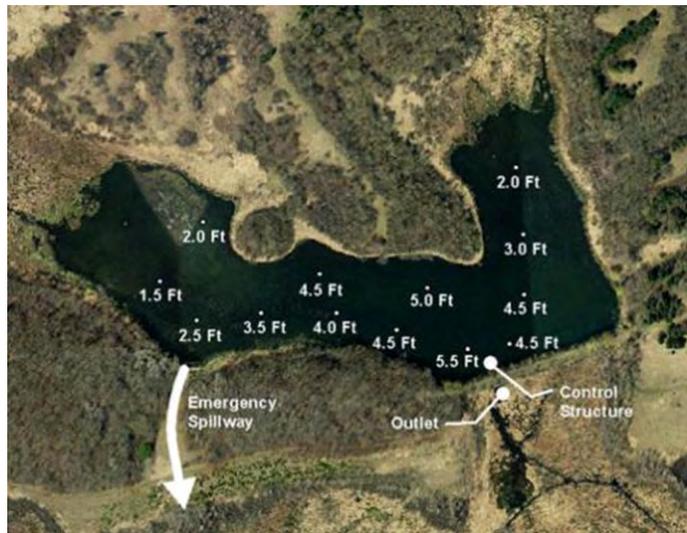


Figure 20: Water Depth in the Lake

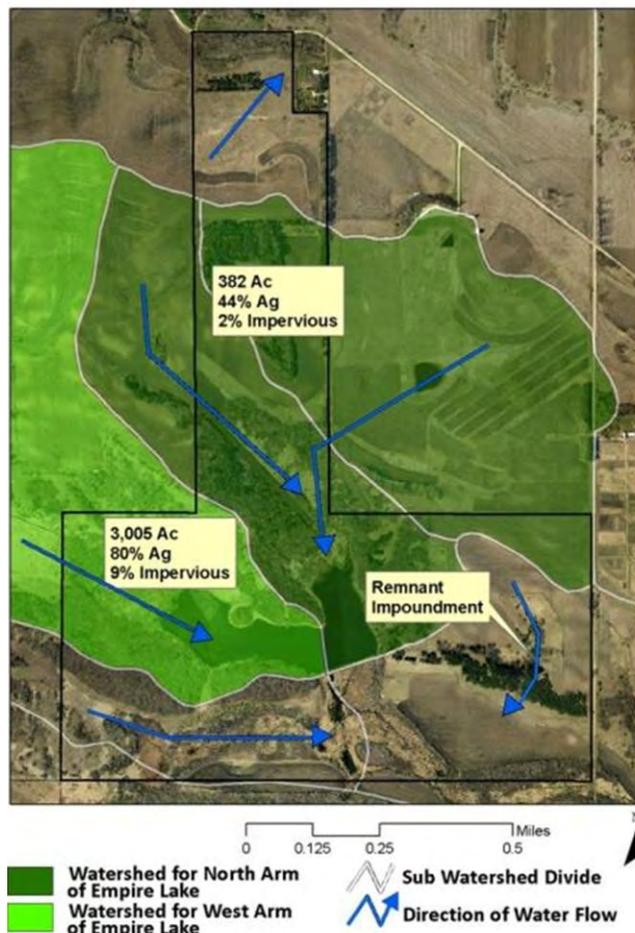


Figure 21: Watersheds

the park (*Photo 15: Typical Drainage Ditch*).

Impoundments

The largest impoundment in the area is the open water wetland (Empire Lake). Another small remnant impoundment exists in the ravine in the far southeast corner of the park (see *Figure 21: Watersheds*). It is unclear when or why the remnant impoundment was constructed, but it likely was constructed as a cattle pond or to help control runoff to cropland to the south. Several impoundments also exist in Vermillion Highlands.



Photo 15: Typical Drainage Ditch

Although not natural features, properly designed and maintained impoundments can benefit natural systems by providing wildlife habitat, catching sediments, and controlling water flow and water availability.

Vermillion River

The Vermillion River, a mile south of the park, is important in that supports a good population of brown trout and some rainbow trout. It is one of few urban trout streams with a self-supporting trout population.



Photo 16: Vermillion River

The Vermillion River has water quality issues. The Minnesota Pollution Control Agency and the United States Environmental Protection Agency classified parts of the Vermillion River as “impaired meaning it does not meet standards for fecal coliform counts and turbidity. Water quality studies will begin in 2011.

The park and the river are not adjacent, but have a close relationship. Water leaving the park makes its way to the Vermillion River, so the park and surrounding land uses affect water quality in the river. The river provides for fishing, boating, and regional trail use that can complement recreation in the park and Vermillion Highlands (*Photo 16: Vermillion River*). The river is a sensitive resource and recreation activities must be carefully balanced with the protection of the river. Potential access to the Vermillion River is discussed in *Chapter 2: Regional Context*.

Watersheds

Watershed areas drain surface water to single low outlet, or “pour point.” The park’s watersheds are defined at a variety of scales, including the Mississippi River Watershed, the Vermillion River Watershed, and its smaller sub watersheds (*Figure 21: Watersheds*).

Management of water resources requires an understanding of watersheds. Surface water quality in the park depends on land uses and management in the upper areas of the watershed – not just in the park. For example, Empire Lake has a drainage watershed of over 3,000 acres, with land uses that include agriculture, mining, roads, and other development. The lake’s watershed will become more developed

over time and the quality of Empire Lake will reflect land use and how water is managed in the upper areas of its watershed.

Understanding watersheds is also important for park uses that capture, store, and use water. Food production in parts of the park could rely on storage of storm water runoff. The park could provide a new water feature for recreation or wildlife habitat, which will require knowing the amount of watershed area necessary to support the water feature.

A water resource management approach based on watersheds (as opposed to property lines) will help ensure the protection of water resources. Refer to *Water Protection Tools* later in this section for additional information.

100-Year Floodplain

Floodplain maps for this area were updated in 2008, but not officially adopted at the time this plan was prepared. For general planning purposes, *Figure 22: 100-Year Floodplain* shows the preliminary updated 100-year floodplain. Official floodplain boundaries will need to be verified prior to park development.

The 100-year floodplain lies within the park's existing wetlands. As with wetlands, development in and alterations to floodplain is severely limited. Some access to water features through trails, boardwalks, and bridges may be acceptable. Retention ponds and alterations to the emergency spillway may also be acceptable. Any proposed work in the floodplain must go through proper review and approval channels. As a general rule, the 100-year floodplain should be left in unaltered.

Water Protection Tools

No single entity or best management practice will adequately protect water resources on its own. Regulatory agencies, nonprofit entities, landowners, the public, and others must work together to protect water resources.

Empire Township serves as the local governmental unit (LGU) for water resource permitting and ordinance enforcement in the township, which includes the park. The Township also coordinates with the Vermillion River Watershed Joint Powers Organization (VRWJPO), the Minnesota Department of Natural Resources, and the Dakota County Soil and Water Conservation District.

Empire Township Water Resources Management Ordinance

Empire Township regulates excavation and grading, storm water management, wetland management, wetland and waterway buffers, floodplain alterations, and drainage alterations. In short, all proposed development in the park will need to go through the Township's review and permitting process.



Figure 22: 100-Year Floodplain

Wetland and Waterway Buffers

Of particular importance to the park master plan are wetland and waterway buffer requirements, determined based on assessment of existing wetlands using the Minnesota Routine Assessment Method (MnRAM). “Exceptional quality” wetlands have greater buffer requirements than “low quality” wetlands. This master plan assumes the park has “exceptional quality” wetlands and anticipates maintaining at least a 50-foot average buffer and a 35-foot minimum buffer around the wetlands.

This plan also assumes that streams are classified as tributary connectors to the Vermillion River, and anticipates maintaining at least a 50-foot average and a 35-foot minimum buffer around the streams.

The Township permits certain uses within the wetland and waterway buffers, such as multipurpose trails with a set-back of at least ten feet from the wetland or waterway.

Floodplain Alteration

Like wetlands and with few exceptions, development must be avoided in the 100-year floodplain, which is necessary to store and manage floodwater. Floodplain alterations cannot result in the loss of storage. From a development point of view, floodplain setback requirements will affect certain uses. For example, a boardwalk would be permissible, but the County should avoid filling or placing structures in the floodplain.

Other Protection Entities and Tools

Other entities actively work on water resource protection. Individuals and organizations can go beyond regulatory actions and proactively implement best management practices. This park is in a unique position to promote awareness and understanding of water resources. By setting a strong example, this park can demonstrate a variety of water protection practices that can be implemented elsewhere.

VEGETATION

Vegetation provides food, fiber, materials, oxygen, climate control, erosion control, and many other benefits. From a planning and management point of view, understanding what types of vegetation historically existed in the park, what exists today, and what is likely to exist in the future provides insight on how best to manage the park’s vegetation. Vegetation changes naturally over time, although changes that occurred since the 1850s are of greatest relevance. More is in *Chapter 11: Natural and Cultural Resources Stewardship*.

Vegetation at European-American Settlement in the 1850s

At the time of the original land survey and Euro-American settlement, prairies covered the park area uplands, interrupted in places by oak barrens or stretches of aspen-oak land.

Lower areas included river bottom forest (elm, ash, cottonwood, box elder, basswood, soft maple, willow



Photo 17: Vermillion River AMA - Prairie Upland with Shrubs and Trees along the Streams

and hackberry) or open, wet prairie.¹ *Photo 17: Vermillion River AMA* shows what the park area may have looked like at the time of Euro-American settlement in the mid-1800s.

Much would have been prairie, interrupted by tree lines along streams and tributaries.

Less is known about pre-historic vegetation of this area, as there are few lakes to store buried pollen evidence in their sediments. The nearby Kirchner Marsh (a glacial moraine ice-block depression formed 12,700 years ago near Rosemount) has provided data to reconstruct pre-historic vegetation patterns in this region.²

As the last glaciers retreated to the north, tundra was followed by spruce parkland; then, with warmer and drier postglacial conditions, spruce forests were replaced with birch, alder, pine and oak. By the time this warming trend reached its maximum, some 7,000 years ago, Kirchner Marsh was surrounded by the oak savanna characteristic of the prairie-woodland boundary. Within a few millennia, slightly cooler conditions allowed deciduous forest to reclaim northern Dakota County, but the park area appears to have retained its savanna character until the late nineteenth century.

Changes in Vegetation: 1850s to 2011

Shortly after the public land survey in the 1850s, European-Americans settled the area and farmed the land. Prairies were plowed under for crops or used for grazing livestock. Without prairie fires to keep trees in check, trees naturalized in many uncultivated areas. Virtually all the native upland prairie in the area was eliminated over time. Refer to aerial photographs of the park from 1957, 1974, and 2008 (Figures 23, 24, and 25) for an illustration of vegetation changes over time.

Cultivated and Grazed Land

Since the 1850s, the amount of cultivated and grazed land on the park site has varied. In 2010, Dakota County leased 130 acres in the park for farming, although aerial photographs suggest that 250 or more acres were



Figure 23: 1951 Aerial Photograph

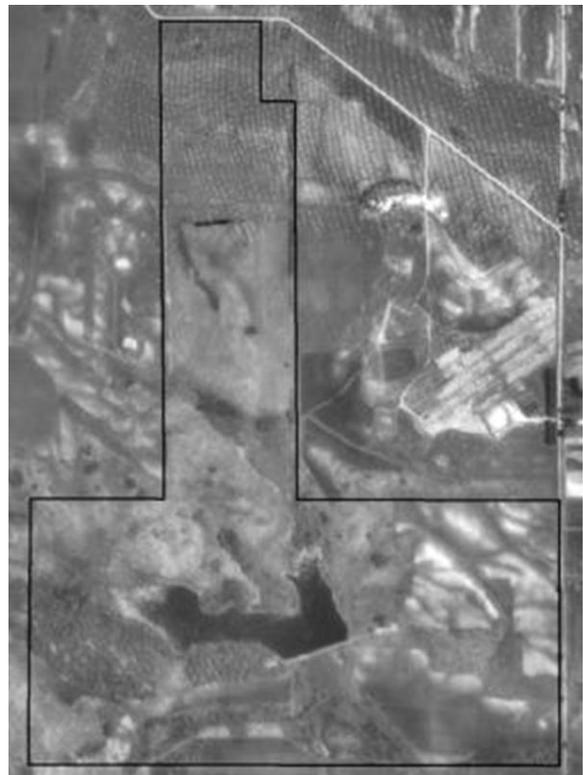


Figure 24: 1974 Aerial Photograph

¹ F. J. Marschner, *The Original Vegetation of Minnesota* (reissued; Saint Paul: USDA Forest Service North Central Experiment Station, 1974).

² Harrison, "Cultural Resources Survey."

cultivated in the mid-1900s. Most of the uncultivated uplands were likely being grazed.

Naturalized Deciduous Woods and Forests

Aerial photos show few scattered deciduous trees on the site in 1937, in a savanna-like pattern on hills south of today's lake. Aerial photos from 1951 and 1964 show increased canopy in the same area, with additional deciduous trees naturalizing isolated steep slopes that were not suited to cultivation or grazing. In the mid-1970s, remaining uncultivated areas with steep slopes began to fill in with shrubs and trees. As grazing decreased, deciduous forests increased. Left unmanaged, naturalized deciduous forests would likely expand across the site.

Planted Trees

In the 1970s spruce and pine trees were planted in an orderly fashion on steep slopes in areas that had previously been cultivated (*Photo 18: Planted Pines*). The conifers were likely planted to control soil erosion. Spruce and pine also appear to have been randomly planted in grassland and sparsely forested areas. In the late 1990s or early 2000s, hundreds of white cedars were planted in an old field south of the lake, presumably as winter cover for deer.

Wetland Changes

Soil surveys indicate a broader area of hydric soils in the park than what is currently classified as wetlands, suggesting that the site historically had more wetlands than today. Drainage ditches that originate in the park and drain to the Vermillion River have allowed historically seasonally flooded areas to be cultivated farmland.

Dam construction in the 1960s did not affect the wetlands extent, but changed the types of wetlands that exist on the site.

Invasive and Harmful Exotic Vegetation

Native vegetation in the park area is primarily mesic and wet prairie. The 1850's public land surveyor also noted thickets of aspen in the area. Although oaks were not noted, they would have been common in the area, with basswood, elm, and ash.

Today the site hosts some invasive and harmful exotic plants species such as common buckthorn, smooth



Figure 25: 2008 Aerial Photograph



Photo 18: Planted Pines



Photo 19: Transition in the Plantation

brome grass, and crown vetch. Invasive species can spread rapidly and degrade habitat quality. Once established, they can be costly and difficult to control. See *Chapter 11: Natural and Cultural Resources Stewardship* for information regarding the control of invasive or harmful exotic vegetation on this site.

Anticipated Changes in Vegetation

The park's vegetation will continue to change over time for several reasons, including the following:

- Prairie fires no longer occur naturally to keep woody vegetation in check. Controlling woody vegetation now requires regular intervention, which can be difficult and costly. Without fire, the area will transition to a woody landscape.
- Non-native invasive plant species are already established in the park. Eliminating these species is virtually impossible and slowing their spread can be difficult.
- Climate change and exotic pests will likely affect the park's vegetation. Climate change may allow new plant species to flourish in the park, while discouraging others. The Emerald Ash Borer is an example of an exotic pest that poses a threat to the park's ash trees.
- Vegetation around the park is aging. While some pine and spruce plantations are regenerating, others will begin to diversify over time as they thin out and other vegetation comes in (*Photo 19: Transition in the Plantation*). This transition is relevant throughout the park.
- Future park development will change the park's vegetation as trees and other vegetation are planted and removed to accommodate uses.

The park's vegetation will continue to change over time – with or without human intervention. A goal of this master plan is to guide the change in a way that is ecologically sound and consistent with the vision of the park. Refer to *Chapter 11: Natural and Cultural Resources Stewardship* for additional information.

VEGETATIVE LAND COVER

This section provides an overview of the park's vegetative land cover based on the Minnesota Land Cover and Classification System, and provides information on the park's vegetation based on the County Biological Survey and the Minnesota Natural Heritage Information System. A qualitative analysis of the park's natural communities is provided, based on field observations.

Minnesota Land Cover Classification System

The Minnesota Land Cover Classification System (MLCCS) is a standardized tool to classify land cover in Minnesota. Its emphasis is on vegetative land cover as opposed to land use, making it a useful tool for resource managers and planners. The MLCCS uses a five level hierarchy:

Level 1: Artificial/cultural land cover versus natural or semi-natural land cover

Level 2: Dominant vegetation (trees, shrubs, herbaceous)

Level 3: Plant type (deciduous, coniferous, etc.)

Level 4: Percent of imperviousness or upland versus hydric soils

Level 5: Specific plant species in the area

This master plan describes the land to level three, with information about dominant vegetation. As park design moves into more detailed site studies, additional MLCCS levels should be analyzed. *Figure 26: Land Cover Classification* shows dominant vegetative land cover and plant type in and around the park. Some park areas were classified in field checks that occurred in 1999 and 2000. Other areas were classified based on aerial photography from 1997 through 2008. The following provides an overview of the different plant types in the park:

Artificial/Cultural

This class includes land cover created by humans, including artificial surfaces (driveways, roads, etc.) and vegetation such as mowed and maintained lawns. The MLCCS does not identify any artificial/cultural cover in the park, but some lawn areas are adjacent to the park.

Planted or Cultivated Vegetation

This class includes vegetation planted for cultivation or a similar use. The MLCCS identifies two types of planted or cultivated vegetation in the park:

1. **Planted, Maintained, or Cultivated Trees** Primarily conifers planted in the 1970s for erosion control. MLCCS identifies major plantations, although planted trees are scattered throughout the park.
2. **Cultivated Herbaceous (Crops)** Annually harvested row crops and wildlife food plots. In 2011, 130 acres of land in the park were leased out for cultivation.

Forest

Forests consists of trees with overlapping crowns that cover 60-100 percent of an area. Not planted, developed naturally, and denser than woodland. The park area has three forest types:

1. **Altered/Non-native Deciduous Forest** Forested hills directly south of the lake, dominated by oak trees, with some ash, basswood, maple, and cottonwood. Disturbed shrub and ground layers harbor invasive species such as buckthorn (*Photo 20*).
2. **Aspen Forest – Temporarily Flooded** Quaking aspen dominate these forests in the southwest park, in areas with wet soils and a high water table. (*Photo 21*).
3. **Mixed Hardwood Swamp – Seasonally Flooded** On muck soils in seasonally flooded areas, with tree cover greater than 30 percent (half and half black ash and a combination of tamaracks, black spruce, and white cedar).

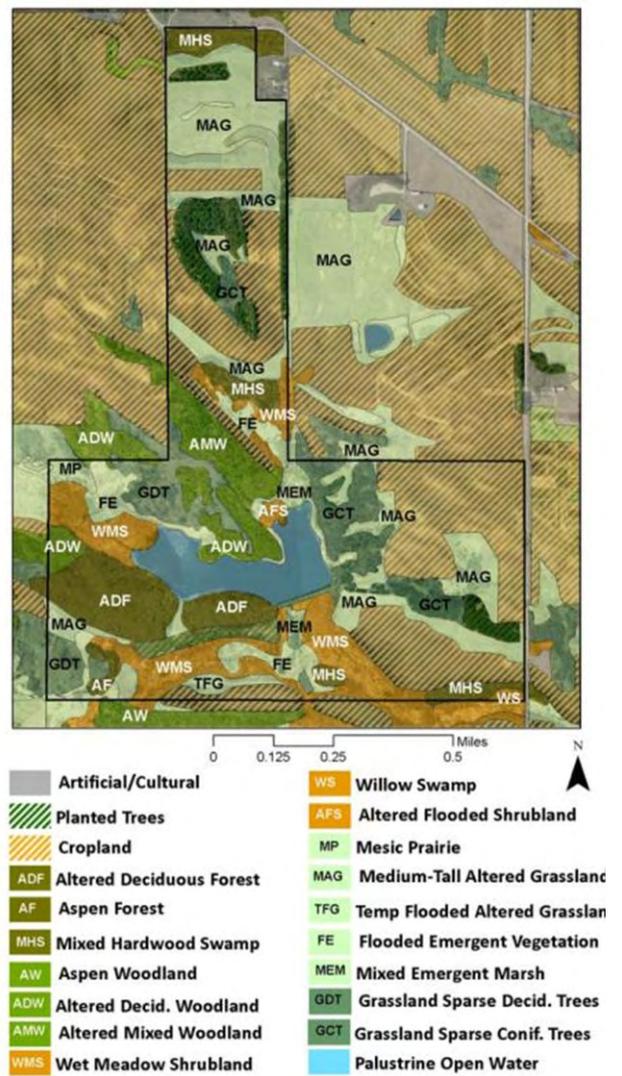


Figure 26: Land Cover Classification

Woodland

Woodlands have open stands of trees, canopies do not touch each other, and tree cover is between 25 and 60 percent. The park has three woodland types:

1. Aspen Woodland

Found in uplands; with aspens comprising 70 percent or more of tree cover. Shrub understory.

2. Altered/Non-native Deciduous Woodland

Upland, 10 to 70 percent tree cover, dominant species are box elder and green ash, less than 25 percent conifers. Shrub layer dominated by buckthorn and Tartarian honeysuckle.

3. Altered/Non-native Mixed Woodland

Upland, 10 to 70 percent tree cover, 25 to 75 percent conifers. Typically consist of red cedar, elms, and aspen. Shrubs often include prickly ash, buckthorn, Tartarian honeysuckle, and sumac.

Shrubland

Shrubs and dwarf-shrubs, growing individually or in clumps, and covering 25 percent of the area. Three types of shrubland occur in the park:

1. Wet Meadow Shrubland – Seasonally Flooded

Found in wetlands, includes tall shrubs covering 50 to 70 percent of the area. Species include speckled alder, willows, and red-osier dogwood (*Photo 22*).

