



Bunker Hills Regional Park Master Plan

Anoka County Parks and Recreation Department



Prepared by:
Brauer & Associates, Ltd.
May 1998

Acknowledgments

Overview

In the fall of 1997, the Anoka County Board of Commissioners commissioned Brauer & Associates Ltd. to prepare a master plan for Bunker Hills Regional Park. This document represents the cumulative effort of the Anoka County Recreation Committee, Anoka County Board of Commissions, Anoka County Parks and Recreation staff design team, and the consultant design team. The project was completed in May of 1998.

Acknowledgments

The planning team lead by Brauer & Associates, Ltd. would like to thank the Anoka County Board of Commissioners and Anoka County staff for providing their insight and understanding of the concerns and needs of county residents. We would also like to thank the individuals who attended the public meetings. Their participation allowed us to prepare a master plan that reflects the unique character and intrinsic qualities of the county and park.

County Board of Commissioners

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Our appreciation is especially extended to John VonDeLinde, Park Director for Anoka County Parks, who took the time to attend many meetings and provide his insight and understanding of the site and local conditions and guidance on difficult planning issues.

Sincerely,
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Primary References and Resources

The following identifies the primary resources used in the preparation of this document:

- < 2020 Vision for Anoka County Parks and Recreation
- < Universal Access to Outdoor Recreation: A Design Guide, PLAE, Inc. 1993
- < Universal Access: Guidelines for Outfitters Operating on Public lands, Wilderness Inquiry, Inc. 1995
- < Minnesota County Biological Survey

Summary Statement

Section I – Introduction and Planning Framework

The project focused on the preparation of a master plan for Bunker Hills Regional Park. The planning and design process took into consideration the history of the site, setting, needs of the surrounding communities, and natural and cultural resources of the site.

The master plan described in this report provides the guidelines for development of the park and a tool for public presentations and funding applications. The plan is only the first step in the planning, development, and managing of this unique and important resource. It should be viewed as firm enough for orderly and agreed upon development, yet flexible enough for changes to be made as time and experience dictate.

Section II – Setting / History / Recreational Demand

Setting

Anoka County Parks and Recreation Department operates and maintains 23 park units and over 8,000 acres of park land throughout the county. Nine of the park units are classified as either a regional park reserve, regional park, regional trail, or special recreation feature park. At nearly 1,600 acres, Bunker Hills Regional Park is the largest regional park in the system and second in size to Rice Creek Chain of Lakes Regional Park Reserve.

History

The first land acquisition for the park took place in the early 1960's, at which time the park was called Bunker Prairie County Park. In 1974, Bunker Hills Park, along with other parks in Anoka County and the seven county metro areas, became a regional park through the Metropolitan Council's establishment by action of the Minnesota State Legislature. This action was the start of the Metropolitan Council's Park and Open Space Program. Thereafter, funding became available through the Metropolitan Council for acquisition and development of the regional parks – with Bunker Hills being one of them.

Recreational Demand

The demand for recreational facilities within the county is growing steadily along with the regional population. The 2020 Vision for the Anoka County Parks and Recreation System Plan provides an extensive overview of recreation and leisure trends, much of which was derived from studies completed by the Metropolitan Council.

Section III – Natural Resources Restoration and Management Framework

These recreational trends, coupled with a burgeoning regional population, will put increasing pressure on the facilities and amenities offered at Bunker Hills park. As one of the most heavily used parks in the regional park system, insightful development in concert with responsible land stewardship will be required if recreational demand is to be met without compromising the integrity of the land resource.

Bunker Hills Regional Park displays a diverse, interesting and unique natural landscape character. The park is also one of the only remaining sizable examples of oak barrens and prairie native plant communities, which puts land stewardship and preservation high on the priority list.

The natural resource analysis considers the various natural aspects of the park, including its geology, hydrology, and ecology. The ecological patterns and vegetative communities found within the park are those that are adaptable to the soil conditions, hydrologic patterns, and climate. Oak savannas/barrens, prairies, and open wetlands have historically been the dominant native vegetative communities.

The impact of human activities since settlement (land and water alterations, pine planting, etc.) coupled with the curtailment of naturally-occurring events (wildfires) have served to change the ecological balance and character of the park. Some of these impacts will have lasting affects, while others can be addressed to forestall further degradation and help ensure a sustainable and healthy landscape for future generations.

To protect this valuable resource, developing and implementing an aggressive and comprehensive restoration and management plan is crucial. Left unchecked, the ecological systems within the park will continue to decline at increasing rates, making attempts at restoration more challenging and less certain as time goes on.

Key overall restoration priorities include:

- < Prescribed burning of oak savanna/barrens and prairie systems – this is a fundamental requirement for restoration.
- < Restore buffer wetlands and attenuate on and off-site hydrological patterns that degrade on-site wetland systems.
- < Restore native plant communities in areas with extensive pine plantations.
- < Restore disturbed areas requiring revegetation.

Section IV – Universal Design Framework

In recent years, extensive public debate has been focused on equal access to indoor and outdoor public spaces for all individuals. The Americans with Disabilities Act of 1991 (ADA) turned past guidelines and standards into law, forever changing the way accessibility issues are to be addressed. But the ADA is not an end unto itself. It is simply another step toward a design philosophy that ensures accessibility for all.

Section V – Development Master Plan

It has become evident that design philosophy must continue to evolve if a barrier-free environment is to be realized in the design of parks. Universal Design is an approach to design that seeks to achieve this philosophy by combining the basic principles of barrier-free design with a more comprehensive view of human beings. By focusing attention on a broad spectrum of needs, facility design can accommodate people with varying degrees of abilities and disabilities.

Since universal design is still an evolving approach to design, achieving universal access is simpler in concept than in practice. Anticipating the needs of people with varying degrees of abilities and disabilities is a formidable task since it is often very difficult to understand the specific needs of individuals with different abilities when one does not share those limitations. Therefore, it becomes imperative that the design process include individuals that represent a cross-section of people with and without disabilities. As the project moves into design implementation phases, efforts should be made to involve representatives of divergent populations in the detail design of specific facilities. This approach helps to ensure that the design for any given facility will actually serve the intended populations.

The Development Master Plan is a direct outgrowth of the site and natural resource analysis and public process. The master plan is dynamic and will continue to evolve and be fine-tuned as it moves through implementation steps and benefits from management and operational experiences and updated recreational demand research in the years to come.

Land Use Zones

Land use zones describe the park by its functional uses. In this case, four distinct land use zones emerged and include:

- < Ecological and Natural Resource Zone – for ecological preservation, passive outdoor recreation, and nature interpretive/education.
- < Recreational Development Zone – for public recreation.
- < Other County Uses Zone – for existing Anoka County public facilities.
- < Golf Course Zone – for existing nationally recognized golf facility.

By considering the park from this broader perspective, the most appropriate use of the land resource within the context of its natural features and development program could be discovered.

Development Program

The development program defines the uses of the park and facilities to support those uses. The program is an outgrowth of recreational demand research, the public participation process, and an assessment of the success of past park uses. The development program seeks to achieve a balance between providing facilities and amenities that allow the public to enjoy the park while still retaining its natural character. In general, the recreational uses shown on the master plan accommodate all of the past activities, although

redesigned to better serve the public. Universal Design considerations are also defined for each program item to ensure that access issues are considered for each park amenity.

The development program includes the following key facilities and amenities:

- < **Main entrance features and contact stations** – provide appropriate introduction to the park from the north and south entrances.
- < **Park roadways and drives** – a simpler and less obtrusive roadway system is proposed that minimizes roadway infrastructure while still servicing park facilities and use areas.
- < **Internal trail system** – features a more extensive hard and natural-surfaced trail system that traverses through the park’s natural areas while avoiding roadway crossings.
- < **Group and family picnic area, general recreation area, and Veterans Memorial** – improves and expands upon existing facilities to better serve the public.
- < **Campground** – expanded and upgraded facility blended into the natural landscape.
- < **Activities Center** – redesigned parking lot and improved pedestrian access.
- < **Archery range** – relocated to better serve the archery group and restore a key ecological area.
- < **Wave Pool** – expansion will accommodate growing demand for this facility.
- < **Environmental Learning Center** – expands outdoor educational opportunities for the local school district.
- < **Horse staging area and corral** – relocates and consolidates these facilities to better serve the user group while reducing ecological impacts.
- < **Miscellaneous site amenities and Improvements** – includes interpretive signage, benches, trash receptacles, boardwalks, signage program, and demonstration flower gardens.