2. Willow Swamp

On seasonally flooded wetlands with less than 30 percent tree cover and 70 percent or more tall shrub cover dominated by willows. A small willow swamp exists in the extreme southeast park.

3. Altered/Non-native Dominated Seasonally Flooded Shrubland

On seasonally flooded wetlands with less than 30 percent tree cover and greater than 50 percent shrub cover. Vegetation can include buckthorn, reed canary grass, and other non-natives.

Herbaceous

Grasses, forbs, and ferns cover at least 25 percent of the area. Trees and shrubs cover less than 25 percent of the area. Seven communities occur in the park:



Photo 20: Altered Deciduous Forest



Photo 21: Edge of Aspen Forest



Photo 22: Wet Meadow Shrubland-Mixed Emergent Marsh



Photo 23: Medium-Tall, Altered Grassland in Foreground

1. Mesic Prairie

Uplands, dominated by native grasses, such as prairie dropseed, and prairie forbs, such as leadplant. The park’s mesic prairie lies in northwest corner of the south park.

2. Medium-Tall, Altered/Non-native Dominated Grassland

Dominated by non-natives such as brome, Kentucky bluegrass, spotted knapweed, and reed canary grass. Less than 10 percent tree cover and less than 50 percent shrub cover (*Photo 23*).

3. Temporarily Flooded, Altered/Non-native Dominated Grassland

Dominated by non-native species (e.g., reed canary grass), flooded often enough that vegetation is at least 50 percent hydrophytic.

4. Seasonally Flooded, Altered/Non-native Dominated Emergent Vegetation

Wetland dominated by non-natives (e.g., reed canary grass), may have pure stands of cattail (*Photo 24*).

5. Mixed Emergent Marsh

Wetland on semi-permanently flooded soils, not dominated by cattails or non-natives. Generally considered a higher quality wetland (*Photo 22*).

6. Grassland with Sparse Deciduous Trees – Altered/Non-native Dominated Vegetation

Uplands with 10 to 70 percent tree cover (with less than 25 percent is conifers) and at least 30 percent herbaceous species (mostly non-native). Common grasses include Kentucky bluegrass and brome. Common shrubs include sumac, prickly ash, and Tartarian honeysuckle (*Photo 25*).

7. Grassland with Sparse Conifer or Mixed Conifer/Deciduous Trees – Altered/Non-native Dominated Vegetation

Upland with 10 to 70 percent tree cover (of which at least 25 percent is conifers) and 30 percent herbaceous species dominated by non-native species. Common grasses include Kentucky bluegrass and brome. Common shrubs include sumac, prickly ash, and Tartarian honeysuckle. Many trees in this class were planted (*Photo 26*).



Photo 24: Flooded Emergent Vegetation



Photo 25: Grassland with Sparse Deciduous Trees



Photo 26: Grassland with Sparse Conifers



Photo 27: Mesic Prairie Identified by Minnesota County Biological Survey

Open Water

The park includes one palustrine open water area, with less than 25 percent vegetative cover. The lake covers at least 20 acres and is less than 6.6 feet deep in its deepest area at low water level.

Minnesota County Biological Survey (MCBS)

The MCBS identifies rare biological features and significant natural areas in the state. Natural community information was identified by infrared aerial photography taken in 1991, later field checked.

Mesic Prairie

Park uplands northwest of the lake include a 1.5 acres remnant of mesic prairie. Site analysis in 2010 found that quality of this prairie had likely deteriorated since the 1990s. The area still contains significant native plants, but exotic vegetation has established in the area (*Photo 27:* and *Figure 27: Minnesota County Biological Survey*).

Aspen Woodland

Located in the wildlife management area south of the park in a shallow wet depression, with quaking aspen, willows, and red osier dogwood. Aspens have a short life span, so this woodland likely has changed since the survey in the early 1990s. A similar aspen forest exists in the far south end of the park.

The MCBS identifies high significance for biodiversity in a broad area including and surrounding the lake and wetlands (*Figure 27*). Field observations from the 1980s note: “very good quality occurrences of rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.”



Figure 27: Minnesota County Biological Survey

Minnesota Natural Heritage Information System

The MDNR Natural Heritage Information System (NHIS) in the park area identifies one listed *threatened* vascular plant species and several listed *endangered* terrestrial communities. For species protection and per MDNR license agreement, detailed information about the species or its location cannot be included in this plan. County staff are aware of the area’s listed species and will work to ensure that they are protected in the design, development, and operation of the park.

Qualitative Rankings of Natural Communities

The Minnesota Land Cover Classification System (MLCCS) provides quality information about vegetative land cover, although it may be dated since it was based on aerial imagery as old as 1997 and field checks from 1999 - 2000. Additional field checks were conducted 2010 by the master planning team to qualitatively rank the park’s natural communities, using the MDNR’s Element Occurrence Ranking

Guidelines (Figure 28: *Qualitative Rankings of Natural Communities*). In some cases, current rankings differ from the MLCCS and the MCBS, which is not unusual over the course of a decade or more.

Excellent Quality (A)

None found in park

This ranking is reserved for areas with the highest quality natural communities that have no disturbances. Past and/or current cultivation of crops and grazing has caused significant disturbances in the park, as has the spread of non-native species.

Good Quality (B)

Lake (open water wetland), mixed emergent marsh, and wet meadow shrublands

Good quality natural communities have intact natural processes, but show signs of past human impacts. These communities contain a relatively low number of non-native species.

Although the lake (open water wetland) was created by building the dam, it has diverse aquatic native vegetation. The mixed emergent marsh in the north arm of the lake is also good quality.

Wet meadow shrublands near the lake inlets and outlet are dominated by native plants.

Moderate Quality (C)

Southern wet meadow shrublands, scattered grasslands, flooded emergent communities, woods (oak)

This class includes recognizable native communities with diverse native species, but obvious past disturbance. The park’s southern wet meadow shrublands are moderate quality. Some grasslands (old fields, grazed land) have native prairie species, including big bluestem, coneflowers, and blazing stars.

The flooded emergent communities have native species and non-native species, including canary reed grass. Oak-dominated woodlands south of the lake have some quality native understory species like Indian pipe. Shrub species are dominated by European buckthorn, which reduces the quality of the natural community.

Poor Quality (D)

Woodlands and grass/sparse tree mixes northeast of the lake

These areas are widely disturbed and poor in quality, with some native species, but predominantly non-natives. European buckthorn is the dominant shrub.

Altered/Non-native Plant Communities

These areas did not qualify for natural community ranking.



Figure 28: Qualitative Rankings of Natural Communities

REGIONAL ECOLOGICAL CONTEXT AND CLASSIFICATION

Ecosystem management requires understanding ecological patterns and processes. The following summarizes a hierarchical framework for resource planning and management, based on understanding inherent natural qualities of the land and how these qualities relate to the social and built environments.

The park is in the geomorphic province referred to as the Eastern Broadleaf Forest, which covers southeast Minnesota, the metropolitan area, and a portion of land in central Minnesota. The park also is in the Minnesota and Northeast Iowa morainal section, the oak savanna subsection, and the Coates Sand Plain land type association. The oak savanna subsection and the Coates sand plain are unique to the immediate park area. Lebanon Hills Park to the north and the area south of the Vermillion River are in different ecological subsections and land type associations.

Regional Conservation Corridors and Greenways

The MDNR and Metropolitan Council identified and mapped regionally significant ecological resources as Metropolitan Conservation Corridors in 2003. Corridor identification was intended to help counties and local governments prioritize conservation and restoration efforts (Figure 29).

The park is in a conservation corridor connecting Lebanon Hills Regional Park and the Vermillion River Corridor. Although mining and future development in UMore Park will significantly alter the existing conservation corridor, plans for the UMore Park community call for restoring and enhancing area ecological corridors as part of redevelopment efforts.

Dakota County prepared a Greenways vision in its 2008 Park System Plan, which includes a greenway from Lebanon Hills through UMore Park and Whitetail Woods Regional Park to the Vermillion River Corridor. It also envisions a local greenway to connect the new regional park to the proposed North Creek Greenway to the west. Countywide greenways will connect ecological landscapes and community destinations. Greenways are discussed in more detail in *Chapter 2: Regional Context*.



Figure 29: Regional Conservation Corridors and Greenways

WILDLIFE

The park area has abundant, diverse wildlife and has long been valued for hunting (especially deer), although other nongame wildlife are also important. This section provides an overview of the existing wildlife in and around the area and it examines the issues and opportunities associated with wildlife in and around the park.

Animals in the Park Area

The park and surrounding area have a variety of mammals, birds, fishes, reptiles, amphibians, insects, and arachnids, summarized below. The County, in cooperation with the MDNR, the UM, and others may want to conduct a detailed inventory of the animals in the area.

Mammals

The park supports mammal species typically found in the region. Whitetail deer are plentiful (*Photo 28*). Park visitors may see coyotes, rabbits, gophers, squirrels, raccoon, bats, and many other mammals.



Photo 28: Whitetail Deer in the Park

Birds

The park's diverse habitat supports a variety of birds. Park wetlands offer outstanding habitat for ducks, geese, bitterns, herons, egrets, cranes, and other aquatic birds. MDNR and County staff report thousands of mallards on the lake. Egrets (*Photo 29*), herons and many other birds are common in the park as well. One threatened species has been spotted in the park area, and one species of special concern nests in the park.



Photo 29: Egret in the Park

Fish

Conversations with a neighboring property owner suggest that the lake may have once supported a few fish species including bullheads, sunfish, and bass. It is unclear which fish species currently live or could live in the lake. The County should consider conducting an inventory of the fish in the open water wetland.

The Vermillion River is known for its brown trout population and, to a lesser extent, its rainbow trout population. No trout have been documented in the park's waterways. Water leaving the park should be managed to avoid adverse impacts to trout habitat in the Vermillion River.

Reptiles and Amphibians

The park hosts a variety of reptiles and amphibians, including the snapping turtle shown in *Photo 30*, and salamanders, frogs, toads, lizards, and snakes.



Photo 30: Snapping Turtle in the Park

Insects and Arachnids

Insects (mosquitoes, ants, butterflies, etc.) and arachnids (ticks, spiders, chiggers, etc.) are important to the health of the ecosystem, although some can carry serious diseases, such as West Nile virus or Lyme disease. Others can decimate plant or animal species, such as the Emerald Ash Borer. Others may be an annoyance that discourages some people from participating in outdoor activities (e.g., gnats, mosquitoes). Park operations and management may need to consider control methods for destructive insects. Proper park design and maintenance and education are additional ways to allow visitors to coexist with native insects and arachnids.

Endangered, Threatened, and Special Concern Animals

The MDNR NHIS identifies one threatened bird species, one threatened amphibian/reptile species, and other species of special concern in the park area. To protect the species and per the MDNR's license agreement, detailed information about protected species cannot be published in this plan. County staff are aware of listed species and will design, develop, and manage the park to be protective to threatened species in the area.

Wildlife Related Recreation Activities

Hunting

Several game animal species reside in the park area and public hunting is allowed in Vermillion Highlands to the east of the park and in the WMA and AMAs to the south of the park. Private hunting occurs on the properties to the west of the park. Vermillion Highlands has controlled hunting requirements for whitetail deer, turkey, pheasant, and late season goose hunting. The Vermillion River WMA and AMAs have additional hunting opportunities consistent with the other Minnesota WMAs. Other game animals include mourning doves, rabbits, squirrels, crows, raccoon, fox, and opossum.

Other than special management hunts, hunting is not allowed in Dakota County parks. The park has some potential for becoming a refuge for game animals. Deer may tend to congregate in the park during hunting season. This could potentially affect the park's vegetation and various uses in the park. The County should continue to work with the MDNR to address concerns related to this issue.

Wildlife Observation Opportunities

The park offers many opportunities to observe a wide variety of wildlife, although observation areas must be carefully planned to avoid adverse impacts on wildlife. The County may consider developing traditional observation opportunities (like wildlife blinds), but should also explore newer technology (such as remote cameras).

Chapter 4: CULTURAL RESOURCES

Knowing the historical context of the people, cultures, and landscapes of an area helps us appreciate the past and understand the present and possibly the future. This chapter provides an overview of how the landscape of the area has changed over thousands of years and how the people who lived in this area interacted with the land. This chapter also identifies areas within the regional park that have archaeological potential. Finally, it describes historical themes that can be incorporated into the design, operations, and programs of the regional park.

LAND HISTORY IN THE CONTEXT OF ITS PEOPLE

The natural environment and culture of an area have great influence on each other. The following provides historical perspective on the park area's natural environment in the context of its people. Refer to *Chapter 3: Natural Resources* for additional information about the natural environment.

Archaeological Regions

According to a regional framework based largely on hydrological characteristics, the regional park falls within the transition between the Southeast Riverine and Central Deciduous Lake archaeological regions.³ The former encompasses the stream-dissected, driftless (not recently glaciated) area extending southeast to the Mississippi River and has very few lakes. The latter encompasses the lake-dotted glacial moraines, till plains and outwash plains of central and east central Minnesota, including northern Dakota County.

Southeast Riverine Region

The Southeast Riverine region had the mildest climate and longest growing season in the state with fertile medium- and fine-textured soils formed under prairie conditions, and extensive rock outcrops rich with deposits of high quality raw material for stone tools. For much of the postglacial period, open prairie or oak savanna dominated the uplands and steep valley slopes, while floodplain forest lined the river bottoms.

Subsistence resources would have included deer, elk and bison on the uplands; mussels, fish and waterfowl along the rivers; and a variety of smaller, fur-bearing animals in the wooded valleys. The rivers also provided edible aquatic plants and the upland flora included nutritious prairie turnips and an abundance of acorns. A mild climate and fertile bottomlands provided ideal conditions for Native American horticulture which preceded Euro-American agriculture by centuries.

Native American habitation sites have been found on bluff tops, in caves and rock shelters, on river terraces and in the floodplain. Mounds were common along the Mississippi River, particularly where tributaries join the main river. Quarrying in limestone and sandstone outcrops produced good quality cherts and quartzites.

³ Scott F. Anfinson, "Archaeological Regions in Minnesota and the Woodland Period," in *The Woodland Tradition in the Western Great Lakes: Papers Presented to Eldon Johnson*, ed. Guy E. Gibbon (Minneapolis: University of Minnesota, 1990).

Central Deciduous Lakes Region

The Central Deciduous Lake region was dominated by forest: deciduous woodlands with prairie inclusions or oak savanna in the south and a mix of deciduous and coniferous trees, predominantly pine, in the north. Wetlands and streams were numerous. Glacial till thickly covered nearly all bedrock. The climate and most of the soils would have been unsuitable for early horticulture. Wild rice was abundant in many lakes and streams. Deer and small herds of elk and bison would have been common in open forests of the south and west. Beaver and other small fur-bearing game, fish and waterfowl would have been abundant throughout the region.

Larger Native American habitation sites were usually located on main lakes, while smaller ones on other lakes and rivers. Few sites were located away from water. This region features more earthworks than the others, usually on uplands overlooking the larger lakes or on bluffs and terraces along the major rivers.

Transition Area between Regions

Located in a transition area on the north edge of the Southeast Riverine Region and a few miles from the Central Deciduous Lake region, the park area would have offered early inhabitants a wide range of natural resources. That few Native American sites have been recorded along the Vermillion River probably reflects a lack of good survey data. Parts of Dakota County that have been more intensively investigated (on the Minnesota, Mississippi, and Cannon rivers) have proven to be rich in highly significant archaeological evidence spanning more than 8,000 years of human history:

- Late Paleoindian and Archaic traditions between 7000 and 500 B.C.
- Woodland tradition between 500 B.C. to A.D. 1650 and initial contact with Euro-Americans
- Middle Mississippian and Oneota traditions contemporary with the late Woodland period

At early Native American and Euro-American contact, several Mdewakanton Dakota villages existed along the main rivers of this region. Many locations with evidence of early Euro-American settlement and industry have survived decades of farming and as well as urbanization and related construction.

Geomorphic Region

The region's generally level to gently rolling terrain is part of the Mississippi River Valley Outwash geomorphic region - a glacial outwash plain characterized by well to excessively well drained sandy and silt loams underlain by late Wisconsin Superior Lobe and Des Moines Lobe glacial sand and gravel.⁴

Considerable topographic relief is provided by southeast-trending outwash channels formed by streams draining from the glacial ice. These channels now appear oversized for the small, intermittent streams that slowly flow towards the Vermillion River and its confluence with the Mississippi River.

Most glacial ridges and terraces have been farmed intensively for well over a century. Soil erosion in some areas has been quite severe because of the often friable nature of the soils and the cumulative impact of plowing, wind, and rain. Outwash features are a good source of gravel and many have been extensively mined. Some streams with timbered banks have been compromised by recent land use, primarily by silting-in from farming and topsoil erosion, but also by the tiling of fields and straightening of stream channels.

⁴ *University of Minnesota, Agricultural Experiment Station, Minnesota Soil Atlas: Saint Paul Sheet, Saint Paul 1973.*

Historically Significant Landscape Features

Dakota and nearby Goodhue Counties feature a small number of free-standing sandstone formations recognized as significant landmarks by Euro-American explorers and settlers as well as by later residents and visitors. Lone Rock/Castle Hill is located just to the east of the regional park in Vermillion Highlands (see *Photo 31: Lone Rock*).

Lone Rock (notes as Castle Hill on Joseph Nicollet’s 1843 map) is an outcropping of Saint Peter sandstone that has been protected by a shielding cap of Platteville limestone. In the eyes of early Euro-American viewers, Lone Rock and similar formations were natural oddities reminiscent of architectural features. According to historic accounts, these formations were significant for Native Americans as lookouts and travel landmarks and as a source of red pigment (ochre) found in the sandstone’s seams.⁵ Less is known about current tribal attitudes on these formations. During a 1993 Dakota County Airport Study, researchers contacted representatives of the Prairie Island Dakota community regarding their views on the significance of Chimney Rock, Lone Rock, and the now-eroded Castle Rock south of Empire Township. While they indicated that Castle Rock (Standing Rock/Inyan Bosdata) was known to have played an important role in the beliefs and community of Dakotas living along the Cannon River prior to the 1860s, there did not appear to be any written or oral documentation suggesting similar significance for Lone Rock or Chimney Rock.⁶

ARCHAEOLOGICAL RESOURCES

Archaeological resources (such as stone tools or the foundation of an old homestead) can help piece together an understanding of past cultures and how our own culture developed. Archaeological resources are nonrenewable resources. If destroyed, an important tie to the past is lost. Before the regional park is developed, it is important to identify and understand potential archaeological resources in the park to ensure their protection.

This section reviews previous archaeological studies conducted in the park area and identifies areas with the highest potential for archaeological resources based on previous studies and observations conducted by the park planning archaeologist.

Previous Investigations In or Near the Regional Park

Since 1992, several cultural resource investigations have been conducted in the area. Although no detailed investigations were conducted in the regional park, previous studies help provide a general understanding of the

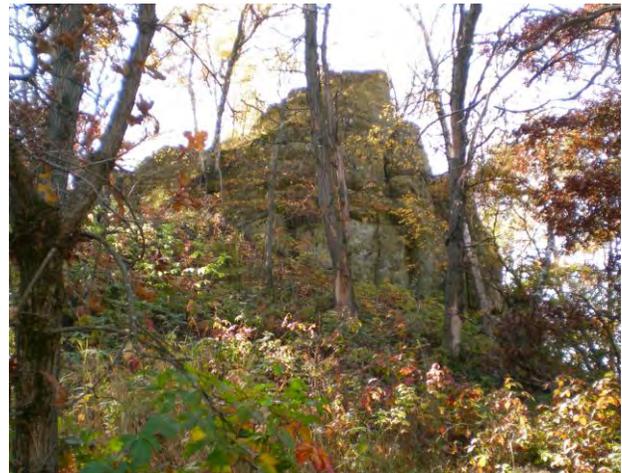


Photo 31: Lone Rock

⁵ Franklin Curtis-Wedge, ed., *History of Dakota and Goodhue Counties, vol. 1* (Chicago: H. C. Cooper Jr. and Company, 1910); Paul C. Durand, *Ta-Ku-Wa-Kan Ti-Pi, “Dwelling Place of the Gods”: The Dakota Homeland in the Twin Cities Metropolitan Area* (Prior Lake, Minn.: n.p., 1982); Warren Upham, *Minnesota Geographic Names: Their Origin and Historic Significance* (1920; repr., Saint Paul: Minnesota Historical Society, 1969).

⁶ Roise and Harrison, “Intensive-Level Cultural Resources Survey.”

park's archaeological resource potential. A summary of the studies follows.

1992-1994 Dakota County Airport Study

From 1992 through 1994, multiple sites in Dakota County were studied as potential replacement sites for the Minneapolis-St. Paul International Airport, including one site was east and northeast of the regional park. Studies there identified eight Native American habitation sites and the remnants of nine early Euro-American farmsteads.⁷

1998 County Road 46 Study

In 1998, an archaeological survey conducted along proposed County Road 46, north/northwest of the park, produced negative results even though the project route followed the side of a drained lake.⁸

2009 Sand and Gravel Mining Environmental Review at UMore Park

In 2009, a Phase IA archaeological survey reviewed the UMore Park Sand and Gravel Mining Environmental Review Services project area, which covered a 1,718-acre core area, with an added one-mile wide buffer which extended into the northern half of the regional park.

Systematic surface reconnaissance within the core area failed to identify any visible indications of Native American earthworks, historic foundations, or partially disturbed archaeological deposits.

Archaeological inventory files, aerial photographs, historic plat maps and early land surveyor notes were examined for the core area and the buffer area. Results were negative in the buffer area that includes part of the park.⁹

Wind Turbine Project in UMore Park

In 2010, a Phase IA archaeological and architectural history survey assessed the cultural resource potential within a proposed wind turbine project area located in UMore Park, two and a half miles northeast of the park. The proposed project area lacked prominent topographic features and was distant from the nearest natural waterway, so was deemed to have low archaeological potential - an assessment confirmed by the negative results of systematic surface reconnaissance.¹⁰

Archaeological Resources Identified Near the Regional Park

Archaeological surveys near the regional park have largely proven negative, except for the Dakota County Airport study. The latter identified stone tools, chipping debris and abandoned homesteads.

⁷ Christina Harrison, "Cultural Resources Survey, Dakota County Airport Study Area, Volume I: Archaeological Resources," prepared for the Metropolitan Airports Commission and HNTB, 1993.

⁸ J. Sluss and C. Malmquist, "Phase I Archaeological Investigation of Future County Road 46 [CSAH 46] and Phase II Evaluation of the Gopher Ordinance Works, Dakota County, Minnesota," prepared by BRW, 1998.

⁹ Kristen J. Bastis and David Wilcox, "Phase IA Archaeological Survey for the UMore Park Sand and Gravel Mining Environmental Review Services, Dakota County, Minnesota," prepared by The 106 Group Ltd., 2009.

¹⁰ Mark Doperalski and Miranda Van Vleet, "Phase IA Archaeological and Architectural History Survey for the Umore Park Research Wind Turbine Project, Dakota County, Minnesota," prepared by The 106 Group Ltd., 2010.

Stone Tools and Chipping Debris

Fairly sparse scatters of stone tools and chipping debris likely to be remains of Native American campsites or seasonal activity areas were identified three miles east/southeast of the regional park property, within what was then “Candidate Site #6” for the airport study:

- Sparse lithic scatter with a few chert flakes with deliberate edge modification and use wear, found on a cultivated upland which overlooks an intermittent drainage;
- Two chert flakes found on a deeply plowed and eroded upland which overlooks another intermittent drainage; and
- Several chert flakes found on a cultivated ridge which overlooks the Vermillion River.

None of these sites were intensively surveyed before focus shifted to preferred airport candidate site. More evidence likely would have been found with visual inspection at close intervals. Similar lithic scatters were found elsewhere in the area, typically on ridges adjacent to intermittent or permanent streams, similar to several locations within the park property.

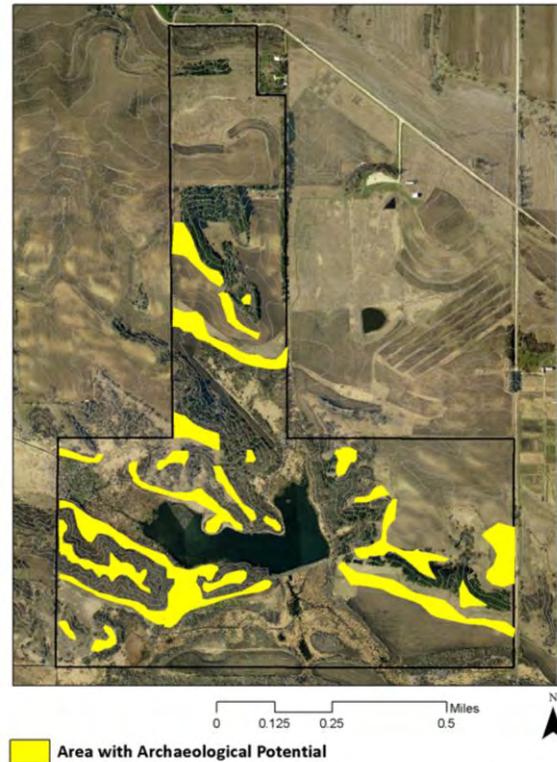


Figure 30: Areas with Archaeological Potential

Abandoned Homesteads

No abandoned homesteads are known on the regional park site, despite being common in the surrounding area. Evidence of nearby former homesteads range from a few depressions in the ground with thinly scattered artifacts to well-preserved foundations with informative artifactual evidence. Review of historic maps from 1874, 1879, and 1896 indicated several historic homestead locations, many of which had been relocated and were inspected during the airport study field survey. Several former home sites were just north and east of the park property.

Archaeological Potential in the Regional Park

Based on review of previous archaeological studies in the park area and a 2010 field survey of most of the park, it is reasonable to conclude that the park's level-crested ridges and intermediate terraces that overlook drainage ways and wetlands have archaeological potential



Photo 32: Archaeological Potential in the Regional Park - Level Ridge Overlooking Open Water Wetland

(see *Figure 30: Areas with Archaeological Potential*).

Because areas with archaeological potential are likely to invite public recreational use, archaeological field survey work should be integrated into the more detailed planning and design development phases associated with the development of this park. In addition, construction activities (especially in the areas that have potential archaeological resources) should be sensitive to finding and protecting archaeological resources.

Photo 32: Archaeological Potential in the Regional Park - Level Ridge Overlooking Open Water Wetland shows one of many park areas where there is potential to find archaeological resources. This area sits on a high, relatively wide and level ridge that overlooks what use to be a small stream (now an open water wetland). With expansive views in all directions, it is an area that most people would find to be a good campsite.

HISTORICAL OVERVIEW FROM 1680S TO THE PRESENT

This section describes five major historical eras as they relate to the park.

Era of Dakota Indians and Euro-American Explorers

When Euro-American explorers, including Louis Hennepin, first visited this area in the 1680s, they encountered the Mdewakanton band of Dakota Indians. Although migratory, the Mdewakanton band may have lived in the area for three or four hundred years and their ancestors may have been in the area thousands of years earlier. Other than scattered artifacts, little suggests that settlements or encampments were in this area, although evidence of encampments exists along the Mississippi and Minnesota rivers.

In 1838, Joseph Nicollet visited and described the area around Lone Rock in his journal. *“We cross the Vermillion after 6 miles, and 2 miles farther along we come to Sandstone Hill where we breakfast and take the height at noon. I visit this pretty hill of soft and rough-grained and varied-colored sandstone. Worked over by the wind and the rain, it has the appearance of an old chateau or fort in ruins with castellations, window openings, and loopholes.”*

Photo 33: Lone Rock in 1903 shows Lone Rock in 1903. Trees appear to be young and likely began naturalizing this area after the 1850s, when prairies were converted to farm fields. During this era, the land was in a natural, relatively undisturbed state.

Era of Euro-American Settlement and Early Farming

In 1851, the treaties of Traverse des Sioux and Mendota opened up about 24 million acres (including the park site) to settlement.¹¹ Native Americans were forced to reservations. Throughout the 1850s, pioneers and speculators rushed to acquire the land. Prairie was converted to farmland, roads and villages were established, and tremendous landscape change occurred.

¹¹ *Theodore C. Blegen, Minnesota: A History of the State, rev. ed. (Minneapolis: University of Minnesota, 1975), 167-168.*

Era of Gopher Ordnance Works

The 1940s introduced another era of major change to this area. To support its World War II efforts, the United States government in 1942 quickly acquired 11,500 acres in the Rosemount area to develop the Gopher Ordnance Works, a munitions plant manufacturing smokeless gunpowder. Although the park property was outside of the Gopher Ordnance Works fenced boundaries, it was included in the buffer area owned by the federal government. Station Trail (or Patrol Road as it was then known) at the park’s northern boundary was originally constructed as the plant’s guard road. The United States government closed the plant in 1945. See *Figure 31: Map of Gopher Ordnance Works*, for a map showing the relationship of the park to the plant. See *Photo 34: Guard Tower* for a picture showing a typical guard tower that was constructed along Station Trail near the northern boundary of the park.

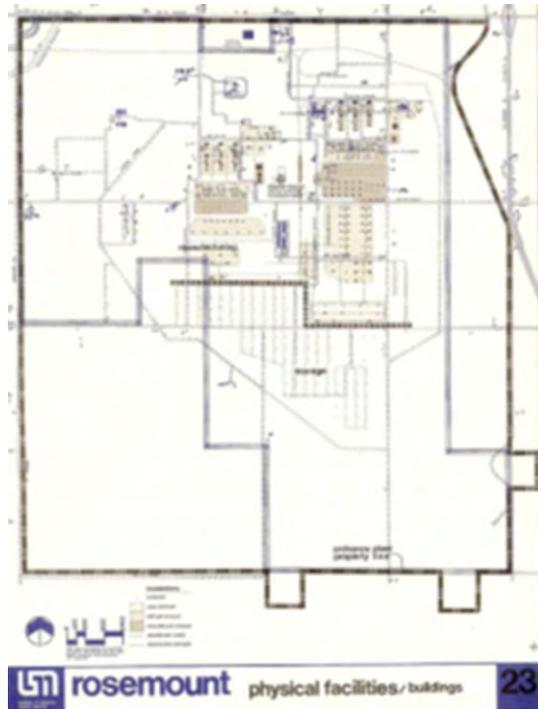


Figure 31: Map of Gopher Ordnance Works

Era of the University of Minnesota Rosemount Research Facility

After the closure of Gopher Ordnance Works, the University of Minnesota acquired roughly 8,000 acres of the site and used it for a variety of purposes, including agricultural research. The research facility also served as host to the Dakota County Master Gardeners.

Era of Collaboration

In 2006, in return for financial assistance from the State of Minnesota to help build the University of Minnesota football stadium, the University transferred 2,800 acres of land to the Minnesota Department of Natural Resources for development of Vermillion Highlands – a research, recreation, and modified wildlife management area. In 2007, a report titled “Building Common Ground” identified how the University of Minnesota and the Department of Natural Resources would coordinate uses associated with Vermillion Highlands.

In 2008, Dakota County purchased the new regional park property immediately west of



Photo 33: Lone Rock in 1903 (Source: Minnesota Historical Society)



Photo 34: Guard Tower

Vermillion Highlands. The University of Minnesota also announced plans to mine 5,000 acres of its remaining property at the Rosemount Research Facility/UMore Park site and then develop the site into a sustainable community.

In 2010, the Vermillion Highlands Concept Master Plan was adopted. The Plan illustrates a collaborative management approach that engages the University of Minnesota, the Minnesota Department of Natural Resources, and Dakota County. In 2010, Dakota County began work on the Development Master Plan for the new regional park.

Chapter 5: RECREATION DEMAND

Dakota County's population is, on average, increasing, aging, and becoming more culturally and ethnically diverse. Recreation in this regional park must respond to changing demographics in the County and the Region. This chapter summarizes key demographic trends related to recreation and this park, findings from the Minnesota State Comprehensive Recreation Plan, the Metropolitan Council Regional Parks and Trail Survey of 2008, and an online survey conducted by Dakota County for this park.

DEMOGRAPHIC TRENDS

Changing aspects of the County's population will have profound effects on recreation demand for the new regional park. Refer to Dakota County's Comprehensive Plan, *DC2030*, for more information.

1. **Increasing population.** Dakota County's population continues to increase. By 2030, the county is projected to add 160,000 people and over 78,000 homes, with much of this growth in the new park's service area (Rosemount, Lakeville, and Farmington). Once developed, UMore Park is anticipated to house 20,000-30,000 new residents, who will seek convenient access to nearby parks. The Metropolitan Council's 2001 Park and Open Space Policy Plan identified Rosemount, Lakeville, and Farmington as underserved by regional parks and the new park will provide improved access to regional recreation facilities.
2. **Aging population.** Like much of the US, Dakota County's population is, on average, aging. The number of people over age 60 is expected to nearly triple between 2005 and 2035, and the percentage of people 35-44 will be smaller than today. New housing near the regional park will be designed with appeal for people of all ages, and the park will also need to provide recreation opportunities for people of all ages.
3. **Diversifying population.** Racial, ethnic, and economic diversity is also projected to continue increasing in Dakota County, and the park needs to recognize and respond to these changes.
4. **Less physically active population.** Residents in Dakota, like much of the US, have become less physically active and increasingly obese. The regional park has an opportunity to counter this trend by providing fun and healthy recreation activities.

ANTICIPATED PARK VISITATION

The Metropolitan Council develops annual use estimates for its regional parks. Dakota County's most-visited park is Lebanon Hills Regional Park, with 459,500 visits in 2010, and its least-visited park is Miesville Ravine Park Reserve, with 78,000 visits in 2010. Visitation of the new park is expected to be low until the park is developed with primary recreation improvements and the surrounding area is more developed. By 2030, it is reasonable to assume that the park will serve roughly 500,000 visitors a year. This visitation level will occur once the park provides a diverse, year-round, and full service destination.

MINNESOTA'S 2008-2012 STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

Minnesota's 2008-2012 State Comprehensive Outdoor Recreation Plan (SCORP) outlines priorities and actions to help guide outdoor recreation decisions in Minnesota. The MDNR uses criteria based on SCORP to distribute funding through the Land and Water Conservation Fund program. Consequently, projects that seek funding through the program should be consistent with the goals, priorities, and strategies described in the SCORP.

Goal of Minnesota's SCORP

Minnesota's SCORP has one simple goal: increase participation in outdoor recreation. Outdoor recreation provides many benefits to natural, social, and economic environments. It can increase awareness and understanding of natural processes, which helps ensure that Minnesotans adequately care for the natural environment that supports them. Outdoor recreation promotes healthy living, quality of life, sense of community, and also can help support the State's economy.

SCORP included a scientific survey of Minnesotans in 2004, in which 82 percent of respondents stated that outdoor recreation is at least moderately important in their lives. The survey also found that participation in outdoor activities is constrained by available free time, expenses, outdoor pests, and a lack of outdoor recreation companions. Providing outdoor recreation that meets the expectations of Minnesotans is dependent on understanding and addressing their concerns, as well as understanding the implications of demographic changes in Minnesota.

Strategies of Minnesota's SCORP

The SCORP identified four strategies to increase participation in outdoor recreation. Each strategy is described below, as it relates to this park development master plan:

1. **Acquire, protect, and restore our natural resource base.** Outdoor recreation depends on a quality natural resource base, but increasing population, development, and other activities have put pressure on our remaining natural resources. Dakota County's acquisition of the park and the State's acquisition of Wildlife Management Areas and Aquatic Management Areas are fully consistent with this strategy.
2. **Develop and sustain a resilient outdoor recreation infrastructure.** The SCORP recognizes the importance of designing parks with sustainability in mind. Park infrastructure must be resilient and adapt to changes, such as shifting from conventional buildings to highly energy efficient buildings.
3. **Promote increased outdoor recreation participation through targeted programming and outreach.** There are many reasons why some people do not participate in outdoor recreation. It is important to understand those reasons and develop programs that can help overcome participation barriers.
4. **Evaluate and understand the outdoor recreation needs of Minnesotans and the ability of Minnesota's natural resources to meet those needs.** The new regional park, with its collaborations with the UM and the MDNR, has a wonderful opportunity to conduct research that will help us better understand how we can meet the outdoor recreation needs of people by connecting them to nature.

COUNTY SURVEY OF RECREATION NEEDS

Survey Overview

Dakota County conducted an online survey to identify what people would like in the new regional park. The survey consisted of 12 multiple choice, open-ended, and demographic questions. Responses were collected between Friday, October 29 and Monday, December 13, 2010. The sample used was not random, so results are not statistically representative of Dakota County residents. In all, 357 people participated.

Summary of Responses

Current park usage:

Most respondents had visited Dakota County parks at least once in the last two years. Nearly one-half of respondents (47.9%) had visited a Dakota County Park “six or more times” in the last two years.

What people want a park to provide:

Nearly one-half of respondents (49.7%) said they look to a county park to provide both solitude and an active recreation experience.

Top three reasons for visiting the new regional park:

1. To participate in outdoor recreational activities (66.9%)
2. To appreciate the natural world (64.6%)
3. To relax and find serenity (47.1%)

Activities that would most entice residents to visit the new regional park:

- Non-motorized recreation, such as biking, hiking, canoeing, snowshoeing, and cross-country skiing (59.2%).
- Nature appreciation, such as birding, wildlife watching, and photography (52.2%).
- Equipment rentals, such as canoes, snowshoes, cross-country skis (40.8%).
- Other -- geocaching, off-leash dog area, radio-controlled aircraft flying site (33.4%). (Although many responses advocated for a radio-controlled aircraft flying field, it should be noted that a local club’s flying site had recently been lost. County staff was in the process of coordinating with the club on potential options elsewhere in the region.)

Winter activities/amenities that would entice residents to visit the new county regional park:

Cross-country ski trails (including lit trails for night skiing)
Heated cabins
Warming hut with refreshments for purchase (e.g. hot chocolate)
Equipment rental (ski and snowshoe)
Snowshoe trails
Geocaching
Ice skating
Sledding
Ice fishing
Snowmobiling

Amenities to attract young people:

Mountain bike trails
Geocaching/GPS rental
Disc golf course
Running/hiking trails
Outdoor equipment rental
Camping
Pavilion rentals/picnic shelters
Rock climbing
Outdoor skills classes/nature activities
Sports fields (e.g. volleyball, softball/baseball, basketball courts)
Playground
Swimming area
Fishing
Paved bike trails
Bonfire pits

Top things respondents would like to see at the park:

Hiking/walking trails
Bike trails
Cross-country ski trails
Camping
Picnic areas
Equipment rental
Radio-controlled aircraft flying field
Fishing
Canoeing/Kayaking
Dog park
Swimming/beach
Wildlife/nature preservation efforts

Creative/fresh ideas:

- "Above the tree canopy" bird and wildlife observation towers
- Canoe/hike-in campsites
- Café/bar/lounge area
- Hot air balloon launch area
- Climbing wall/tower
- Trails for various users – e.g. a short trail with tactile learning elements for families with young children; a flat, paved trail for seniors/people with disabilities
- Historical display about the Empire area
- Animal park/mini zoo
- Historical trading post
- Sculpture garden/art displays
- Ropes/obstacle course
- Zip line
- Outdoor fitness areas for adults
- Xeriscape exhibit
- Community garden

- Changing area/locker rooms for changing into snow gear, etc.
- Toboggan run
- Human foosball court
- Observatory
- Kinetic sculptures powered by wind/sun
- Clear boardwalks through wetlands/bogs
- Native food plants (plums, berries, etc.) near paths for people to pick and enjoy
- Amphitheatre/outdoor art experiences
- Nature photography area
- Roller park
- Tree swings
- Tie-in to agriculture past of park
- Waterfall/water-based attractions
- Wi-Fi
- Year-round heated restrooms

Demographics

City/town of residence: cities and towns throughout Dakota County and elsewhere.

Age:

Under 18:	6%
18-24:	2.1%
25-44:	29.9%
45-64:	47.5%
65 or older:	14.4%

Ethnicity:

Native American or Alaskan Native:	0.4%
Asian or Pacific Islander:	1.1%
Black:	0.4%
Hispanic:	0%
Multi-racial:	1.1%
White:	93.7%
Other:	3.5%

Household size:

1 person:	6.7%
2 people:	40.5%
3 people:	13.7%
4 people:	26.4%
5 or more people:	12.7%

Chapter 6:

OPPORTUNITIES, ISSUES, AND POTENTIAL CONFLICTS

Throughout the preparation of this Development Master Plan, numerous opportunities, issues, and potential conflicts came to light - most are identified in Chapters 2 through 5. This chapter summarizes primary opportunities, issues, and potential conflicts to lend guidance and direction to the Development Master Plan.

OPPORTUNITIES

The park has tremendous opportunities associated with its development:

1. **Collaborative efforts with Vermillion Highlands.** By working together, Vermillion Highlands and the regional park have the opportunity to become stronger entities that enhance existing and future communities in the area. Regional park visitors can use Vermillion Highlands for skiing, hiking, and wildlife observation. Hunters, researchers, and others primarily using Vermillion Highlands can use the regional park for camping, outdoor education, and other purposes. The two entities can also collaborate on food production, wildlife habitat, maintenance issues, administration, and promoting public awareness and understanding of nature.
2. **Connections to future development.** As areas develop north and west of the park, new connections to the park will make it more accessible to incoming residents.

ISSUES

Several issues will affect park development, including:

1. **Long-term mining and development in the surrounding area.** Sand and gravel mining will occur north and west of the park for many decades to come, posing short-term challenges in connecting the park with surrounding communities of the future.
2. **Roads and access.** Park visitation will grow over time, although it may take decades before adjacent areas transition to residential development. Necessary road improvements for a primary park access will need to occur before new residential development is likely to happen. Road access from the west could be phased and cost-shared with development. Roads and access to the park will be important issues to address with the associated jurisdictions.
3. **Environmental Clean-Up of Vermillion Highlands.** While the regional park is designed to be a full service park within its boundaries, recreational use of Vermillion Highlands enhances recreation provision by adding miles of trails. Until clean-up is complete, the regional park will not realize its full recreational potential.

POTENTIAL CONFLICTS

Few potential conflicts could emerge with development of this park, although conflicts could offer potential opportunities to further enhance the park. The following describes the primary potential conflicts, which related to surrounding land uses.

Adjacent Hunting Uses

Hunting is important for wildlife management and providing a traditional recreation activity – one that is especially valued in this area. Hunting is an activity that requires some separation from the non-hunting public. Consequently, hunters can be uncomfortable hunting near public areas (like parks) and the public can be uncomfortable being near areas where hunting activities are occurring (like the adjacent Vermillion Highlands).

Wildlife management areas are required under State law to keep development, such as roads and trails, to an absolute minimum. One of the goals of the regional park is to provide connections to neighboring properties. While Dakota County may want connections from the park to the Vermillion River and to the residential areas southwest of the park, potential connections would occur in or immediately adjacent to existing wildlife and aquatic management areas.

Throughout this planning process, Dakota County, the MDNR, and UM have worked together to address potential conflicts. The park proposes the use of an internal park road system (as opposed to an upgraded Annette Avenue), to reduce potential conflicts with hunting, wildlife management, and agricultural research in Vermillion Highlands. Recognizing the importance of trail connections to the success of the regional park, MDNR has worked with Dakota County to explore year-round trail connections to the Vermillion River Regional Greenway, the west of the park through a MDNR wildlife management area.

Adjacent Shooting Range

The shooting range in Vermillion Highlands provides a popular recreation activity. While there is virtually no danger of a stray bullet from the shooting range reaching the regional park, it is likely that visitors in some parts of the park will hear gun shots from the shooting range. If shooting range noise does become an issue, the County, shooting range, and Empire Township have opportunities to work together to address any potential conflicts and to promote mutually beneficial programs.