Future Land Exchange/Acquisition

On the southwest corner of the park adjacent to the railroad right-of-way lies a finger of land that is currently park property. Separated from the park by the railroad tracks and golf course, the parcel’s primary value lies with it being a buffer between public and private uses. From a natural resource perspective, the area is showing signs of decline in ecological quality. Past uses of off-road vehicles in the area has also had a detrimental impact. Directly west of this parcel the Yamaha Corporation has a test facility. Further west, the City of Coon Rapids has an open space area that will likely be developed for a public park, with a key trail link to their and the regional trail system. Linking this property to Bunker Hills park via a trail corridor offers desirable recreational value.

In this context, the opportunity exists to exchange about 47.5 acres of land with the Yamaha Corporation to establish a greenway corridor between the park and city property. Given its isolation and current ecological status, the finger of land under park ownership would be exchanged for a like amount of Yamaha property to form the greenway corridor. The timeframe for any action remains undefined.

Section VI – Implementation and Operations Plan

Anoka County has also been pursuing the acquisition of about 50 acres on the east side of the park. The proposed acquisition, which has been an approved part of past acquisition plans for the park, consists of 10 five acre parcels. Note that two parcels (totaling 10 acres) are no longer being actively pursued for acquisition by Anoka County. These parcels already have public utilities and an appraised value of \$30,000 to \$32,000 each. At this price, the cost-benefit of acquiring them is not justified relative to other acquisition and development priorities. Anoka County will, however, continue to pursue the acquisition of the remaining eight parcels as the opportunity presents itself.

Cost Analysis

The extensive redevelopment defined in the master plan for Bunker Hills Regional Park will require substantial capital investment. In all likelihood, implementation will occur over a number of years as funding through various sources becomes available.

The cost analysis table in the report defines the potential costs associated with each component of the master plan. **The overall cost estimate for full plan implementation is \$12,041,920, which includes a 10% construction contingency and 10% for professional fees and charges.**

Implementation Strategy (Project Phasing)

Given the overall magnitude of the potential costs, it is reasonable to expect that development of the park will occur over a period of time to coincide with funding opportunities. The implementation strategy suggests various groupings of master plan components into a number of implementation phases.

Components were grouped in consideration of the following criteria:

- < Existing facility exhibits an immediate concern (i.e., safety, dysfunctional, detrimental to long-term vitality of park).
- < Existing facility is worn out and no longer effectively services public need.
- < Existing and/or expanding demand warrants development/redevelop of a certain facility.
- < Facility is required to support high priority items (parking, for example).
- < Facility cost.

Development was divided into four phases, along with a recommendation to implement a natural resources restoration and management plan. Note that phases are not linked to specific timeframes. Actual project phasing will be a function of funding availability.

Operations Plan

The operations of Bunker Hills Regional Park falls under the jurisdiction of the Anoka County Department of Parks and Recreation. Policy and goal setting are done through the Anoka County Parks and Recreation Committee and the Anoka County Board of Commissioners.

The Anoka County park ordinances are enforced by the Anoka County Park Rangers. Local police departments and the Anoka County Sheriffs Department also respond to incidents in the park system.

The Operations and Maintenance unit of the Department of Parks and Recreation has an annual budget of approximately \$3.2 million. There are thirty-eight permanent employees and nearly one hundred seasonal employees ones. Volunteers also help with the Wargo Nature Center, Arbor Day plantings, park cleanups, flower bed maintenance, and a variety of other events. Area schools participate in natural resource activities and displays at the Banfill-Locke Center for the Arts. Contractual agreements are in place for trash removal, Bunker Hills Stables operation, the archery club, and campground hosts.

Recreational programming presently occurs within the park and opportunities will increase with new facilities. Natural resource seminars are offered for educating the public on a variety of seasonal topics. The trails through the park will offer exploration of wetlands, oak savannahs, sand plain, and native prairie.

Promotion of Bunker Hills Regional Park happens through a variety of sources. Seasonal brochures invite everyone to enjoy the many opportunities available. Brochures specific to shelter reservations and room rental promote the choices available. Press releases, flyers, posters and mailings notify area residents. Most of all, word-of-mouth advertising is the most successful method.