Adjacent Future Mining

Sand and gravel mining will occur in nearby areas over many decades. As mining approaches the regional park, issues may arise related to views, traffic, dust, noise, and runoff. Some of these issues may be mitigated with a physical barrier, such as a planted berm. Adjacent mining activities may provide natural and cultural interpretation activities. Once the mining is complete, opportunities exist for sensitive development incorporating water features and trails that connect the regional park. Dakota County should proactively work with mine permitting to ensure that any potential conflicts are successfully addressed, and with post-mining development to restore the area's natural systems and enhance community connections with the park.

Chapter 7:

OVERARCHING VISION AND GUIDING PRINCIPLES

Visions typically look 10 to 20 years into the future. Because development surrounding the regional park may take 30 to 40 years to complete, the full vision of the park may not be realized until 2040 or beyond. The County should periodically review and update the vision (and this Development Master Plan) at least once every ten years (see *Chapter 13: Park Operations and Maintenance*).

OVERARCHING VISION

The overarching vision expressed in this plan was developed with broad stakeholder input. Refer to *Chapter 1: Planning Process* for additional information on public input into the planning process.

A COLLABORATIVE RECREATION AND LEARNING PARK

Whitetail Woods Regional Park is a healthy mosaic of natural and community spaces that restore the human spirit, where people can gather, celebrate, and be inspired. Outstanding recreation and learning experiences heighten awareness and appreciation of our relationship with nature.

Strong partnerships with Empire Township, the University of Minnesota, and Minnesota Department of Natural Resources on adjacent public lands expand boundaries of all areas, with the park as a welcoming gathering place for visitors.

GUIDING PRINCIPLES

Early in the planning process, the park planning team sought to increase the relevance of this park from societal, environmental, and economic standpoints. The idea of health emerged as a universal theme, whether related to enhancing environmental quality, building a strong community fabric, increasing human physical and mental health, and developing economic opportunities. The park should provide natural and community spaces that restore the human spirit and where people can gather, celebrate, and be inspired. From this notion of environmental, societal, and economic health emerged the following guiding principles:

- 1. Protect significant natural features and restore ecologically degraded areas.** The park has a variety of significant natural features that should be protected for future generations and the ecological integrity of the park. Place park development in areas that already have impacts from past use and restore the ecological functions of these areas.
- 2. Strive to meet fundamental human needs.** All humans, regardless of age, gender, and culture have a basic set of fundamental human needs, including subsistence, protection, affection, understanding, leisure, participation, creation, identity, and freedom. Strive to meet all of these needs in the park through a variety of recreation activities, programming and events, food production, public art, and community-building.
- 3. Foster awareness and understanding.** Use the regional park as a means to raise awareness of the interrelationships of people and natural processes.

4. **Provide a variety of great outdoor recreation experiences.** Provide a variety of fun and meaningful outdoor recreation experiences that cater to a diversity of people – especially youth. Also, ensure that there are a variety of great outdoor experiences all year long.
5. **Integrate a variety of agricultural uses throughout the park.** Agriculture has been an important part of this area for a long time. Provide ways to ensure that agriculture remains relevant in the park.
6. **Promote collaboration with others.** Continue to build partnerships with the University of Minnesota and the Minnesota Department of Natural Resources for recreation, education, and natural resource enhancement. Reach out to others, such as local schools and organizations, to create opportunities to intersect and advance missions.
7. **Design with nature.** Observe ecological processes and mimic them in park design and layout.
8. **Sensitively interpret the culture and history of the area.** Help visitors relate to past cultures that lived in this area.
9. **Address fundamental economic issues.** Recognize society’s growing economic divide and ensure that regardless of economic status, all people can enjoy the park, including programs, events, equipment, park access, and recreational facilities.
10. **Promote healthy, environmentally sensitive, economical transportation.** Provide fun and healthy ways to get people active and depending less on fossil fuel vehicles.
11. **Promote resilience in the face of ongoing changes.** The park area has experienced many significant changes over time, as have people associated with the land. It is not possible to preserve an ideal moment in time, whether it is today’s park or what existed before Euro-American settlement. Observe and understand ecological and social changes, and develop a responsive vision and actions that build resilience into park ecosystems and development.
12. **Foster a strong sense of place and community.** Make this a destination park that has a strong and unique sense of place that people will incorporate into their daily lives. Build in elements of mystery, surprise, discovery, and immersion throughout the park, so visitors develop a sustaining relationship with this park.
13. **Look beyond sustainability.** Explore ways that park can regenerate, and produce more than is taken with respect to soils, energy, food, and materials. Strive to use clean renewable energy and ways to produce surplus energy. Strive to produce no waste -- close the loop on all processes in the park through recycling and on-site re-use and composting.

RELATIONSHIP TO OTHER PLANS

The overarching vision for the regional park is consistent with visions and goals expressed in other plans including the Dakota County Park System Plan, the Dakota County Comprehensive Plan (DC2030), the Empire Township Comprehensive Plan, the Vermillion Highlands Concept Master Plan, and the Metropolitan Council 2030 Region Parks Policy Plan. The following sections provide a brief summary of those visions and goals.

Dakota County Park System Plan

Dakota County updated its Park System Plan in 2008, with a simple, straightforward vision for all County parks: "*Great Places, Connected Places, and Protected Places.*" The following describes the vision and key goals for the Dakota County Park System. These visions and goals are incorporated by reference into this plan. More information on the Park System Plan is online at www.dakotacounty.us/parks.

1. **Great places:** Serve residents and park visitors by enhancing the overall park experience. Make parks great destinations by realizing the potential and unique qualities of these remarkable settings.
 - Provide a balanced variety of high-quality, popular, year-round activities to promote healthy active lifestyles
 - Welcome visitors of all backgrounds, interests, and abilities to their parks
 - Exemplify sustainability and innovation as recreation trademarks of Dakota County Parks
 - Enhance provision of quality outdoor and environmental education
 - Provide exceptional service delivery and build public awareness of recreation opportunities
2. **Connected Places:** Create a seamless and interconnected greenway framework of parks, natural areas, lakes, and rivers, from which to provide convenient and high quality recreation for our citizens and protect and restore Dakota County's natural systems.
 - Protect, restore, and connect Dakota County's urban natural areas and open space (green infrastructure), using recreational greenways as a building block
 - Provide convenient and accessible recreational open space
 - Create a Greenway Collaborative to achieve mutual objectives for greenways and trails
3. **Protected Places:** Provide a healthy and biologically diverse mosaic of resilient landscapes and waterways that represents the natural heritage of Dakota County and supports a range of nature-based recreation activities. Provide cultural resource management that preserves the irreplaceable and increases understanding of our collective past.
 - Develop a comprehensive, strategic park natural resource management approach to: 1) Preserve the highest quality resources; 2) Restore targeted areas that bring economic and ecological value; 3) Enhance visitor experiences; and 4) Enter all parkland into appropriate and sustainable management regimes
 - Protect, design, and maintain scenic park viewsheds to enhance visitor experience
 - Protect park cultural resources and offer appropriate opportunities for visitors to experience them
 - Design and maintain park facilities sustainably, to reduce and avoid negative environmental impacts
 - Expand resource management partnerships to leverage skills, policies, and access

Dakota County Comprehensive Plan

Dakota County adopted its Comprehensive Plan update in 2009. The Plan guides orderly growth and change in the County, with five guiding principles intended to shape future of Dakota County, including its parks. The new park master plan addresses each of these guiding principles. Refer to the Comprehensive Plan available from the County’s website for additional information.

1. **Sustainability:** living in ways that can be sustained over many generations without placing undue burdens on the environmental, economic, or social systems of future generations.
2. **Collaboration:** working together among the private sector and many public agencies that set policy for land use, economic development, transportation, and employment.
3. **Connectedness:** moving easily between neighborhoods, jobs, shopping and services, as well as being connected to natural systems.
4. **Growing and Nurturing People:** meeting the needs of people in the county of all ages, incomes, abilities and backgrounds, so that they can live healthy, stimulating and fulfilling lives.
5. **Economic Vitality:** having a well-trained, well-educated, diverse work force, and essential infrastructure for transportation, communication and other services necessary to help the county compete successfully in a regional and global economy.

Vermillion Highlands Concept Master Plan

The Vermillion Highlands Concept Master Plan stresses the importance of collaboration among the University of Minnesota, the Minnesota Department of Natural Resources, Dakota County, and Empire Township. The plan envisions that Vermillion Highlands will accommodate research, limited natural resource-based recreation, and wildlife management uses. It envisions the regional park will provide the primary recreation uses and that connections and collaborations will be developed between the regional park and Vermillion Highlands.

Other Plans

The vision and guiding principles discussed in the Development Master Plan are consistent with the Empire Township Comprehensive Plan, the Metropolitan Council 2030 Regional Development Framework, and the Metropolitan Council 2030 Regional Parks Policy Plan.

Chapter 8: Major Use Areas and Recreation

The Development Master Plan brings to fruition the park vision, planning principles and the recreation program. It is based on careful consideration of environmental, social, and economic conditions discussed in Part Two of this Plan, with input from the Technical Advisory Group, focus groups, survey and open house participants, and representatives from the University of Minnesota, the Minnesota Department of Natural Resources, and Empire Township.

The Development Master Plan will guide park development, but it is important to recognize this plan as conceptual and refined to a level typical of most master plans. Specific layouts will require refinement as projects advance into design development. The Plan will be revisited periodically and refined. This chapter 1) presents the recreation program that the park will provide, 2) identifies major land use areas within the park, 3) presents the overall master plan, and 4) provides key recommendations and concept sketches for specific park destinations and facilities, presented from north to south in the park.

RECREATION PROGRAM

Following is an overview of proposed summer and winter uses for the park and potential collaborative opportunities for the park, Vermillion Highlands, and other area recreation and education providers.

General Approach to Recreation

The recreation program responds to the park site, recreation analysis, and vision presented in earlier chapters of this Plan. Key approaches to recreation in the park follow:

Popular recreation for all

Provide a balanced mix of basic, popular, and signature recreation and facilities. Meet or exceed visitor expectations for essential activities, and provide unique recreation that becomes part of this park's signature. Engage people of all ages, cultures, and abilities.

Year-round recreation

Provide a variety of recreation activities throughout the year. This park should be used and enjoyed as much in the winter as in the summer, while maximizing opportunities for expanded daily use and hours.

Strive for universal accessibility

Ensure recreation facilities are accessible to all. Most major use areas and trails are placed in level areas and uses are grouped to optimize access among facilities. The Community Commons area provides opportunities to people of all abilities.

Emphasize activities to engage youth

Activities like disc golf, nature play, water play, special events, and music can interest youth in coming to the park.

Integrate learning into all recreation experiences

People are looking for places to meet basic needs for learning, recreation, nature, physical activity, adventure, and pure joy. View this as a learning park. Provide fun and informative ways to recreate.

Promote healthy recreation

Provide opportunities for people of all fitness levels and abilities to participate in healthy, fun recreation, such as disc golf, hiking, and biking.

Build Partnerships to increase recreational opportunities

Partner with the UM and MDNR to expand complementary natural resource-based recreation in Vermillion Highlands. Work with local governments and organizations to integrate regional connections to the park.

Recreation Uses

The following matrices outline proposed recreation uses in the regional park. Because this regional park builds on the concept of multi-agency collaboration, the matrices show activities that could be provided by others entities in the area, as they determine appropriate.

SUMMER RECREATION USES	
	Regional Greenway Shared Use Paved Trail Boardwalk Natural Surfaced Hiking Trail Trail Overlooks Trailhead/Equipment Rental Equestrian Trail Equestrian Trailhead Canoe/Kayak Fishing Special Hunting General Hunting Shooting Range/Archery Recreation/Education Programs Integrated Food Production Labyrinth Integrated Public Art Nature Play Water Play Observation Tower General Picnicking Picnic Shelter Performance Area Flexible Use Commons Small Ceremony Area Unique Camper Cabins Special Group Camping Visitor Center Research/Learning Center Disc Golf Off-leash Dog Area Maintenance Facility Organized/Athletic Fields
Regional Park	Planned or existing recreation, Potential or coordinated recreation to be considered, Signature activities
Vermillion Highlands	Potential or coordinated recreation to be considered
WMAs	Potential or coordinated recreation to be considered
AMAs	Potential or coordinated recreation to be considered
Local Parks	Potential or coordinated recreation to be considered

Planned or existing recreation
 Potential or coordinated recreation to be considered
 Signature activities

		WINTER RECREATION USES																										
		Regional Greenway	Shared Use Paved Trail	Boardwalk	Dedicated Snowshoe Trail	Classic Cross Country Ski	Beginner Lit Cross	Skate Ski	Trail Overlooks	Trailhead/Equipment	Equestrian Trailhead	Equestrian Trail	Sledding Hill	Ice Fishing	Special Hunting	General Hunting	Shooting Range/Archery	Recreation/Education	Integrated Public Art	Nature Play	Observation Tower	Flexible Use Commons	Unique Camper Cabins	Visitor Center	Research/Learning Center	Disc Golf	Off-leash Dog Area	Maintenance Facility
Regional Park		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Vermillion Highlands					■	■		■			■	■			■													■
WMAs		■																										
AMAs		■													■													
Local Parks		■																										

Planned or existing recreation
 Potential or coordinated recreation to be considered
 Signature activities

MAJOR LAND USE AREAS

Wetlands, steep topography, and boundaries divide the park into several zones or major land use areas. See *Figure 32: Major Land Use Areas*. This section describes each land use area and the types of recreation and development matched to it. Major uses and visitor destinations are described in detail later in this chapter.

Gateway Recreation Area ■

The Gateway Recreation Area in the northern park “stovepipe” welcomes visitors and sets the stage for what they will experience throughout the park. The Gateway is one of two areas more intensively used for recreation. With access from Station Trail, this area will feature popular destinations: an off-leash dog area, performance area, trailhead, picnic facilities, integrated food production, trails, and unique camping.

Primary Recreation Area ■

The Primary Recreation Area in the southeast park can support diverse recreation and more intensive uses. This area has the park’s largest contiguous

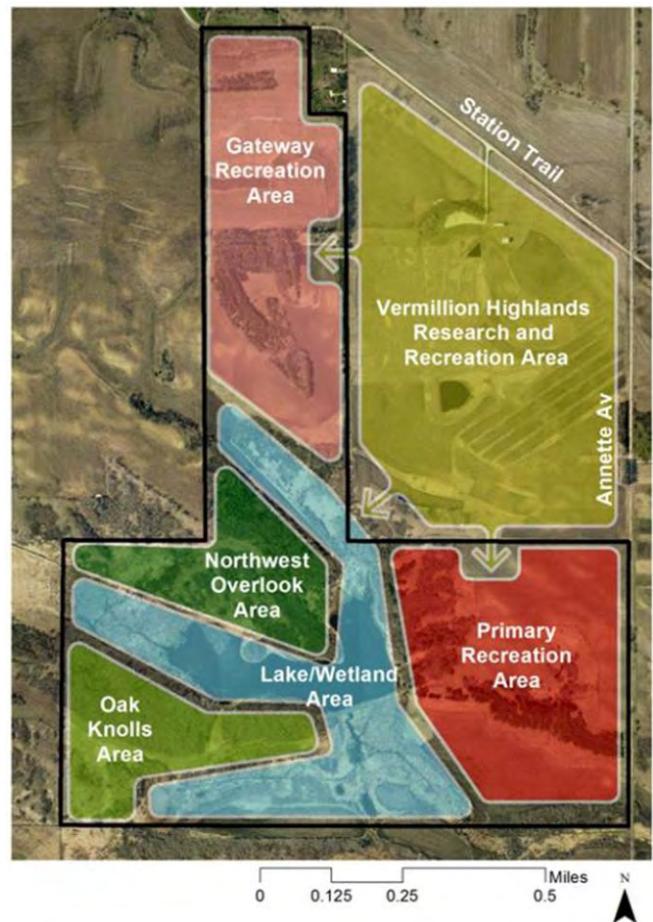


Figure 32: Major Land Use Areas

area of relatively level upland; provides good views to the south; is next to woods and the lake, which are important park attractions; and has soils and slopes that can support a range of activities. This area will have a visitor center, picnic shelters and areas, disc golf, the Community Commons, trails, integrated food production, a maintenance facility, and unique camping.

Oak Knolls Area ■

Diverse upland and wetland landscapes provide a good setting for a variety of recreation. Due to surrounding wetlands, vehicle access to this area is limited to a one-lane “road” that crosses the dam. Visitors will likely access this area via foot, bicycle, cross country skis, or perhaps a kayak or a shuttle. The semi-secluded feel of the Oak Knolls Area provides a special getaway where visitors can experience solitude and unique recreation without traffic. This area will feature interpretive activities, nature play, remote picnic sites, special remote camping, a variety of trails, and agro forestry opportunities.

Northwest Overlook Area ■

Many visitors will find the Northwest Overlook Area to be one of the park’s most special areas. Its ridgelines sit 60 feet above the lake, with expansive views to the south and summer breezes that make this a pleasant place to be on a hot summer day. This area will not have vehicle access, and is a good place to reflect and enjoy nature and solitude without the distraction. The Northwest Overlook Area will provide viewing areas, small gathering spots, interpretive features, a wildlife blind, a variety of trails, and agroforestry opportunities.

Lake/Wetlands Area ■

The Lake/Wetlands Area consists of a variety of wetlands that offer outstanding wildlife habitat and unique interpretive opportunities. Park visitors will experience much of this area from adjacent uplands, but in special areas, boardwalks will allow an up-close wetland experience. Visitors will be able to explore the lake with a kayak or canoe.

Vermillion Highlands Research and Recreation Area ■

Dakota County, the University of Minnesota, and the Department of Natural Resources are coordinating recreational use of Vermillion Highlands. In Vermillion Highlands, the research and recreation area lies west of Annette Avenue and south of Station Trail, and currently includes a segment of the Lone Rock Trail and its trailhead, research, and hunting uses. This area could also host other uses such as a research/learning center and a food production/education area.

By coordination, each entity has the opportunity to advance their missions, leverage additional resources, and enhance function and use of the regional park, Vermillion Highlands Research and Recreation Area, and to some extent the adjacent Wildlife Management Areas. Refer to *Chapter 7: Overarching Vision and Guiding Principles* for additional information.

DEVELOPMENT MASTER PLAN

Figure 33: Development Master Plan shows a conceptual layout of the major facilities in the regional park. This layout is intended to provide a general framework that can help guide the initial development of the park in a logical manner. Because the plan presents a long-term vision that may take decades to fully realize, the County will periodically update this plan (generally every ten years).

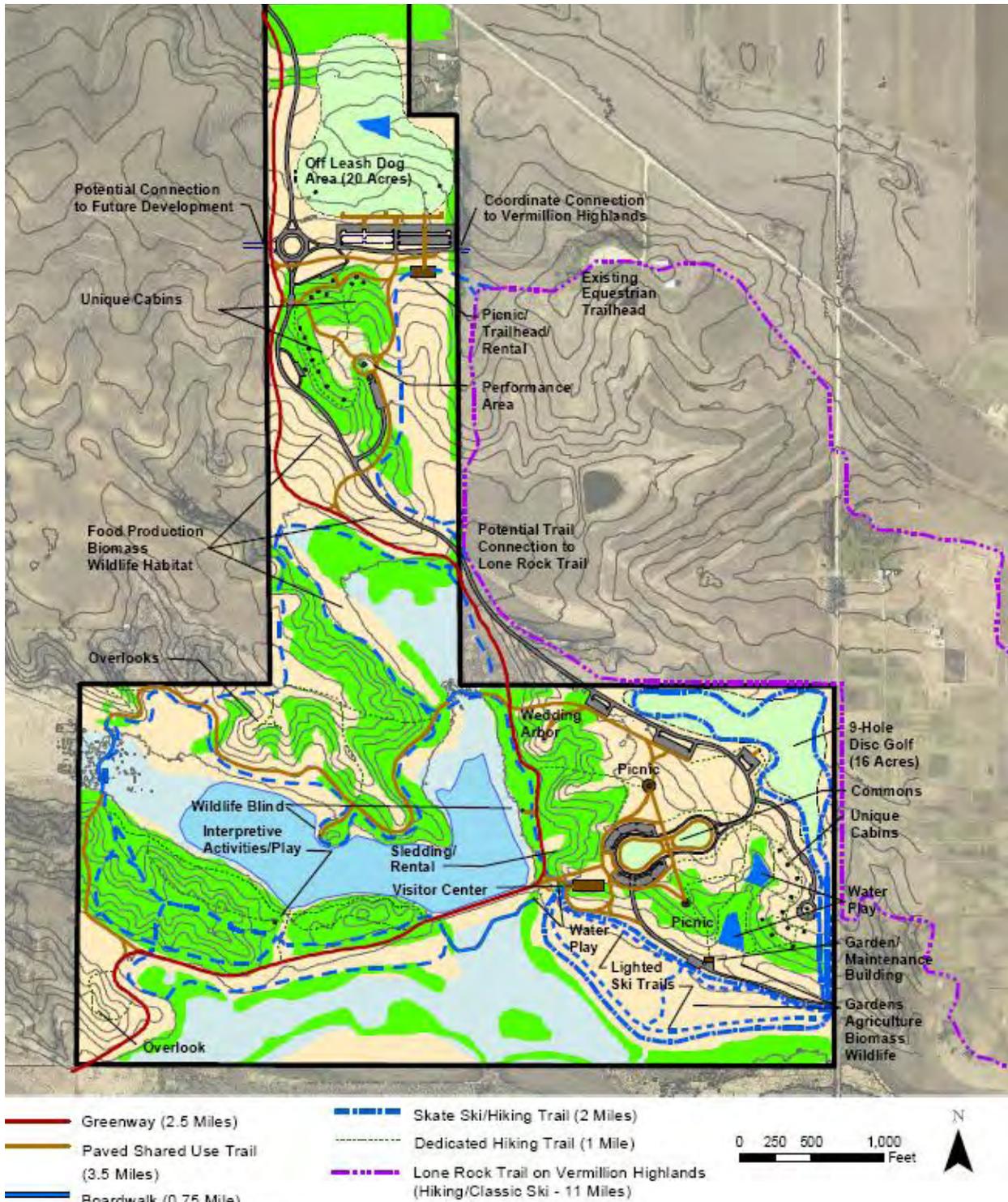


Figure 33: Development Master Plan

GATEWAY ENTRANCE, OFF-LEASH DOG AREA, GATEWAY TRAILHEAD

The north part of the Gateway Recreation Area includes the park entrance, an off-leash dog area, and the Gateway Trailhead (Figure 34).