Table of Contents

Section I - Introduction / Planning Framework	1-3
Section II - Setting / History / Recreational Demand	4-8
Section III - Natural Resources Restoration and Management Framework	9 - 35
Section IV - Universal Design Framework	36 - 40
Section V - Development Master Plan	41 - 62
Section VI - Implementation and Operations Plan	63 - 72

Section I

Introduction / Planning Framework

Project Scope

The project focused on the preparation of a master plan for Bunker Hills Regional Park. The planning and design process took into consideration the history of the site, setting, needs of the surrounding communities, and natural and cultural resources of the site.

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Planning Framework

The planning framework provided structure to the undertaking of this project. The framework consists of a number of components:

- < Public involvement
- < Public agency involvement
- < Planning process

Public Involvement

The public was the primary motivating force behind the master plan for the park. Survey research undertaken at the county and state level established a base starting point for the planning and design process. (Section II defines key findings)

An extensive public input process followed to allow for extensive and first-hand public input and to address the interests of all stakeholders. Several discussions with Anoka County staff and the Park and Recreation Committee initiated the process in October of 1997. The following is a listing of public meetings where citizens had opportunities for input:

- < November 4, 1997 Parks and Recreation Committee Meeting
- < November 12, 1997 County Board Meeting
- < January 7, 1998 Parks and Recreation Committee Meeting
- < January 14, 1998 County Board Meeting
- < February 26, 1998 University of Minnesota Extension Staff
- < February 26, 1998 Andover, Blaine, Coon Rapids Parks agencies
- < March 3, 1998 Parks and Recreation Committee Meeting

< March 4, 1998	Blaine Senior High School
< March 1998	Yamaha Corporation
< March 10, 1998	County Board Meeting
< March 26, 1998	Public Meeting on Master Plan
< April 7, 1998	Parks and Recreation Meeting
< April 14, 1998	County Board Meeting
< May 5, 1998	Parks and Recreation Committee Final Approval
< May 12, 1998	County Board Final Approval

The municipalities in and around Bunker Hills Regional Park were represented by staff and commission members connected with their parks and recreation services. All parties responded favorably to the concepts presented. Connecting the trails to their respective communities received highly favorable responses.

Blaine Senior High School staff were informed of the plan. Science educators are excited about the area of the park adjoining their property. The natural features suit their purposes and the trail access presents possibilities for physical education and athletic teams.

At the March 26, 1998 public meeting, approximately 90 people attended. Response to the master plan was favorable. The questions and comments concerned the location of the entrance stations(how close to residential areas), improving trail access to the park from neighboring areas, timing of the plan, location of the stable operations, security/vandalism concerns, and the approval of reclaiming the natural resource aspects of the park.

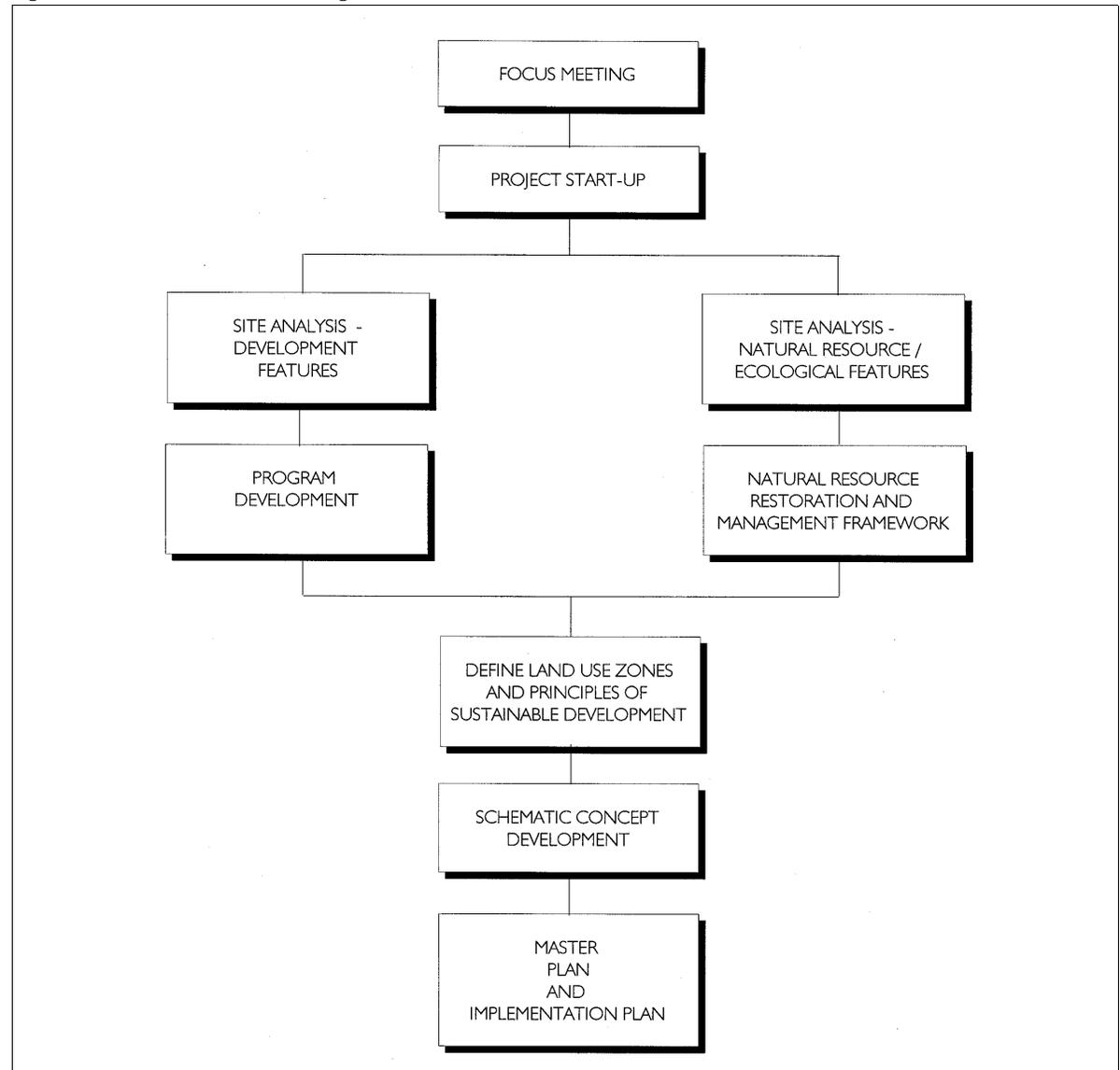
Public Agency Involvement _____

To ensure consistency with broader, county-wide planning objectives, policies, and implementation procedures, the consultant team worked closely with Anoka County Parks and Recreation staff as a collaborative team.

Planning Process _____

The planning of the park followed a step-by-step process that encouraged public participation and allowed for a series of checks and balances. This approach ensured pertinent issues were considered and addressed in the proper sequence. Figure 1.1 illustrates the planning process.