Gateway Entrance

This Gateway entrance provides a positive, meaningful first impression of the park. The gateway entrance extends from Station Trail to the conifer plantation a half mile south of the entrance.

Vision

As visitors wind their way through the gateway entrance, they receive a glimpse into what they will see throughout the park - art sculptures and displays, orchards and food gardens, a variety of plants and landscapes, and interpretive displays. The gateway entrance provides visitors with a meaningful experience in its own right.

Photo 35: Concept Images of the Gateway Entrance provides illustrative examples for this area.

Key Recommendations

Entrance sign: An attractive park sign conveys unique aspects of this park. As possible, integrate materials from the park into the sign itself. Consider integrating features such as solar photovoltaic panels that could connect to the electrical grid or help provide lighting for the sign. Perennial food plantings, such as orchards, should also be integrated into the entrance.

Agriculture: Integrate a variety of food plantings into the entrance experience, with perennial crops (such as orchards) and annual plantings like pumpkin patches. Food areas potentially could be adopted and maintained by families and organizations.

Art and activities: Integrate areas for permanent art exhibits (such as sculptures) and seasonal outdoor art exhibits like a pumpkin house or snow sculptures. Involve a variety of organizations in developing and maintaining these areas.



Photo 35: Concept Images of the Gateway Entrance



Figure 34: Concept Sketch of Gateway Entrance, Off-leash Dog Area, and Gateway Trailhead

Landscaping: Plant a variety of trees, shrubs, forbs, and grasses to frame and screen views. Provide a vegetative screen along the west property line to buffer future mining activities. Generally screen the proposed off-leash dog area from the gateway experience.

Storm water management and wetland replacement:

Provide new wetlands to replace the small portion of Type 7 wetland that will be disturbed in constructing the access road off Station Trail. Integrate rain gardens and low impact development practices to handle storm water in a cost effective and environmentally sensitive manner. Celebrate water by integrating it into art and gateway features.

Energy production: Integrate onsite energy production into the entrance experience. A small wind energy conversion system could be constructed near the gateway’s high point or solar photo voltaic panels could be integrated into the entrance sign.

Parking: Integrate small pull-off parking strategically along the entrance road. Added parking will be addressed by the large parking lot associated with the trailhead/multipurpose facility.



Photo 36: Concept Images of the Off-Leash Dog Area

Off-Leash Dog Area

Dakota County operates Dakota Woods Off-Leash Dog Area a few miles northeast of the new regional park. The new proposed off-leash dog area in the park would only be developed if the County chose to relocate Dakota Woods to the new park, near the park gateway entrance.

Vision

The off-leash dog area provides unique, diverse amenities that make this dog park a destination for the region and upper Midwest. The dog park provides high-quality facilities for the average dog owner, an agility course that hosts events and competitions, and a training area for hunting dogs that promote synergy among Vermillion Highlands, the adjacent wildlife management areas and the regional park.

Photo 36: Concept Images of the Off-Leash Dog Area provides illustrative examples for this area.

Key Recommendations

Large dog area: An eight- to ten-acre fenced area for large dogs, with a double gated entrance, low-maintenance turf and crushed stone play area, drinking water (for dogs and people), strategically placed landscaping, dog play features, a walking path, and a small picnic shelter with tables.

Small dog area: A three- to four-acre fenced area for small dogs, with a double gated entrance, low-maintenance turf and crushed stone play area, drinking water (for dogs and people), strategically placed landscaping, dog play features, and a small picnic shelter.

Hunting dog training area: A nine- to ten-acre fenced natural area will be mostly for hunting dogs, but is open to all. A variety of landscapes include a pond for water training, beach, woods, tall grasses, and primitive trails. The area will be designed to allow for spectators and hunt training competitions.

Agility course area: One-acre area for agility courses could attract competition level use.

Spectator area: Bench/bleachers provide seating for competition spectators.

Fee collection/orientation area: Kiosk area in central location near the entrance allows for fee collections, maps, rules, and orientation to area.

Living fence: Living, vegetative fence separates dog areas.

Vegetative buffer: The off-leash dog area is separated from an existing home at the northeast corner of the park and from the gateway entrance.

Parking: 40 parking spaces in a shared lot provide parking for the Gateway Trailhead.

Gateway Trailhead

Located near the existing Lone Rock Trailhead in Vermillion Highlands, park visitors can easily embark on the park's trails and access the Lone Rock Trail in Vermillion Highlands. This trailhead will provide picnic facilities, toilets, and potentially an interim visitor center/rental equipment area.

Vision

Near the park's highest point, the Gateway Trailhead and its observation tower (reminiscent of the guard towers at Gopher Ordnance Works) attract visitors to excellent views of Vermillion Highlands and the southern park. The trailhead provides easy connections to park trails and the Lone Rock Trail.

Its central location near the off-leash dog area and performance area includes picnicking and group gatherings. Trailhead architecture sensitively integrates the facility into the landscape. Perennial food gardens provide opportunities to gather, prepare, and share in locally grown food.

Photo 37: Concept Images of Gateway Trailhead provides illustrative examples for this area.

Key Recommendations

Purpose: An embarking point for park and area trails. Many visitors will arrive in cars, but may choose to walk, bike, or take one of the park's alternate modes of transportation. A picnic shelter, toilets, and possibly an interim visitor center with rental equipment are included.

Trailhead: Coordinate with the University of Minnesota and the Department of Natural Resources in connecting the Gateway Trailhead to the Lone Rock Trail. Provide an information kiosk and maps with



Photo 37: Concept Images of Gateway Trailhead

information about Whitetail Woods Regional Park and Vermillion Highlands.

Picnic facilities: Covered picnic shelter for 100 visitors, with restrooms and additional tables scattered outside the shelter for an additional 100 visitors.

Interim visitor center/equipment rental facility: Explore providing a small center for visitor orientation, and rental of bicycles, skis, equipment, and alternative transportation. This facility could eventually be consolidated with or shifted to the visitor facility in the Primary Recreation Area.

Observation tower: The proposed trailhead in in the park’s highest area and provides opportunity to build an observation tower for outstanding views. The tower could evoke former guard towers once located along Station Trail/Patrol Road, around the former Gopher Ordnance Works. Make parts of the tower universally accessible. Include historic photographs and interpretive features.

Distinctive architecture: A living facility integrated with site, with green building principles and expansion potential.

Terraced perennial food production: Terraced perennial food gardens on the south facing slopes adjacent to the facility provide opportunities to integrate local foods into the public events.

Parking: Shared parking for this facility and the off-leash and performance areas. Develop in phases and only in the amount needed. At full build-out, parking should accommodate 180 spaces on porous pavement and roughly 120 spaces on a lawn overflow area. Use Low Impact Development techniques to minimize the environmental impacts of the parking.

CAMPING, SMALL GATHERING, AND PERFORMANCE AREAS

The camping, small gathering, and performance areas are located in the horseshoe shaped conifer plantation in the center of the Gateway Area (*Figure 35: Concept Sketch of the Camping, Small Gathering, and Performance Areas*).

Camper Cabins in the Conifers

Proposed elevated camper cabins are spaced out amid the conifer stand, overlooking the small gathering and performance areas.

Vision

Tucked among the conifers, unique cabins provide an exceptional overnight experience for campers. These cabins are in high demand year-round, especially among visitors attending special events in the nearby performance area.

Photo 38: Concept Images of the Camper Cabins in the Conifers provides illustrative examples for this area.

Key Recommendations

Purpose: Year-round cabins will be used by park visitors, Vermillion Highlands researchers, hunters in the Wildlife Management Areas, people attending folk school events in the park, and special groups (family reunions, congregations, clubs, youth camps, etc.). Cabins could also serve transitional housing/park work programs.

Clustered and secluded cabins: Twelve cabins serve this area. In the north plantation, cluster six cabins in two groups of three for family reunions and small groups. In the south plantation, spread six cabins out for a secluded feel and privacy.

Floor plans: Provide varied floor plans and amenities, with some “efficiency” cabins and others with one or two bedrooms.

Amenities: include screened porches, insulation, heating, and wireless service. Some cabins may have a compostable toilet. Clustered cabins have a central meeting area to promote community.

Distinctive architecture: Distinctive architecture gives cabins a unique sense of place. Cabins could be “tree house” log cabins using trees grown in the park.

Shared toilet and shower facility: Clustered cabins share toilet and shower facilities that are less than 300 feet away. Provide on-demand water heating and consider using compostable toilets.

Play area and nature trails: A nature-oriented play area serves the clustered cabins. Use slopes to develop slides, zip lines, and rope swings. Nature trails wander through the woods and connect the play area, cabins, and the small gathering area.

Parking: Ten spaces serve the clustered cabins and ten parking spaces serve the secluded cabins. Provide parking access via a one-way looped road.

Vegetation: Thin the conifers and plant deciduous trees, shrubs, and groundcover over time. See the *Natural and Cultural Resources Stewardship* chapter for more information.

Fire hazard mitigation: Elevated water storage may be needed in strategic areas. See the *Natural Resource Stewardship* chapter for more information.

Amenities: include screened porches, insulation, heating, and wireless service. Some cabins have a compostable toilet. Clustered cabins have a central meeting area to promote community.

Distinctive architecture: Distinctive architecture gives cabins a unique sense of place. Cabins could be “tree house” log cabins using trees grown in the park.

Shared toilet and shower facility: Clustered cabins share toilet and shower facilities that are less than 300 feet away. Provide on-demand water heating and consider using compostable toilets.



Photo 38: Concept Images of the Camper Cabins in the Conifers



Figure 35: Concept Sketch of the Camping, Small Gathering, and Performance Areas

Play area and nature trails: A nature-oriented play area serves the clustered cabins. Use slopes to develop slides, zip lines, and rope swings. Nature trails wander through the woods and connect the play area, cabins, and the small gathering area.

Parking: Ten spaces serve the clustered cabins and ten parking spaces serve the secluded cabins. Provide parking access via a one-way looped road.

Vegetation: Thin the conifers and plant deciduous trees, shrubs, and groundcover over time. See the *Natural and Cultural Resources Stewardship* chapter for more information.

Fire hazard mitigation: Elevated water storage may be needed in strategic areas. See the *Natural Resource Stewardship* chapter for more information.

Special Group Camping/Gathering

Inside the conifer plantation, overlooks the performance area.

Vision

The special group camping/gathering area provides opportunities to gather for wood-fired pizza, solar oven slowed cooked barbecues, and other foods. Picnic tables, restrooms, and grills are available. This area is also used by groups, congregations, and organizations for performance events. Temporary walk-in tents and teepees can be added for overnight stays, making this a unique and fun place for group weekend events.

Photo 39: Concept Images provides illustrative examples for this area.

Key Recommendations

Purpose/users: A level lawn area allows groups to camp in tents or teepees with a special permit. Groups can include congregations, organizations, and others using the performance area for events, services and presentations. The camp area can serve up to 100 campers. For performances and when camping is not planned, this area is used for picnicking.

Toilets, compost bins, and recycle bins: Toilets and compost and recycling bins serve campers and those attending a performance. Consider compostable toilets.

Picnic facilities: Picnic tables and wood-fired grills can be used to cook food grown on the site. Also consider solar ovens.

Vegetation: Lawn area with shade trees.

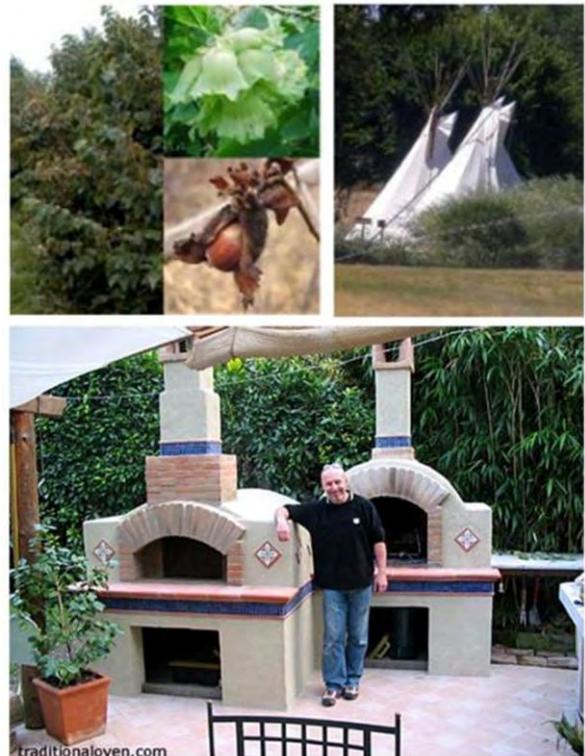


Photo 39: Concept Images of Group Camping/Gathering Area

Performance Area

The curved enclosure of the conifer plantation provides a unique performance setting. Gentle slopes to the southeast provide good seating with outstanding views of Vermillion Highlands.

Vision

The park is known for outdoor summer concerts and other productions in the performance area. Hundreds of people from around the region enjoy quality performances in a natural setting with locally produced wood-fired and solar-cooked food.

Photo 40: Concept Images of the Performance Area provides illustrative examples of this area.

Key Recommendations

Access and parking: A shuttle drop-off and bicycle parking are west of the performance area, connected to it by a natural surface walk through the conifers. Parking south of the stage serves 40 vehicles, in a location that balances universal access needs with the need to screen parking from the performance and seating areas. For large events, other parking areas could be used, with shuttle services to and from remote parking lots.

Performance structure: A distinctive and attractive covered stage, built from native materials, frames and enhances views of the park area. The structure provides storage, lighting, audio, and electricity.

Formal seating area: Porous paving area seats up to 300 people on benches or chairs and is fully accessible.

Informal seating area: Informal lawn seating serves small and large groups, using blankets and lawn chairs. Topography ensures proper water drainage and quality views of the performance area.

Support facilities: Provide a toilet area at the performance structure for performers and visitors. Additional toilets in the special group camping/gathering area are available as needed.



Photo 40: Concept Images of the Performance Area

SMALL CEREMONY SPACE AND LARGE PICNIC AREA

The small ceremony space and large picnic area are in the uplands of the Prime Recreation Area, overlooking the north arm of the lake (see *Figure 36: Concept Sketch of the Small Ceremony Space and Large Picnic Area*).

Small Ceremony Space

Ridgelines on the southwest edge of the Primary Recreation Area provide small ceremony spaces for special events like weddings, anniversaries, and other celebrations. Near the large picnic area and visitor center, the small ceremony space has access to kitchens, restrooms, and support facilities.

Vision

A small outdoor ceremony space is tucked away on a narrow, level ridgeline surrounded by trees. This unique setting, with natural architecture and landscape plantings, is one of the most scenic outdoor ceremony areas in the metropolitan area and is in high demand through the spring, summer, and fall, especially for weddings.

Photo 41: Concept Images of the Intimate Ceremony Area provides examples for this area.

Key Recommendations

Purpose: A beautiful setting hosts small weddings, anniversaries, baptisms, and family photographs.

Accommodations: Lawn area with a paver walk accommodates 30 to 50 people in an intimate setting.

Distinctive architecture: Beautiful, indigenous architecture enhances a unique sense of place, with a living arbor to frame ceremonies. A covered shelter built with indigenous materials offers an alternative location for ceremonies with food, dressing rooms, storage for seating, and toilet facilities. Electrical outlets and lighting are sensitively integrated with structures and the site.

Landscaping: Plantings form a backdrop with year-round displays of colors and textures.

Accessible site design: The site is universally accessible, with a paver walk and seating area.

Designed photo shoot areas: Integrated photo shoot areas with backdrops (bench, trellis, fountain).

Parking: Nearby parking serves 20 vehicles. More parking is available at the adjacent large picnic area.



Photo 41: Concept Images of Small Ceremony Space

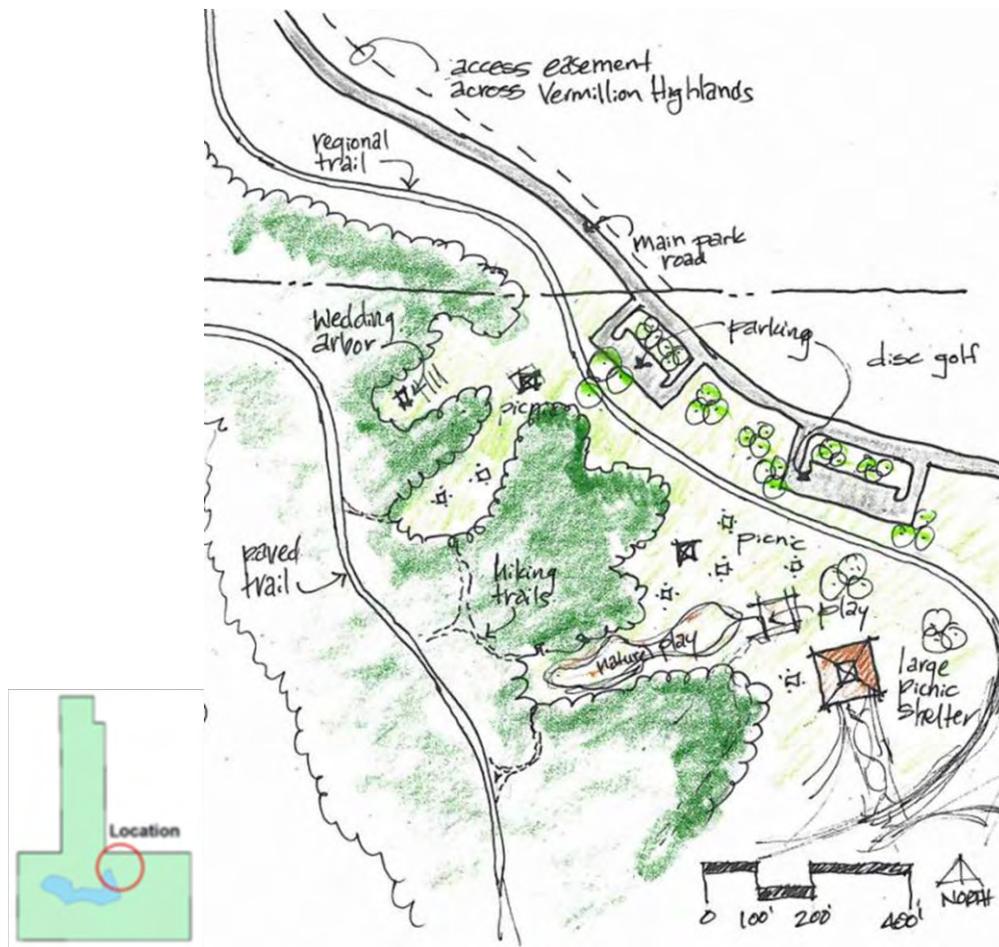


Figure 36: Concept Sketch of the Small Ceremony Space and Large Picnic Area

Large Picnic Area

The large picnic area accommodates large group events on a level upland area near the visitor center and the community commons.

Vision

Corporations, schools, congregations, and other large groups regularly host picnics in this area, which can easily accommodate 800 people. Covered shelters, open lawn areas, and nature play areas serve the area, which also is close to other fun activities in the park.

Photo 42: Concept Images of the Large Picnic Area provides illustrative examples of this area.

Key Recommendations

Purpose: This picnic area accommodates large group events, such as corporate picnics.

Picnic shelters: Site-sensitive picnic shelter accommodates 300 people, and integrates green building techniques, cooking facilities, and restrooms. Smaller shelters are nearby.

Lawn area: Low-maintenance lawn area dotted with shade trees provides picnicking for 500 people. Open lawn areas host informal lawn games.

Nature play: A variety of nature-play and water-play activities are found in the picnic shelter area, to offer experiences for different ages, abilities, and interests.

Photo 43: Concept Images of the Nature Play Area includes examples for this area.

Parking: Parking for 50 vehicles lies north of the shelter, with added parking at the community commons and visitor center.

Disc Golf Course

Disc golfing is in the northeast corner of the Primary Recreation Area (see *Figure 37: Concept Sketch of the Disc Golf Area*).

Vision

Visitors of all ages, especially youth, enjoy the disc golf course year-round. Restored with trees, shrubs, grasses, and forbs, the course is constantly evolving with new experience throughout the year. The course provides a fun and healthy outdoor activity, and sensitively integrates nature interpretation and art into the playing experience. Players can pick fruits and other wild edibles while playing the course.

Photo 44: Concept Images of the Disc Golf Area provides illustrative examples of the area.

Key Recommendations

Access and parking: Parking area serves 20 vehicles and connects to trails.

Picnic shelter: An attractive, site-sensitive picnic shelter serves 30 people.

Course layout: Based on design standards promoted by the Professional Disc Golf Association, with key design considerations:

- 9- to 12-hole, two-tee course, with one beginner tee and another moderately challenging tee. Allot one acre per hole, with beginner holes placed 200-250 feet



Photo 42: Concept Images of Large Picnic Area



Photo 43: Concept Images of the Nature Play Area

apart and the more challenging holes placed 250-500 feet apart. A good balance of holes requires controlled left, right, and straight throws. Fairways do not cross each other.

- Universal accessibility
- Safety of players and passersby
- Minimize damage to the natural environment (soil erosion, soil compaction, damage to vegetation)
- Integrate natural resource restoration into the function and quality of the disc golf area experience. Consider resource restoration and naturalization of perennial food crops as Phase 1, with course placement as Phase 2.