Figure 1.1 - Master Plan Planning Process Overview

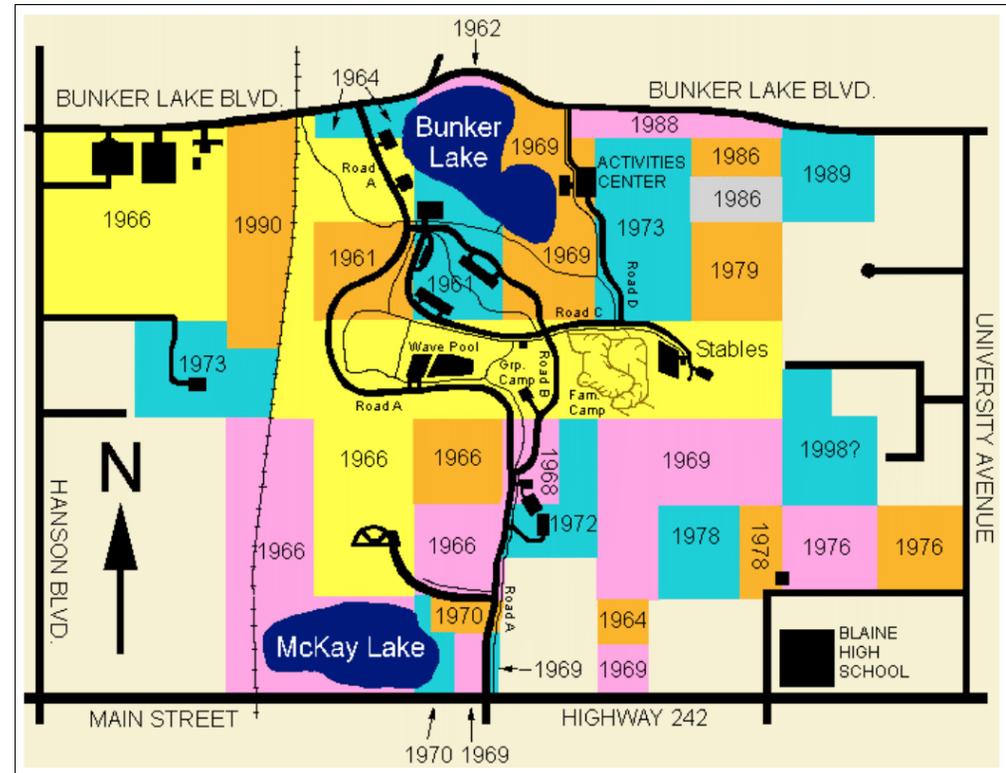


Located in west-central part of Anoka County, the park is highly accessible from the region. The park is surrounded by the fast growing communities of Andover, Blaine, Coon Rapids, and Ham Lake. Forecasts by the Metropolitan Council project 14% of the metro area population and 15 % of the household growth over the next three decades to occur in Anoka County – totaling 95,000 new residents in 51,500 new households. Of the four cities surrounding the park, three of them -- Andover, Blaine, and Coon Rapids – are projected to have the largest population and household growth in the county. As with the rest of the metropolitan area, the population is growing steadily older.

Historical Land Acquisition and Development Perspective

The first land acquisition for the park took place in the early 1960's, at which time the park was called Bunker Prairie County Park. Figure 2.2 provides an overview of the patchwork of land acquisition that makes up what is now Bunker Hills Regional Park.

Figure 2.2 - Land acquisition map for Bunker Hills Regional Park



The following provides a historical overview of the park acquisition and development from the initial land acquisition until the Metropolitan Council was established:

- < Earliest land acquisition was a combination of tax forfeit parcels and private land - in the early 1960's through the early 1970's (golf course area - west of RR tracks and center of park).
- < Much of the private land was acquired with LAWCON (MnDNR's Land and Water Conservation), LCMR (MnDNR's Legislative Commission of Minnesota Resources), HUD (National Housing and Urban Development) grant funds and Anoka County funds in 60's/70's
- < Rapids Archery Club developed the archery range prior to the park being established (pre-1960's).
- < Late in the 1960's and early 1970's, park development began with grant funds through LAWCON, LCMR, and County funds. Development consisted of roads, parking lots, picnic facilities, picnic shelters, playground equipment, restrooms at picnic areas, campground facilities, restrooms at group/family camping, electric/security light, and maintenance shop by campground.
- < Horse trails, facility buildings, and show ring were established in 1972.
- < First 18 holes of Coon Rapids Golf Course (established by City of Coon Rapids and a County/City lease agreement) was developed in the early 1970's.
- < Activities Center was built in 1974-75 to house Anoka County Park Headquarters and University of Minnesota Extension Offices (Funded was through Federal cigarette taxes).

In 1974, Bunker Hills Park, along with other parks in Anoka County and the seven county metro areas, became a regional park through the Metropolitan Council's establishment by action of the Minnesota State Legislature. This action was start of the Metropolitan Council's Park and Open Space Program. Thereafter, funding became available through the Metropolitan Council for acquisition and development of the regional parks – with Bunker Hills being one of them. Acquisition funds from Metropolitan Council in the late 1970's were used to purchase parcels in the southeast corner of the park, near Blaine High School. Development funds started to become available in the 1980's, including the following developments:

- < 1984 - Main Maintenance Facility for entire park system (west of RR).
- < 1988 - Bunker Hills Wave Pool.
- < 1989 - five miles paved trails throughout park.

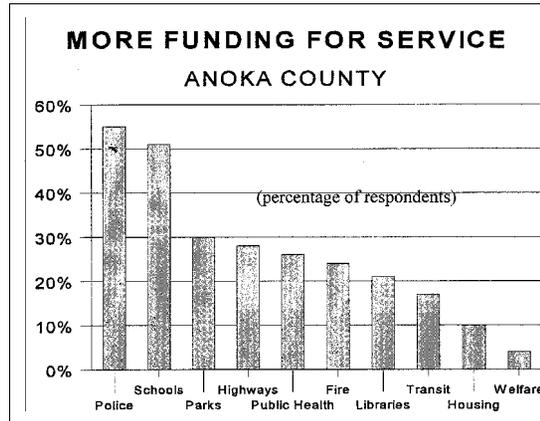
In addition to Metropolitan Council funds, a variety of other projects were funded through Anoka County and other funding programs in the 1970's and 1980's. Projects included:

- < 1975 - Compost/burn site.
- < 1976 - Sheriff's gun range.
- < 1982 - County highway maintenance garage.
- < 1982 - Prairie restoration.
- < 1983 - Metropolitan Mosquito Control building.
- < 1985 - Veterans Memorial and adjacent restrooms and shelter.
- < 1986 - Archery building (replacing old building that burned down).
- < 1987 - County Highway Department main facility.
- < 1988 - Radio communications facility.
- < 1996 - 1997 - Sheriff's Patrol Station and horse patrol stable building.

Recreational Demand

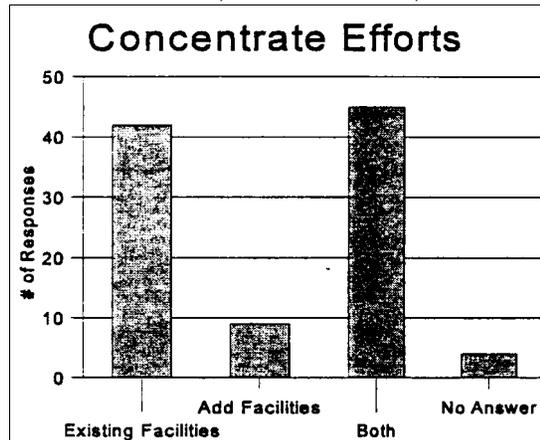
As to where more funding should be spent, citizens ranked parks third behind police and schools.

Source: U of M, Center for Survey Research



As for concentration of effort, citizens felt that the County should focus on both improving existing facilities as well as adding new ones.

Source: Anoka County Vision 2020 Survey



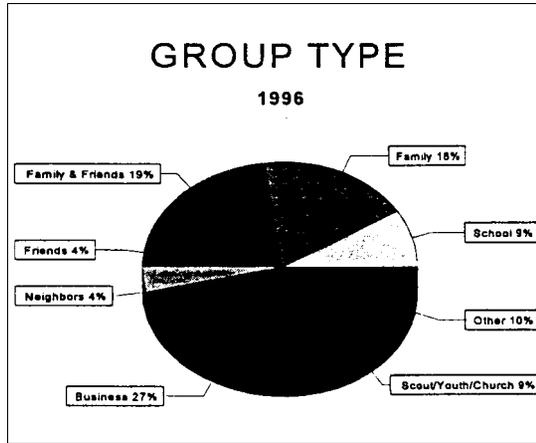
The demand for recreational facilities within the county is growing steadily along with the regional population. The 2020 Vision for the Anoka County Parks and Recreation System Plan provides an extensive overview of recreation and leisure trends, much of which was derived from studies completed by the Metropolitan Council. The figures on the next couple of pages summarize the key findings of the Vision 2020 plan that have direct implication on the type and extent of facilities proposed for Bunker Hills Park.

Figure 2.3 -Participation in outdoor recreational activities.

Source: Metropolitan Council Leisure Time Survey.