Photo 44: Concept Images of the Disc Golf Area

Landscaping and integrated food: This area has been cultivated for many years and lacks perennial vegetation. To provide a strong landscape buffer along Annette Avenue, native and perennial food trees and shrubs will be planted. Some naturalization will occur over time and exotic invasive plants will require management.

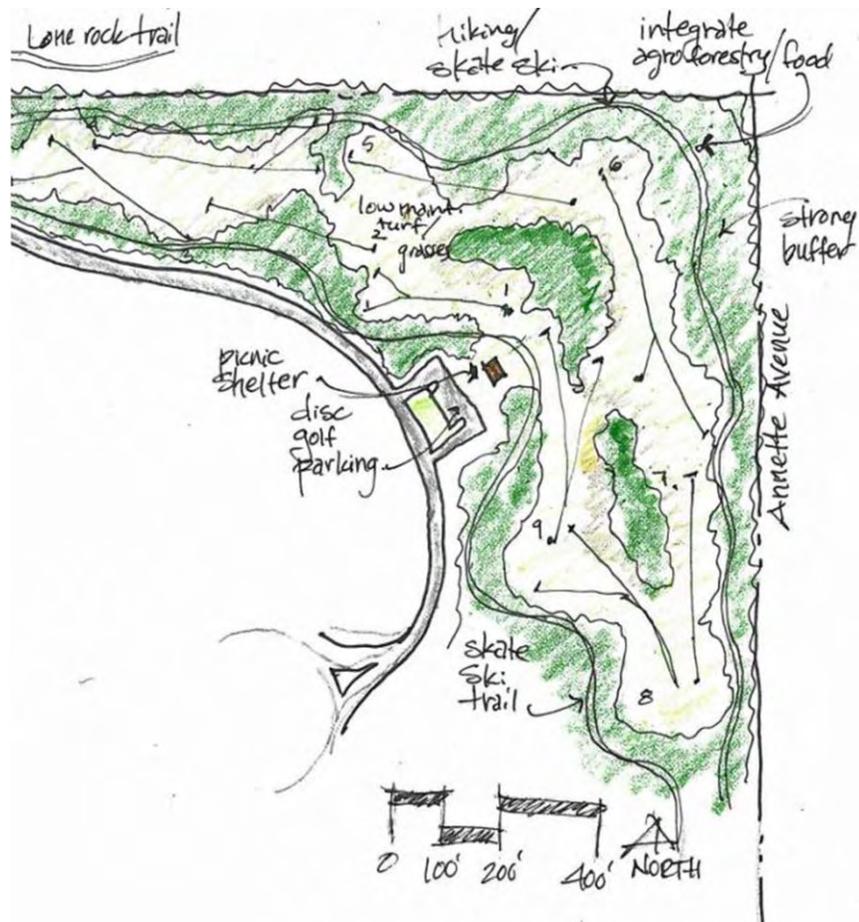


Figure 37: Concept Sketch of the Disc Golf Area

EAST CABINS-GARDENS-WATER PLAY-PICNIC AREA

Located on the east side of the Primary Recreation Area (see *Figure 38: Concept Sketch of the East Cabins/Maintenance and Gardens/Water Play/Picnic Area*).

East Cabins

Unique cabins are sited in uplands along Annette Avenue.

Vision

Wildlife enthusiasts, hunters, gardeners, researchers, weekend park visitors, and others enjoy stays in these unique year round cabins.

Photo 45: Concept Images of the East Cabins provides illustrative examples of this area.

Key Recommendations

Purpose: Year-round indigenous cabins, constructed with sod, bark, and straw bales, serve park visitors, researchers from Vermillion Highlands, hunters from adjacent Wildlife Management Areas, folk school students, and special groups. Cabins could host transitional housing/park work and training programs.

Clustered and secluded

cabins: Ten cabins, with a few clustered for family reunions and groups. Remaining cabins are separate for a more secluded feel.

Floor plans: Varied floor plans and amenities meet a variety of needs. Some cabins are “efficiency,” others have one or two bedrooms.

Amenities: All cabins have screened porches, insulation, heating and wireless service. Some cabins could have a compostable toilet.

Distinctive architecture: Cabin architecture provides a unique sense of place. Cabin construction could be straw bale, dugouts, sod, or bark.

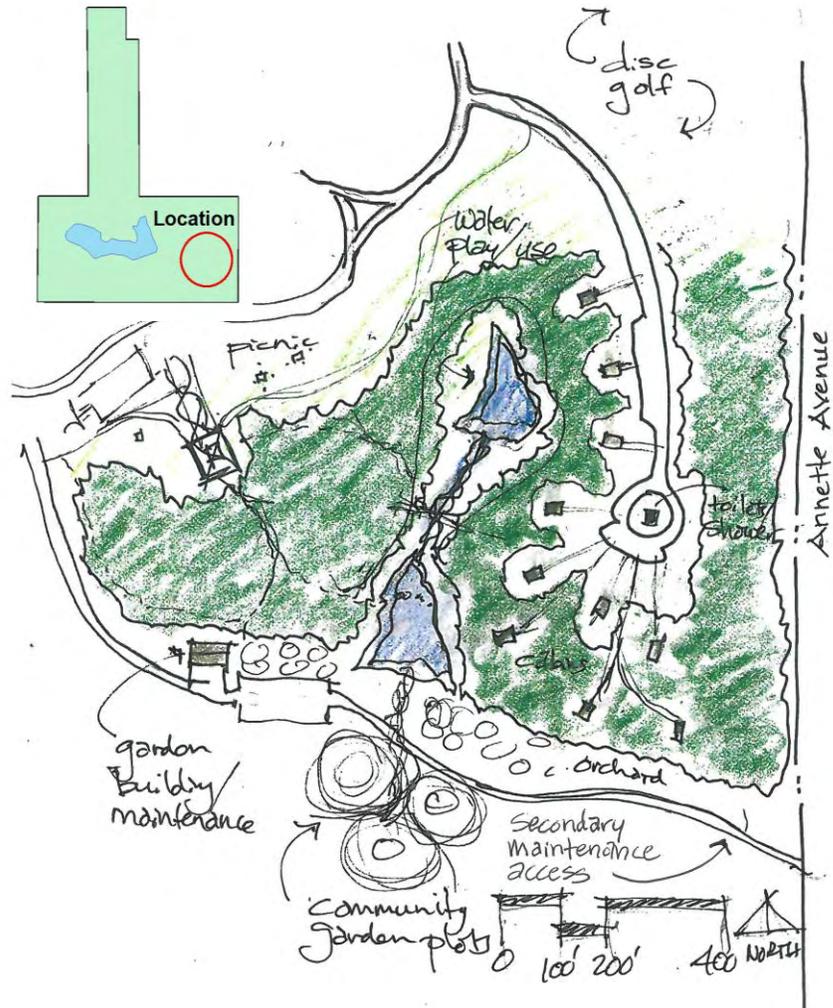


Figure 38: Concept Sketch of East Cabins-Gardens-Water Play-Picnic Area

Shared toilet and shower facility: Toilet and shower facilities are shared, centralized, and less than 300 feet from cabins. Features could include on-demand water heating and compostable toilets.

Play area and nature trails: Trails connect the cabin areas to nature- and water-play areas.

Parking area: Provide a roughly fifteen parking spaces total spread out to serve the cabins.

Vegetation: Plant trees, shrubs, and low maintenance turf, as this area has been cropped in recent years.

Fire hazard mitigation: Provide for fire mitigation.

Gardens and Maintenance Area

The park gardens and maintenance building are at the base of south facing slopes on the Primary Recreation Area east side.

Vision

The park's diverse community gardens provide an opportunity to address fundamental human needs. People can come together and learn about food production. Some of this space is rented to residents and the remainder serves park programs.

Photo 46: Concept Images of the Maintenance and Garden Area provides illustrative examples for this area.

Key Recommendations

Purpose: Diverse garden, orchard, and biomass areas provide food, learning opportunities, a sense of community, park building materials, and potentially energy. Some space may be leased to gardeners or farmers, with remaining space used in park programming. Partnerships will be sought with gardening groups such as the Dakota County Master Gardeners.

Water: Water captured and stored in water play areas can also serve the garden.

Types of gardens: Varied garden types could include annual and perennial crops, permaculture, square foot gardening, orchards, and multi-ethnic foods.

Maintenance area: A maintenance facility for garden and other park equipment, could architecturally relate to traditional agricultural buildings in the area. This facility



Photo 45: Concept Images of the East Cabins



Photo 46: Concept Images of Maintenance and Garden Area

could also serve needs of partner agencies at Vermillion Highlands. A compost area should be provided in this area.

Maintenance access and parking: Provide a gravel service access and parking 30 vehicles accessed from the park.

Water Play/Picnic Area

Vision

Natural ravines provide opportunities to capture and store water. Water is then sensitively integrated into fun water activities and eventually used for watering the nearby garden. The water play area provides an enjoyable and educational recreation activity for those using the adjacent picnic facilities. Similar water play activities are integrated throughout the park.

Photo 47: Concept Images of the Water Play Area provides illustrative examples of the area.

Key Recommendations

Theme: Water play areas throughout the park incorporate a variety of themes. This area uses a natural theme based on the water captured in the existing ravines.

Activities: Passive and active water play provides activities for a variety of ages and interests.

Safety: Carefully consider safety protocols when integrating play activities into the water features.

Water Budget: Evaluate the park’s water “budget” (quantity, quality, flows) in designing water play areas, to minimize reliance on pumping or new wells to support this feature.

COMMUNITY COMMONS-VISITOR CENTER AREA

The heart of the Primary Recreation Area overlooking the lake, the Commons and Visitor Center are the center of park activity.

See *Figure 39: Concept Sketch - Community Commons-Visitor Center Area.*



Photo 47: Concept Images of the Water Play Area



Photo 48: Concept Images of Community Commons



Figure 39: Concept Sketch of the Community Commons/Visitor Center Area

Community Commons

Vision

Like a campus quadrangle, the community commons provides a common meeting area where people gather for events, such as festivals, art fairs, environmental fairs, and concerts. The commons is located between two major picnic areas and the visitor center.

Photo 48: Concept Images of the Community Commons provides illustrative examples of the area.

Key Recommendations

Unify the area: The Commons provide a unified center of park activities.

Gathering/Performance Area: Semi-formal, for varied use:

- Large open area can host events and community festivals
- Informal low-maintenance lawn seating for 1,000 visitors
- Temporary stage that can be set up for major performances

- Safe, solar-lighted accessible walk with bench seating and art
- Varied low maintenance gardens

Nature-related art/celebration area: Semi-natural area for:

- Nature-themed public art
- Integrated nature play and water play features
- Native plantings and topographic changes
- Solar-lighted accessible trail around edge, inner nature trails
- Varied experiences interweave nature and culture

Visitor Center

At the south end of the commons overlooking the lake, this is the primary park building, designed to change and grow as needs change.

Vision

People enjoy visiting this destination building for many reasons. Architecturally, it is a living building that returns more to nature than it takes in, and the building and its uses grow and change over time. The building offers outstanding nature interpretation, offices, and banquet rooms, eventually it provides a restaurant that serves food from the park.

Photo 49: Concept Images of the Visitor Center provides illustrative examples for the area.

Key Recommendations

“Living Building:” A “living building” that regenerates energy, produces zero waste, and uses natural materials. Sited on a south facing slope with a walkout basement, the visitor center has south-southeast exposure for solar gain.

Expandable: Designed to be expanded, the visitor center can start small to meet primary needs. As visitation grows, expand space in a thoughtful, designed manner to serve additional needs.

Uses: Varied uses include visitor orientation, interpretation, classrooms/folk school, offices, local foods café, and banquet facilities.

Green roof café: A green roof café overlooks the water.



Photo 49: Concept Images of the Visitor Center

Integrated food production: Greenhouses, perennial and annual gardens, composting, chickens, honey bees, and similar uses are part of the building and its surroundings.

Constructed wetlands: Consider constructed wetlands to handle sanitary sewage.

Storm water: Capture, store, and use storm water for grey water, cistern water collection, and filtration.

Sliding hill: A gentle (20-25%) sliding hill lies to the west of the visitor center.

Water rental/warming house: An equipment rental/warming house sits the base of the sliding hill, and can store water equipment (kayaks, hip waders, and nets).

Accessible walks with integrated water features: Accessible walks connect the lake and visitor center. Walks weave back and forth to meet accessible grade standards. Side slopes integrate water play features.

Parking: A pervious parking area serves 120 vehicles and will develop in phases. Overflow parking is added as visitation grows.

Oak Knolls Area Outdoor Learning and Play Area

This area is near the lake spillway in the oak knolls. Structures are only placed clear of the spillway and outside the floodplain.

Vision

The learning and play area provides a venue for visitors (especially youth) to learn about the outdoors through day camps and special group overnight camps. The area can be accessed via kayaks from the water rental facility. Because this area cannot be accessed by cars, this area is a fun getaway.

Photo 50: Concept Images of the Oak Knolls Outdoor Learning and Play Area provides illustrative examples for this area.

Key Recommendations

Shelter/storage/toilet facilities: A shelter hosts day camp activities and picnicking and the facility includes toilets, drinking water, secure storage for equipment, learning supplies, and related materials.

Learning/challenge courses: A beginner learning-challenge course is open to all. A moderately difficult supervised challenge course could include a ropes course and zip line. Courses are carefully integrated into the natural setting, using existing trees and topography.

Outdoor classroom: An informal area where 30 people can gather to learn about natural systems. Seating may be



Photo 50: Concept Images of the Oak Knolls Outdoor Learning and Play Area

provided with tree trunks, stones, and split log benches.

Agro forestry: Incorporate wild edibles into outdoor learning by enhancing existing woods with native food-producing vegetation, in a manner consistent with ecological principles.

Temporary special group camping: Provide for temporary-only special camping, with portable and reusable facilities (such as teepees). Consider opportunities for visitors to construct temporary bio-degradable facilities like a lean-to or a straw bale structure.

Kayak/canoe landing: Provide a kayak/canoe landing for special outdoor learning camps and other special events. Park kayaks and canoes can be stored at the rental facility in the Primary Recreation Area.

Southwest and Northwest Overlooks

In the southwest corner of the Oak Knolls and the Northwest Overlook areas, these overlooks provide tremendous views in all directions.

Vision

Simple overlooks with outstanding views in all directions sit high upon the southwest prairie knoll and in the Northwest Overlook Area. These remote places offer quiet solitude where one can simply absorb and reflect on the beauty of the area.

Photo 51: Concept Images of the Overlook Areas provides illustrative examples for this area.

Key Recommendations

Access: An unobtrusive nature trail/ski trail gently winds its way to the overlook.

Overlook: Strategically placed seating promotes quiet reflection, with boulders and split log benches. Overhead structures can be provided if unobtrusive. All structures should enhance a reflective nature and not become the focal point of the area. Seating should accommodate six people at a time.

Art and nature interpretation: Sensitively integrate art and nature interpretation into overlooks, such as nature-oriented quotes, music accessible via a cell phone, and writings inscribed on stones, sculptures.

Vegetation: Enhance and maintain the open grassland/prairie quality of the knoll, so it is not overtaken by invasive trees and shrubs. Provide plantings that enhance the reflective nature of this area.



Photo 51: Concept Images of the Overlook Areas

TRAILS

A well-designed trail system is the backbone of a good park, and trails often are the primary interface between visitor and park. Trails do much more than link destination facilities, as they offer an ever-changing sequence of views and provide opportunities for interpretation, recreation, enhanced fitness, and larger understanding of a park as a collection of ecosystems and places.

Overarching Vision

Park trails are used year-round by people of all ages, interests, and abilities. Some visitors enjoy the more remote and physically challenging nature trails in the park for hiking and snowshoeing. Others enjoy the accessible paved, shared use trails for walking, biking, and inline skating. Still others enjoy cross country skiing in the winter.

Trails go beyond providing connections to significant park areas. They provide opportunities for natural and cultural interpretation; fitness activities, and gathering perennial food crops along the way. Looped trails with resting spots allow visitors to take short, medium, and long walks. The trails fit well with the natural environment and are molded to it, rather than thrust upon it.

Overarching Recommendations

Ecological considerations

- Design, construct, and maintain trails to work with natural systems (See *Photo 52: Example of an Ecologically Sensitive Trail*):
- Work with existing topography to minimize grading and erosion by constructing trails parallel to topographic contours.
- Minimize damage to existing vegetation - especially significant trees. Avoid soil compaction.
- Avoid placing trails in wetlands, floodplains, and other ecologically sensitive areas. Where crossing such areas is important, provide sensitive structures such as boardwalks or bridges.
- Avoid using materials that can damage the natural environment. If using asphalt paving, buffer sensitive areas like wetlands. Avoid sealants that adversely affect the natural environment.
- Provide safe and convenient opportunities for wildlife crossing, such as tunnels under trails to allow for turtle crossings.

Functional considerations

- Design trails to function for users and intended uses.
- Design trails according to accepted standards for proposed uses. Greenway and shared use paved trails should meet standards for universal accessibility, with appropriate grades, surfaces, widths, and resting spots.
- The Oak Knolls and Northwest Overlook areas do not have roads: trails may need to accommodate maintenance and emergency vehicles.
- Provide varied trail loop lengths to accommodate



Photo 52: Example of an Ecologically Sensitive Trail

users of all abilities and interests and provide resting spots in strategic locations.

- Where lighting is needed or desirable, consider solar lighting, where feasible. Shield lighting to maintain its functionality while minimizing light spillage to other areas.
- Integrate signage into all trails, including directional signage, trail rules, orientation maps, interpretive signage, and warning signs (e.g., wildlife crossings, trail crossings, short sight distance)
- Minimize road crossings and minimize ski and snowshoe trail crossings at paved trails.
- Natural surface hiking trails should use best practices for sustainable trail design to maintain their natural character and composition over time.

Experiential considerations

- Lay out trails to accentuate desirable views. Consider trail visibility from other areas of the park and avoid trail routes that disrupt significant views.
- Integrate natural and cultural interpretation into the trail system.
- Integrate opportunities for people to pick food, such as raspberries, while on the trail system. Provide interpretive signs and opportunities for seating.
- Integrate fitness information for those who want a physically challenging trail experience.
- Incorporate sense of place into trail design so each trail has associated unique experiences.
- Provide at least 50 feet separation between paved and natural surfaces trails.

Cost and maintenance considerations

- Balance long-term and short-term costs associated with construction and maintenance of trails.
- Develop a program to encourage trail users to engage in personal stewardship of the trails.

SPECIFIC TRAILS

The park will offer a variety of trails that support year-round use. In addition to park trails, Vermillion Highlands provides equestrian, hiking, and cross country ski trails, which can connect to the park's trail system. *Figure 33: Development Master Plan* shows a conceptual layout of proposed trails in the regional park, subject to refinement prior to implementation. A brief description of each type of trail follows.

Regional Greenway

The proposed regional greenway enters the park northern Gateway Area near Station Trail and exits the park in its far southwest corner, crossing the adjacent Wildlife Management Area and eventually connecting to the Vermillion River Greenway in Empire Township (See *Figure 40: Conceptual Layout of Greenway*). This greenway provides a critical link in the County Greenway System connecting Lebanon Hills Regional Park with the future UMore Park, the new regional park, and the Vermillion River Greenway.

Users: People of all ages and abilities, including walkers, joggers, bicyclists, in-line skaters, nature enthusiasts, families with baby strollers, and others will use the greenway. Design will allow for maintenance and emergency vehicle access in strategic locations. Snow will be cleared from the greenway during the winter months. Parts of the greenway may be lighted for night use.

Surface, width, and direction: The greenway will be 12 feet wide, asphalt, two-directional, with natural shoulders at a minimum width of two to three feet.

Gradients: Longitudinal gradients generally should not exceed three to five percent, which will accommodate most potential trail users, including in-line skaters and people in wheelchairs.

The greenway will traverse land with slopes of five to ten percent, but sensitive design in the existing topography can keep gradients to five percent or less. In special areas the greenway may have to exceed five percent for short distances. No part of the greenway should exceed 10 to 12 percent longitudinal slope. Trail design and construction will need to balance gradient minimization efforts with the need for extensive grading to produce desired gradients.

A two percent side slope can provide adequate trail surface drainage. Side slopes should neither exceed three percent nor fall below 1.5 percent.

General layout: In general, provide gentle, sweeping curves that relate to the topography. Consider design speed and sight distances. Avoid road crossings to the maximum extent possible and separate the greenway from the park road and wetlands to the maximum extent possible.

Shared Use Paved Trails

Shared use paved trails provide a loop around the lake and supplement the regional greenway. Shorter paved trails throughout other parts of the park provide universal access to significant areas.

Users: Primary users will be similar to those using the greenway. However, some paved trails will be more geared to pedestrians, rather than bicycles and inline skaters. The trails should also accommodate maintenance and emergency vehicles where needed. The County should clear snow from the trails during the winter months. Some trails may be lighted for night use.



Figure 40: Conceptual Layout of Greenway

Surface, width, and direction: Most of the shared use paved trails in the park will be 10 foot wide, asphalt, and two-way directional trails. Depending on where the trail leads, it the trail could be six-foot wide and be constructed of another paved material such as brick pavers or concrete.

Boardwalks

The park plan includes three boardwalks: the north and west lake arm boardwalks provide access to the Northwest Overlook Area and allow for a lake loop trail. An interpretive boardwalk below the dam provides visitors an up-close experience with the wetlands, relatively close to the Visitor Center.

Purpose: Boardwalks offer the means to experience park areas (the Northwest Overlook, a variety of wetlands) that would otherwise be inaccessible. *Photo 53: Concept Image of Boardwalk* provides an illustrative example.

Users: Lakeside boardwalks should accommodate walkers, joggers, bicyclists, in-line skaters, and maintenance and emergency vehicles. The wetland boardwalk below the dam will provide a wetland interpretive experience.

Surface, width, and direction: at least 10 to 12 feet wide, wood or composite decking, two-way directional shared use in the north and west arms of the lake. Provide six feet of width for the interpretive boardwalk below the lake dam. Boardwalks must be wide enough to accommodate ski trail grooming equipment.

Design features: Design recommendations and considerations for the boardwalk include:

- Consider placing handrails on one or both sides of the boardwalk. Balance costs, safety, and appearance issues. Provide wheel guards at the edges of the boardwalk.
- Evaluate low level LED lighting along the boardwalk.
- Provide bump out areas for seating, group talks, and interpretive activities in strategic locations.
- The Dam is too narrow to accommodate side-by-side ski and paved trails. Explore options to serve both uses in the Dam area, such as seasonally directing one use to the boardwalk south of the dam.



Figure 41: Conceptual Layout of Boardwalks

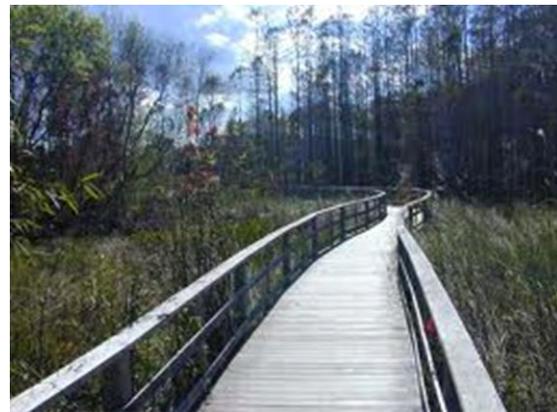


Photo 53: Concept Image of Boardwalk

Classic Cross Country Ski/Natural Surface Hiking Trails

Classic cross country ski trails are planned throughout the park and should connect to the Lone Rock Trail, which is also groomed for classic cross country skiing. Ski trails should be 8-10 feet wide and allow for two tracks in one or two directions. Ski trails may be lighted for night use. During the summer months, ski trails will be used for hiking. The average trail grade is 10 percent, which makes the trail an easy to intermediate ski trail.

Skate Ski/Natural Surface Hiking Trail

The proposed dedicated skate ski trail is 14-16 feet wide. Where the skate ski trail is combined with classic cross country skiing, the trail should be 16-20 feet wide. Skate ski trails are located in the southeast part of the park. During the summer, skate ski trails will be used for hiking. In 2011, there were no skate ski trails in Vermillion Highlands. If demand warrants additional skate ski trails, the County should coordinate with the MDNR and the UM to explore skate ski trails on Vermillion Highlands.

Beginner Ski/Natural Surface Hiking Trail

The Beginner Classic Cross Country Ski Trail is located near the Visitor Center, and is relatively level, will have lighting for evening use, and offers a short loop option. In summer, the trail will provide for hiking.

Snowshoe/Natural Surface Hiking Trail

Snowshoers can use dedicated snowshoe trails or travel cross country. Dedicated snowshoe trails are located primarily in the Oak Knolls Area and serve as hiking trails during the summer months. The trails are roughly 2-6 feet wide and can cover a variety of terrains from relatively level to relatively steep.

COLLABORATIVE RECREATION OPPORTUNITIES

Lone Rock Trail (on Vermillion Highlands)

This natural trail provides more than ten miles for equestrian use, hiking, and winter classic cross country skiing. Refer to the regional context chapter of this plan and the Vermillion Highlands Concept Master Plan for more information.

Vermillion River Use Areas

Dakota County and the MDNR discussed potential opportunities for park visitors to access the Vermillion River, which is relatively close to the park, but not adjacent. Two areas within the Vermillion River Aquatic and Wildlife Management areas have been proposed.

Primitive Hiking Trail and River Use Area: a 6-foot wide mowed trail heading straight south from the corner of Annette and 190th to the Vermillion River. A bench could be erected at this point to offer a resting and reflection point. This would entail the future purchase of private property. (See “A” on *Figure 42: River Use Areas*).

Drive-to River Use Area: on the south side of the Vermillion River, off of Co. Rd. 66, from the existing parking lot to the river. The gate from the lot to the river would be allowed to remain open from Memorial Day Through August 31st. It may be able to open sooner than Memorial Day depending on the spring conditions, but would need to close by September 1st when Dove season opens. This drive would be single-lane gravel with room for five or six vehicles to park at the end. An open pavilion style building

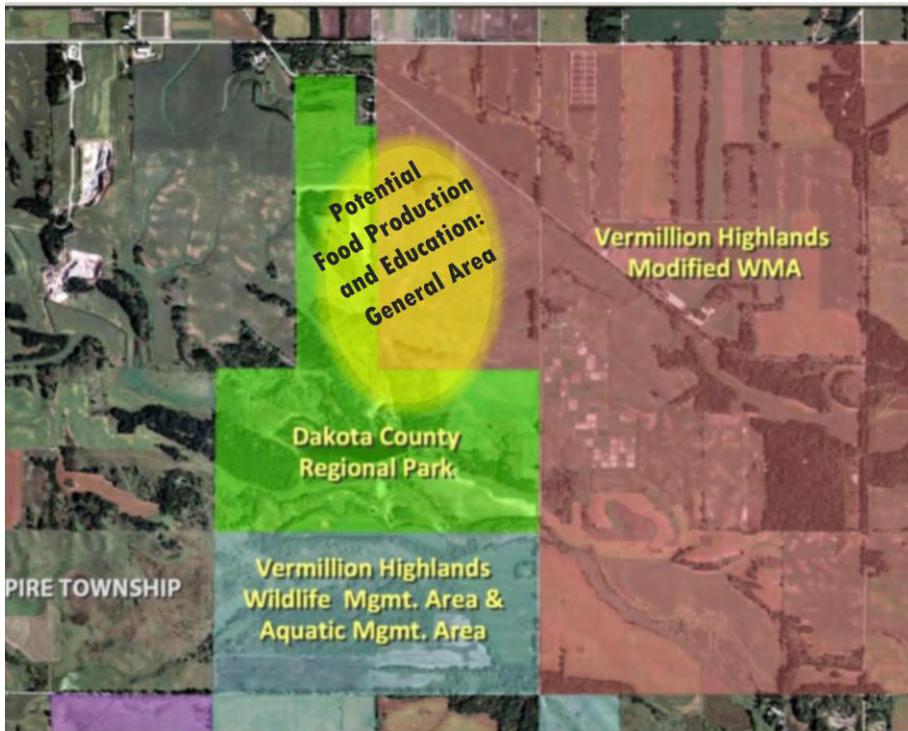


Figure 43: General Area for Collaborative Food Production and Education

Plot ideas:

- Community gardens, with emphasis on multicultural gardens
- Orchards, vineyards and fruit
- Agronomic crops
- High tunnels for extending the growing season
- Permaculture, or perennial horticulture
- Chemo-preventive crops with nutritional compounds demonstrated to prevent specific diseases
- Native and historic crops
- Livestock for dairy and fibers

Discussion will continue with partners from the University of Minnesota, Dakota County, and other organizations.

Chapter 9: PUBLIC SERVICES

This chapter provides an overview of the park's vehicular circulation system, sewer, water, and energy.

VEHICULAR CIRCULATION SYSTEM

Main Access and Park Road

Perhaps no issues affected the layout of the Development Master Plan more than access and roads. As discussed in *Chapter 2: Regional Context*, the County, in consultation with the UM, the MDNR, and Empire Township explored several access alternatives. Ultimately, the County, in consultation with its planning partners, decided on a primary access road off Station Trail at the park's northwest corner. The proposed road runs on a northwest to southeast diagonal with a small segment of road having to cross Vermillion Highlands to avoid existing wetlands in the park.

Vision

Like a stream winding its way through a valley, the Park Road gently and unobtrusively winds its way from Station Trail to the primary recreation area in the southern part of the park. Along the route, visitors experience a variety of views and interpretive features such that the road actually helps strengthen the visitor's experience, while minimizing its impact on the natural environment. Over time, the road has shifted from carrying primarily fossil fuel automobiles to carrying shuttles and other alternative modes of transportation.

Recommendations

The following provides a general list of recommendations for the main park road. Refer to *Figure 44: Conceptual Layout of the Main Park Road*, for additional information.

General layout and design criteria: Design and build roads to be safe, functional, economical, and environmentally sensitive.

- Assume a design speed of 20-25 miles per hour.
- Design and build the road according to low impact development (LID) principles. Provide the minimum safe and functional width: consider 22 feet for two-way traffic and 14-feet for one-way traffic. Provide areas for vehicles to move to the side when needed.
- Consider initially constructing the park road as a gravel road. Once road use reaches a level that becomes challenging for maintenance, consider paving the road with a hard durable surface, like asphalt.



Figure 44: Conceptual Layout of the Main Park Road

- Sensitively handle runoff from the road. In general, avoid curbs and manage runoff near the source.
- Minimize disturbance to the natural environment. Generally follow topographic contours to reduce grading, erosion, and disturbance to existing vegetation. Avoid disturbing sensitive natural environments, especially wetlands.
- To the extent possible, lay out the road to provide good views from the road, while minimizing views of the road from elsewhere in the park.
- Provide buffers and screening as needed, particularly where the park road parallels the park's west property line in the Gateway Recreation Area.



Photo 54: Turtle Crossing Signage

Easement across Vermillion Highlands: Work with the UM, in coordination with the MDNR and Empire Township, to obtain an access drive and trail easement across a small portion of the southwest corner of Vermillion Highlands. The layout of the main park road and, ultimately, the layout of the park depend on acquisition of the easement. Consequently, obtaining this easement is a high priority.

As discussed in *Chapter 2: Regional Context*, the UM has identified contamination on Vermillion Highlands that will likely need to be addressed. Dakota County and the UM should continue to discuss how contamination and cleanup issues may affect development of the main park road.

Wildlife crossings: Roads have the potential to disrupt wildlife movement, particularly slower moving wildlife such as turtles, snakes, and other reptiles and amphibians. Likewise, wildlife (deer in particular) can present a hazard to drivers. Consequently, where appropriate, provide wildlife crossings features, including culverts or tunnels for turtle crossings, signage, and the like to minimize conflicts between vehicles and wildlife (see *Photo 54: Turtle Crossing Signage*). Work with the MDNR on wildlife crossing issues.

Trail crossings: The proposed park road bisects the park, so it is inevitable that trails will cross the road. However, strive to minimize at-grade trail crossings. Where at-grade crossings cannot be avoided, provide crossing features, including pavement changes, signage, and the like (see *Photo 9-B: Example of Envisioned Trail Crossing*). Explore potential opportunities for grade separated crossings of major trails.



Photo 55: Example of Trail Crossing

Secondary Maintenance Access

Annette Avenue Access

The proposed maintenance road generally follows the existing internal farm road that runs from Annette Avenue to the dam in the Primary Recreation Area of the park. Although all park visitors and most park staff will enter and exit the park via the main entrance off Station Trail, the proposed maintenance road serves several important purposes:

1. **Maintenance vehicle access:** The proposed access provides for occasional maintenance vehicle use to avoid conflicts with public use of the main park road.
2. **Emergency access:** The proposed maintenance access provides an alternative to the park in the event of an emergency. Without the proposed maintenance access, the park would have a 1.5 mile long dead-end road, which could be problematic if the road were to become blocked.

Vision

The maintenance access is a lightly traveled unobtrusive narrow road that generally follows an old farm road that runs from Annette Avenue to the dam. It provides access for Park Maintenance and also serves as a road for emergency vehicles.

Recommendations

The following provides a general list of recommendations for the maintenance road. Refer to *Figure 45: Concept Layout of Maintenance Access*, for additional information.

General layout and design criteria:

- Layout the maintenance access to generally follow the old farm road that runs from Annette Avenue to the dam to connect the park.
- Design the road in accordance with low impact development principles. Consider constructing a 12 to 14-foot wide gravel access. This maintenance access may look very similar to a gravel trail. In conjunction with the paving of the main park road, consider paving that section of the maintenance road that runs from the visitor center to the maintenance facilities and then be gravel from the maintenance facility to Annette Avenue.
- Where the road must traverse steeper grades near the visitor center, consider paving that portion of the road with a hard durable surface



Figure 45: Concept Layout of Maintenance Access

that will not be subject to erosion.

- Sensitively handle runoff from the road. In general, avoid curbs and manage runoff near the source.

Controlled access: Provide a gate at the Annette Avenue entrance. The gate will control access to Annette Avenue from the park, and will remain locked at all times. No public access will be allowed from the controlled access.

West Access

The area west of the regional park will likely not develop until after the year 2040 (see *Chapter 2: Regional Context*). However, once this area develops, it may be possible to provide a secondary access in the general area shown in *Figure 45: Concept Layout of Maintenance Access*. The County, Empire Township, and the adjacent landowner should coordinate on this issue as appropriate.

Parking

A variety of vehicles (automobiles, buses, bicycles, etc.) will access the park and all will need a convenient and functional place to park, if only for a short while. However, providing adequate and convenient parking must be balanced with the costs and environmental impacts of parking. Furthermore, parking needs will change considerably over time as visitors increase and the types of vehicles accessing the park change. The goal is to provide the right amount of parking in the right locations.

Vision

The park has the right amount of parking in the right locations. Rather than providing massive parking lots that are rarely full, the park has just enough parking lots to accommodate average weekend park use. During times of peak usage, overflow parking occurs on widened shoulders of the park road and on mowed grasslands in designated overflow parking areas. Parking has low impact on the natural and visual environments.

Over the years, as the types of vehicles change, the parking facilities in the park also change. Electric vehicle charging stations with photovoltaic panels are integrated into the parking lots. Additional bicycle parking is integrated throughout the park. Eventually, as residential development occurs to the north and west of the park, more people begin to access the park on foot, by bicycle, or mass transit. This has allowed some of the original parking areas to be returned to nature.

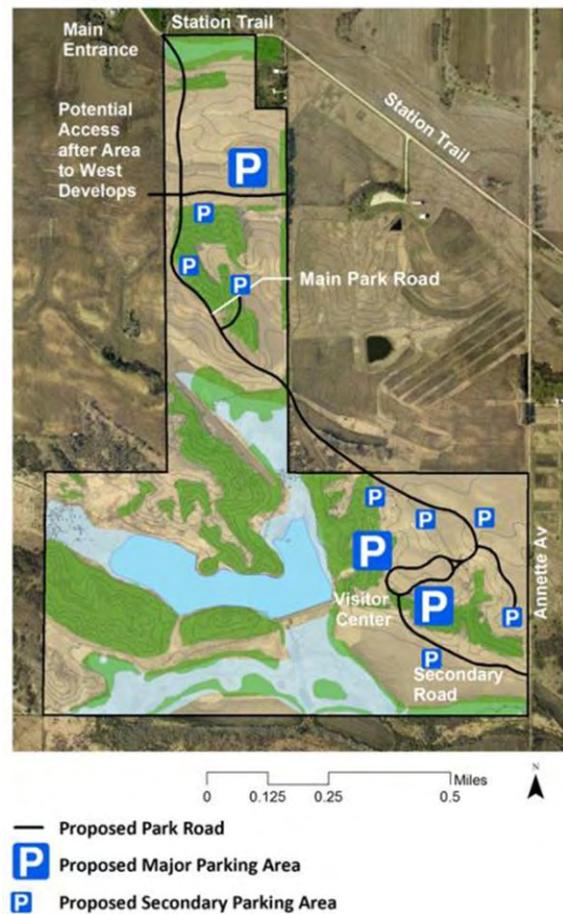


Figure 46: Concept of General Parking Areas

Recommendations

The following provides a general list of recommendations for parking. Refer to *Figure 46: Conceptual Layout of General Parking Areas*, for additional information.

Parking and drop off locations: Provide parking and drop offs in convenient locations related to the various uses in the park.

Parking design: Design and construct the parking areas in accordance with low impact development (LID) principles. Consider providing porous pavement with adjacent infiltration areas. Provide landscaping at the edge and interiors of parking areas to shade parking areas, reduce runoff, and visually break up large expanses of parking. See *Photo 56: Example of Low Impact Development Parking Lot* for an example of what the parking at this regional park could look like.

Amount of automobile parking: Provide a minimal amount of dedicated parking spaces during the early development years of the park. As park usage grows, explore options to expand the parking areas or implement alternatives to reduce the need for additional parking. In short, balance the need to provide adequate, convenient, and functional parking with the environmental and monetary costs of constructing parking lots. Note that the parking shown in *Figure 46: Concept of General Parking Areas* assumes the park is fully developed and has a high level of visitation.

Overflow parking: Provide mowed grassy areas near dedicated parking lots for overflow parking. Also explore opportunities to provide overflow parking to the sides of the park roads. If additional parking is needed for a special event in one area of the park, consider providing shuttles from lesser used parking lots within park to the special event area.

Off-site parking: For large events, like concerts, art festivals, and the like, consider arranging for off-site parking with a shuttle to the event. Once UMore Park is developed, there will likely be opportunities to use school or congregation parking lots.

Electric vehicle charging stations: The percentage of electric vehicle use is expected to rise considerably in the future. Consequently, explore opportunities to provide electric vehicle charging stations in strategic parking areas throughout the park. As demand increases, increase the number of charging stations. Where appropriate, consider providing photo voltaic solar panels to offset the electricity used in the charging process (see *Photo 57: Example of*



Photo 56: Example of Low Impact Development Parking Lot



Photo 57: Example of Electric Vehicle Charging Station with Photo Voltaic Solar Panels

Electric Vehicle Charging Station with Photo Voltaic Solar Panels).

Bicycle parking: Sensitively and artistically integrate bicycle parking into all use areas. See *Photo 9-E: Example of Creative Bicycle Parking* for an example of the type of bicycle parking that could be integrated into this regional park.



Photo 58: Example of Creative Bicycle Parking

Transit, Shuttles, and Alternative Transportation

In the early years of the park, mass transit drop offs, shuttles, and alternative modes of transportation will not be as important as they will likely be decades from now. Consequently, this Plan does discuss these features in detail. However, when the County moves into the design development phase of parking lots and roads, the County should consider installing the necessary infrastructure for electric charging stations and similar future features.

SEWER AND WATER

The regional park is outside the Metropolitan Urban Service Area (MUSA). Therefore, the park is not expected to be supplied with public sewer and water until at least 2030 or beyond. More realistically, the park will never be served with sanitary sewer and water. Consequently, the site will need to use onsite services.

For water, the park can drill wells and potentially capture, filter, store and use storm water. For sanitary sewer, the park could use conventional septic systems or perhaps explore the possibility of using constructed wetlands. Alternatively, the park could explore the use of compostable toilets. Storm water runoff should be handled onsite using low impact development techniques.

ENERGY

Electrical service can likely be extended to the park from the area near the existing radio communications tower and from the area along Station Trail. However, to the extent possible, this Plan recommends that the park use renewable energy to the greatest extent possible. This means designing energy efficient buildings and integrating renewable sources such as photovoltaic and thermal solar, wind energy, and geothermal energy.

SOLID WASTE

The park should strive to be as close to a “zero waste” park as feasibly possible. This means organic waste should be composted on site and the compost returned to the site. Bottles, cans, and like should be hauled away by an approved recycler for recycling. Some “waste” materials could potentially be re-used for art exhibits on the site.

The County should develop an awareness and understanding campaign to encourage proper “disposal” of “waste”. All “waste” and recycled material disposal shall be consistent with all applicable laws.

DAM

Dakota County has evaluated the structural integrity of the dam at the lake and has found it to be sound. An engineering evaluation conducted in 2011, included specific recommendations on managing the dam:

1. A hydrologic study for the Butler Pond area is not necessary, because hydrologic models for the Vermillion River and its tributaries are available.
2. The hydraulic model results and inundation maps presented by the recent County-wide FIS can be used for County Park planning purposes for the area.
3. Elevations along the Butler Pond dam crest and emergency channel control section should be surveyed for accurate evaluation of discharge capacity and maintenance needs.
4. A study of dam stability and structural improvement need should be conducted.
5. A maintenance plan should be developed including erosion prevention, tree removal on the upstream slope of the dam and on the emergency spillway channel, and surveillance and monitoring of erosion and seepage in dam structure.

CHAPTER 10:

NATURAL AND CULTURAL RESOURCES STEWARDSHIP

Chapter 3: *Natural Resources* and Chapter 4: *Cultural Resources* provide a detailed analysis of the natural and cultural resources associated with the site. This chapter provides a general overview of stewardship approaches for these resources.

Natural Resources - General Approach

Three management approaches will generally be applied throughout the park in targeted areas, including 1) restoration, 2) protection, and 3) production.

Restoration Areas

Restoration can improve ecological quality by establishing desired plant cover in an area, to 1) provide habitat for desired wildlife species, 2) remove or control non-native or invasive plant species, and/or 3) introduce or re-introduce resilient plant species that are best adapted to site conditions, typically native plants.

Because this park currently is undeveloped, restoration opportunities exist that can prepare sites for eventual public use. Prairie restoration is suggested for these park areas:

Ridgelines in West Overlook Area: control woody, exotic, invasive vegetation and maintain open prairie-grassland qualities. This area will remain an undeveloped scenic overlook. Enhanced natural cover and expansive views will comprise its primary attraction and visitor use.

Southwest Knoll: control woody, exotic, and invasive vegetation at and around southwest knoll, and maintain its open prairie/grassland qualities. This area also will remain an undeveloped scenic overlook. Enhanced natural cover expansive views will comprise its primary attraction and visitor use.

Cultivated Area East of Gateway Pine Plantation: establish and maintain prairie /native grasses in the cultivated valley area east of the pine plantation camping and performance area, as a scenic backdrop.



Figure 47: Restoration Areas



Protection and Maintenance Areas

Protecting and maintaining existing habitats is appropriate in:

1. Several park areas where communities are of a high quality
2. Impacted communities where complete restoration would prove challenging, excessively costly, less likely to succeed, or would require many decades to realize the benefits.

At a minimum, protection and maintenance relies on regular monitoring of plant community health. More aggressive efforts include control and management of invasive non-native plants to slow their spread. Protective improvements can be made to several wooded and wetland communities, as follows:

Protect and maintain existing wetlands: The park core wetlands are of good quality and should be monitored to control any new exotic and invasive vegetation before they become established. A fish inventory and potential measures to enhance water quality by controlling fish population is recommended.

Improve Composition of Conifer Plantations: Natural regeneration is occurring in some areas, but since they are not adapted to site conditions, selected grooming should remove undesirable trees and promote protection, growth and regeneration of tree species that fit with the future use.

- Thin/harvest plantations to stimulate growth of remaining trees and improve health and yields. Selective thinning should redistribute growth potential to trees/species of the highest quality and suitability. Protect desired trees from wildlife and logging damage before removing any large trees. Avoid damage to trees; any with large wounds should be removed.
- Plant and manage future canopy species and consider understory - acidic shade is ideal for native serviceberries, which have food value.
- Forest Resource Use Plan: Set out long-term objectives for wood harvest and onsite timber use.

Interim Woodland Management: Critical, lower-cost actions are recommended for the long-term health of Oak-Woodlands and to accelerate succession of recently fallow shrub/woodlands. Invasive species (buckthorn, earthworms) in the Oak Knolls are reducing this community's regenerative potential, by reducing diversity in tree species and creating an age gap in future canopy. Other park woodlands are in earlier successional states, and include less desired species (box elder and slippery elm).



Figure 48: Protection and Maintenance Areas



- Plant and manage saplings of desired species today to improve forest health within the park. It may be necessary to periodically kill mature buckthorn plants to promote healthy growth of desired species and minimize buckthorn seed dispersal.
- Consider managing woodland areas with medicinal herb plots, in public/private partnership. Private plot managers could clear invasive understory and manage soils in exchange for access to establish plots for local harvest
- Explore the possibility of receiving offset credits for carbon sequestration through increasing biomass stock.

Production Areas

Parts of the park have been cultivated in the past and offer good opportunities for well-designed food, fiber, and energy plantings. These areas can inspire visitors, evoke the area’s agricultural tradition, showcase a broad variety of food production modes, engage volunteers, build community, and contribute to a unique sense of place in the park. Several of these food production areas should connect to the collaborative food production area (“Agboretum”) discussed on Vermillion Highlands.

Park gateway entrance and trailhead: orchards with a variety of fruit and nut plantings are an important part of the visitor’s arrival sequence in the park.

Disc golf course: because this area has been in cultivation recently, establishing a mix of trees and shrubs will buffer hunting activity to the west and build the setting the golf course. The tree-shrub mix could include fruit and nut varieties, and maples or syruping.

Lower terrace below primary recreation area:

Proposed as park production gardens that could supply a park café, and growing biomass (such as oilseed crops like sunflower to produce biodiesel) or construction materials for the park and park community gardens. As master plan implementation proceeds, evaluate alternative locations in the upland area for public community gardens.

Other Production Area suggestions include:

- Wild Food programming or an interpretive trail to guide visitors in “foraging” while learning about native foods
- Space and programming on food preservation, canning, brewing, winemaking
- Compost facilities to convert yard waste into healthy soil and selling soil



Figure 49: Production Areas



Additional Recommendations

Soil Resource Stewardship

Park soils are **non-hydric** (mostly upland) and **hydric** (mostly, but not always in wetlands). An assessment of non-hydric soils is suggested, to characterize organic matter, minerals, and toxins. Soil stewardship recommendations should be included as part of the assessment, to help restore nutrients and organic matter reserves, and re-structure soils to optimal conditions. The soils assessment and stewardship recommendations should be incorporated into vegetation management decisions.

Temporary Cover Options for Cultivated Land

As of 2011, 130 acres of park land were leased out to area farmers to grow corn, soybeans, and wheat. Until labor and resources are allocated to restore a specific cropland area to a preferred natural community and maintain it, keeping the land in crop production can prevent establishment of undesired invasive species. Revenue from leasing can also be dedicated to future restoration and maintenance efforts. Additional opportunities related to cultivated land leasing follow:

- Evaluate current cropped areas and identify sites where natural succession could occur with few maintenance inputs. Sites may include areas with hydric soils or suitable seed banks for regeneration. Consider softening and varying linear edges between the cropped fields and natural communities.
- Consider pesticide restrictions in lease agreements
- Consider hay cropping and mowing regimes that support ground-nesting birds
- Consider perennial prairie grasses for biomass production, but avoid hybrid poplar
- Leasing to native plant seed growers, which can reduce park restoration costs and help direct the nature of successional changes
- Partner with others, such as Minnesota Food Association, on opportunities for Immigrant Farmer Training Program graduates while they are seeking permanent lands to establish farms.

Active and Passive Water Harvesting

Managing water for food production can use a variety of techniques, which additionally have interpretive potential as part of the park's food production theme. Passive techniques that infiltrate or direct water generally rely on landforms, such as raingardens, to mimic pre-settlement hydrology. Active methods for harvesting water can include structures, such as cisterns that capture stormwater runoff, and practices, such as recycling grey water.

As park facilities are developed, integrated planning for stormwater management is recommended, so infiltration and ponding areas are functional at time of construction.

Management/Use of Wetlands and Lake

The lake (open water part of the wetland) plays an ecologically important role as habitat for migratory waterfowl. If migrating waterfowl are the prime ecological focus for the lake, fish removal is advised. Fish species found in the lake include bottom-feeding species, which disturb lakebed sediments and contribute to water turbidity. Alternatively, if fishing is a desired activity in the park, promotion of desired fish species that can overwinter can be emphasized.

Moist Soil Management: Wetland management opportunities include partnership with the MDNR on managing seasonal water levels in the wetland complex south of the lake. MDNR has established moist soil management practices just south of the park, in which water flow through existing drainage structures is controlled to maintain shallow water at the surface. Moist soil management areas provide wildlife food resources that improve the condition of waterbirds for migration and reproduction and can improve waterfowl hunting opportunities during the fall.

Moist-soil management simulates a seasonal wetland by adding and removing water, often through managing drainage ditch flows, in a systematic way to maximize food production for waterfowl and shorebirds. An area managed for “moist soil” is typically flooded in the spring and then maintained moist during the growing season to target the summer production of annual wetland plants that produce large amounts of seed. The unit must be dry enough to till and plant if crops are planted in lieu of natural seed production. When re-flooded in late summer or early fall, the decomposing plants also provide ideal habitat for aquatic invertebrates, an important source of duck and shorebird nutrition. These benefits can carry over to the next spring until the water is again drained off.

Seasonal restrictions on kayaking or lake surface use could be applied to portions of the lake to minimize disturbance during water fowl breeding and nesting period.

Cultural Resources – General Approach

Because areas with archaeological potential also are very likely to invite public recreational use, archaeological field survey work should be integrated into the more detailed planning and design development phases associated with the development of this park. In addition, construction activities (especially in the areas that have potential archaeological resources) should be sensitive to finding and protecting archaeological resources.

Legislative Requirements

Several federal laws govern the treatment of historic, archaeological, and cultural resources, although the most relevant, if federal funds or permits are involved, is the National Historic Preservation Act of 1966. In addition, three state laws related to cultural resource protection may pertain to the park.

National Historic Preservation Act of 1966, Section 106: Requires Federal agencies to account for the effects of activities on historic properties and afford the Advisory Council on Historic Preservation opportunity for comment. The State Historic Preservation Office acts on behalf of the Advisory Council. The Section 106 process addresses historic preservation concerns through consultation among the agency officials and other interested parties, beginning early in project planning. Goals include identification of potentially affected historic properties; evaluation of project impacts; and developing measures to avoid, minimize, or mitigate adverse effects.

Minnesota Historic Sites Act (M.S. 138.661 – 138.6691), 1965: created a state register of properties “possessing historical, architectural, archaeological, and aesthetic values” and outlines a consultation process for projects that will affect historic sites.

Minnesota Field Archaeology Act (M.S. 138.31 – 138.42), 1963: A “state archaeological site” is any publicly owned or leased land or water area that contains material of archaeological interest. When a state archaeological site is known or suspected to exist, the controlling agency must submit development plans to Minnesota Historical Society (MHS) and Office of the State Archaeologist (OSA) for review and consult with these agencies on preserving such sites. If a site is related to American Indian history or religion, OSA must coordinate with the Minnesota Indian Affairs Council for review and comment.

Minnesota Private Cemeteries Act, 1975: provides protection for marked and unmarked human burials and remains. It is a crime to knowingly destroy or remove human skeletal remains or burials. The Act directs the state archaeologist to authenticate all burial sites and retain a professional archaeologist to authenticate burials on public lands or waters when requested by a scientific or Indian group. Only burials older than 50 years are covered by this Act. When human remains or burials are Indian, the State Archaeologist and the Minnesota Indian Affairs Council (MIAC) must attempt to identify their tribal identity: if on public lands, the political subdivision controlling the land must submit development plans to the state archaeologist and the MIAC for review prior to advertising bids.

RECOMMENDATIONS

Conduct archaeological field reconnaissance along with excavation activity: If construction activity involves excavation in areas identified as having high potential for archaeological sites, archaeological field reconnaissance should accompany the activity. If archaeological remnants are discovered, appropriate steps to document, protect and prevent looting of the remnants should be taken.

Identify and document archaeological sites: For those portions of Whitetail Woods Regional Park considered to have higher archaeological potential, consideration should be given to identifying archaeological site locations. If ground-disturbing activities within the areas of high archaeological potential are planned, efforts should be made to identify any archaeological resource within the areas of impact.

Incorporate interpretive themes into education programming: The cultural research documented in Chapter Four identifies several interesting historical aspects that could provide potential interpretive themes for programming.

CHAPTER 11: PARK BOUNDARY AND ACQUISITION

The Metropolitan Council's 2030 Regional Parks Policy Plan indicates that the agency's two priorities for acquiring land for regional parks and park reserves include:

1. Lands essential to protect the natural resources that define a park or park reserve and make it usable to the public as planned; and
2. Lands that are essential for the park or park reserve to reach its full regional natural resource based recreation service potential as defined by the Metropolitan Council.

The existing acreage of the regional park does a good job of protecting the park's natural resources and allows management of ecological systems as required to upgrade the quality of those resources. Most of the lands to the east and south of the park are already well protected as they are part of the Vermillion Highlands complex, which includes a modified wildlife management area, wildlife management areas, and aquatic management areas. This leaves only two areas that the County could consider acquiring for future park expansion:

1. The County could consider acquisition of a portion of the existing agricultural parcel along the west boundary of the park; and
2. The County could consider acquisition of the five-acre residential property near the northeast corner of the regional park.

The following section provides an overview of these two areas. However, the Development Master Plan does not, at this time, identify acquisition of these properties. If, in the future, the County decides to acquire these properties, or a portion of these properties, it will amend this Development Master Plan and the park's boundaries to show the future acquisitions.

Acquisition Study Areas

Although the existing boundaries of the park are sufficient for the park to properly function as a regional park, *Figure 50: Potential Land Acquisition* identifies the two areas that the County could consider for potential acquisition. The following provides an overview of each area.

Agricultural and Open Space Property to the West of the Park

Most of the parcel adjacent to the west boundary of the regional park is in agricultural production and does not contain significant natural resources. However, a small portion of the property, which is located to the northwest of the regional park's Northwest Overlook Area, does appear to have natural resources that are worthy of protection and, therefore, potentially worthy of inclusion in the regional park.

A potential reason for the County to consider acquiring part of the property to the west is to increase the width of the relatively narrow stovepipe part of the park referred to as the Gateway Recreation Area. The property to the west could potentially be mined at some future date for its sand and gravel resources. If the County were to acquire a roughly 500-foot wide swath along the west border of the park, it would provide additional area to buffer the park from the mining activities and thereby provide more flexible use of the park's Gateway Recreation Area. However, potential development or mining of this site is not expected to occur before the year 2030. Consequently, the County will continue to

monitor the situation and revisit it as needed in coming years. Again, at this time, the County is not identifying acquisition of part or all of this property.

Residential Property Next to Northeast Corner of the Park

The existing residential five-acre property adjacent near the northeast corner of the park is not needed for the future development of the regional park. In addition, there does not appear to be any existing or future conflict between this residential property and the park. However, this property is essentially surrounded by public land. Consequently, it may be in the best interest of the County, UM, MDNR, and property owner to discuss the long-term plans for the property. Again, at this time, the County is not identifying acquisition of this property.

Park Road Trail Easement on Vermillion Highlands

The park access road is dependent on using a portion of the Vermillion Highlands property to access the park's primary recreation area (see *Figure 50*). Dakota County will work with the State of Minnesota to acquire an access easement across a portion of the Vermillion Highlands property. The use of this portion of Vermillion Highlands for park road access was recommended by the Vermillion Highlands Steering Committee, subject to approval by the University of Minnesota's Board of Regents.

Complicating this issue is the fact that the University of Minnesota is in the process of studying potential clean-up of contaminants in this area. Significant development in the Primary Recreation Area of the regional park cannot occur until this issue is resolved.



Figure 50: Potential Land Acquisition

CHAPTER 12:

PARK IMPROVEMENT AND OPERATIONS

The Development Master Plan presents a long-term plan for allocating resources to develop and manage Whitetail Woods Regional Park. A phased approach to park development is suggested because, in 2011, the undeveloped park site is a blank slate in terms of infrastructure and visitor facilities. A prioritized development approach will allow the County to “open the doors” to the public now and reserve some development for later years when visitation increases.

The Dakota County Parks and Open Space Department is responsible for operations and maintenance of three Regional Parks, one County Park and three Regional Greenways. The Dakota County 2030 Park System Plan envisions park system growth, with eight new Regional Greenways and the addition of the new regional park in Empire Township. This system growth will respond to public demand for natural resource-based recreation and will accommodate increasing use within the current park system. New park and greenway units, new capital improvements, and increasing visitor use will require additional operational resources to protect park system investments and assure high quality recreation opportunities. Improving and opening the new regional park will result in the County assuming new operations and maintenance responsibilities, which will need be balanced with staffing capacity and budget.

Maintenance and Operations

Dakota County Parks and Open Space Department’s operational budget is \$3,455,000 and supports 46 full-time, part-time, and temporary positions in the following program areas: Administration, Visitor Services, Development, Natural Resources, and Maintenance and Land Conservation.

The operational budget is offset by \$927,000 of revenues, resulting in a net County cost of approximately \$2,500,000, predominantly funded with property tax. The annual cost per resident is \$6.25 and cost per park visitor is \$2.67. In 2010, the County park system hosted 933,000 visits.

Opening the new park will require coordination through annual budgeting processes to provide for associated operations and maintenance expenses. The County has established an operational set-aside account which helps fund new operational needs related to park system growth. Based on system priorities, these funds may be available for the County Board to approve for the operation and maintenance of the new regional park.

Partnership and Volunteerism

The Vermillion Highlands Concept Master Plan provides for undiminished research and education by the University of Minnesota, high quality hunting by the Minnesota Department of Natural Resources, and year-round natural resource based recreation by Dakota County. The plan recognizes the expertise of each organization and has the right organization responsible for the right services. Continuing this partnership approach has significant merit for the new regional park.

The Dakota County Environmental Education Program will be benefited by the world-class expertise of the University of Minnesota. Natural resource restoration of the park will be benefited by the expertise of the Minnesota Department of Natural Resources. The County’s new park, its facilities, programs and

services can serve both the University of Minnesota and Minnesota Department of Natural Resources in advancing their missions provide a venue for the three agencies to advance shared missions.

Operating the new regional park will call for volunteerism, which can augment fundamental operational needs such as public information and maintenance. Volunteers can enrich services provided at the park by teaching classes, leading programs, organizing events and bringing necessary expertise. If the park vision is to be realized to its full potential it will need to include volunteers.

Public Safety and Enforcement

County Ordinance 107, Park Ordinance controls public use of the park related to general conduct, operations, property, structures, natural resources, recreational activity, motorized vehicles, traffic, and parking.

Park visitors are informed of park rules and regulations in a variety of ways. Kiosks and signs are strategically located to address specific information about park hours, trails, permitted and prohibited activities, fees, and directions. Park, Lakes, and Trails officers from the Dakota County Sheriff's Office patrol parks in vehicles, on foot and on bicycle; educate visitors; and enforce County Ordinance 107. The Dakota County Sheriff's Office and local law enforcement agencies are responsible for emergency and criminal complaints that occur within County parks.

Public Outreach and Awareness

Dakota County has a Comprehensive Strategic Communications Plan for its Park System, to increase public awareness of park facilities, programs, and services. The Park Communications Plan provides new options for promoting the parks and advancing the Parks Mission, to create a higher profile for parks, demonstrate their value, increase resident appreciation and support for parks, and create new and expanded sources of revenue. The Communications Plan presents opportunities and tactics to reach targeted audiences with essential key messages in the most efficient and cost-effective ways.

In 2008, Dakota County conducted branding initiative for its parks, producing a new brand identity – “Forever Wild.” This brand makes an important promise to the public, which is integrated into service delivery planning, development, and marketing.



Capital Improvement

The Parks and Open Space Department 5-Year Capital Improvement Program is \$50,000,000 and supports planning, acquisition, development, redevelopment, deferred maintenance and land conservation. Annual park and greenway capital expenditures range from \$5,000,000 to \$10,000,000. Nearly 70% of capital funding is derived from non-County revenues. County funding is typically from program aid, general fund balance a small percentage is property tax.

The 2012 – 2016 Dakota County Parks and Open Space Department Capital Improvement Program provides \$3,000,000 for Phase 1 improvement of the new park, to open the park in 2013. Future capital funding for the new park will be considered as part of the County Board's annual approval of the Parks and Open Space Department Capital Improvement Program Budget.

Budget and Phasing

A general budget for Phase One development provides a basic initial park framework for \$5,200,000.

Phase One Cost Estimates		
Description	Quantity	Total Cost
Design related:		
Schematic Design - Site refined layout development, etc.		\$40,000
Construction documents		\$320,000
Hydrologic focus - water budgeting,		\$50,000
Vehicular related:		
Gravel park road	8500 lf @ \$80	\$680,000
Paved parking extra for 100 person shelter and general use	40 car @ \$3000	\$120,000
Paved parking extra for 100 person shelter and general use	20 car @ \$2500	\$50,000
Facilities (not buildings):		
Paved walking loop trail around Wetland (10-12')	10,600 lf @ \$60	\$636,000
Boardwalk for paved loop trail	1100 lf @ \$450	\$495,000
Classic ski/hiking trail	17,000 lf @ \$15	\$255,000
Lighted classic ski trail	17,000 lf @ \$15	\$255,000
Trail connections to parking lot	lump sum	\$30,000
Sledding hill with minimal lights	lump sum	\$30,000
Picnic grounds	lump sum	\$75,000
Multi-purpose graded field	lump sum	\$50,000
Adventure playground	lump sum	\$100,000
Hiking trail		-
Lighted hiking trail		-
Dam maintenance	lump sum	\$50,000
Electrical supply		\$50,000
Buildings/Structures Related:		
Public water supply		\$30,000
Picnic shelter/rest rooms capacity 100		\$725,000
Restroom building		-
Winter warming hut (trailer)		\$15,000
Initial signs		\$10,000
Park Commons Initial Development		
"Water/garden/food/native/wilder" features		-
Natural Resources-Related		
Conifer stand management	25 acres @ \$5,000	\$125,000
NW Overlook prairie/grassland management	30 acres @ \$4,000	\$120,000
Cedar management	6 acres @ \$3,000	\$18,000
Agriculture to prairie grassland	40 acres @ \$1,200	\$48,000
Sub total		\$4,377,000
Contingency	20%	\$875,400
Phase One Whitetail Woods Total		\$5,252,400

Annual inflation of 3-5 percent will influence final costs. It is reasonable to expect that completing park development beyond Phase One could cost \$21,000,000 or more.

Phase Two (Park Completion) Estimates		
Description	Quantity	Cost
Consulting related:		
Design and survey		\$1,904,136
Hydrologic focus - water budgeting		\$150,000
Vehicular related:		
Pave gravel park road	8,500 lf @ \$40 300 cars @	\$340,000
Paved parking for additional 300 cars	\$3,000	\$900,000
Paved road to east cabins	1,000 lf @ \$120	\$120,000
One-way paved road to pine cabins	350 lf @ \$60	\$21,000
Paved road to maintenance facility	850 lf @ \$120	\$102,000
Gravel service road from maintenance to Annette Ave.	950 lf @ \$80	\$76,000
Additional trails		
Hiking/snowshoe trails	5,280 lf @\$10	\$52,800
Additional paved trails	10,600 @ \$60	\$636,000
Interpretive signs and features	lump sum	\$150,000
Buildings/structures related:		
Additional public water supply	lump sum	\$90,000
Additional electrical	lump sum	\$150,000
Year-round furnished cabins in the pines	13 @ \$150,000	\$1,950,000
Year-round furnished east cabins	10 @ \$75,000	\$750,000
Cabin restroom facilities	3 @ 200,000	\$600,000
Visitor center	lump sum	\$5,000,000
Intimate ceremony shelter/restroom and arbor	lump sum	\$250,000
Additional small picnic shelters	3 @ \$30,000	\$90,000
Picnic shelter/rest rooms capacity 300	lump sum	\$1,000,000
Performance area restroom building	lump sum	\$200,000
Performance structure	lump sum	\$300,000
Maintenance building and grounds	lump sum	\$1,000,000
Wildlife blinds	2 @ \$20,000	\$40,000
Park commons further development		
"Water/garden/food/native/wilder" features	lump sum	\$1,500,000
Disc golf (site development)	lump sum	\$150,000
Natural Resources Related		
Priority TBD	lump sum	\$250,000
Sub total		\$15,867,800
Contingency	20%	\$3,173,560
Phase Two Whitetail Woods Total		\$20,945,496