ANOKA COUNTY			METRO AREA		
ACTIVITY	REGULAR PARTICIP.	WOULD DO MORE, BUT	ACTIVITY	REGULAR PARTICIP.	WOULD DO MORE, BUT
1. Walking in Large Park	51%	28%	1. Walking in Large Parks	56%	22%
2. Picnicking	48%	25%	2. Picnicking	52%	21%
3. Outdoor Playgrounds	44%	15%	3. Visit Historic Sites	51%	27%
4. Visit Historic Sites	43%	32%	4. Outdoor Playgrounds	41%	10%
5. Beach Swimming	37%	25%	5. Informal Nature Study	36%	13%
6. Informal Nature Study	36%	15%	6. Beach Swimming	34%	21%
7. Biking (<3 miles)	34%	22%	6. Biking (<3 miles)	34%	19%
7. Fishing	34%	36%	8. Fishing	32%	29%
9. Camping	33%	34%	9. Camping	31%	26%
10. Pool Swimming	29%	20%	10. Pool Swimming	29%	17%
11. Golfing	26%	20%	11. Golfing	27%	19%
11. Hunting	26%	15%	12. Biking in Large Parks	25%	24%
13. Biking in Large Parks	24%	27%	13. Canoeing	20%	25%
14. Canoeing	17%	27%	14. Hunting	19%	11%
14. Snowmobile	17%	14%	15. In-Line Skating	13%	10%
16. In-Line Skating	12%	16%	16. Cross-Country Skiing	13%	17%
17. Cross-Country Skiing	10%	16%	17. Snowmobile	10%	12%
18. Formal Nature Study	4%	10%	18. Formal Nature Study	4%	10%

As for picnic shelters, group size was fairly evenly distributed, with business use slightly ahead of family and friends. Source: Anoka County Picnic Shelter Users Survey.



As for trails, respondents clearly felt that trails are of major importance. Source: Anoka County 2020 Survey.

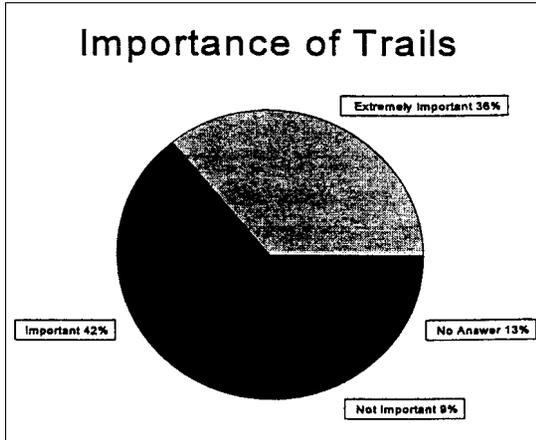
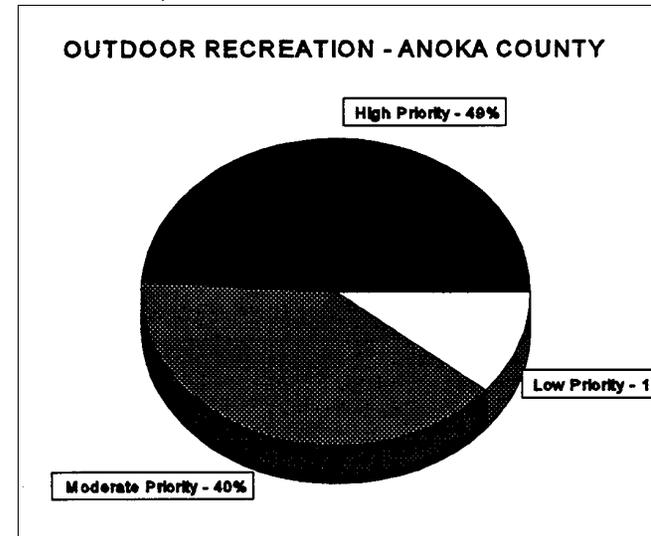


Figure 2.3 - Facilities availability: To few of these facilities.
Source: Metropolitan Council Leisure Time Survey

ANOKA COUNTY		METRO AREA	
FACILITY/RANK	% RESPONSE	FACILITY/RANK	% RESPONSE
1. Bike Paths	42%	1. Natural Areas	37%
2. Fishing Docks	41%	2. Bike Paths	36%
3. Natural Areas	38%	3. Fishing Docks	36%
3. Campgrounds	38%	4. Campgrounds	34%
5. Hiking Trails	37%	5. Hiking Trails	32%
6. Beaches	35%	5. Nature Centers	32%
7. Nature Centers	34%	7. In-Line Skating	27%
7. In-Line Skating	34%	8. X-Country Skiing	25%
7. X-Country Skiing	34%	9. Beaches	24%
10. Downhill Skiing	32%	10. Downhill Skiing	22%

Figure 2.5 - Importance of outdoor recreation activities to Anoka County residents.



The trends shown in the figures were reflected in comments made by citizens during the public process, with local park and recreation board members and residents of the county showing strong support for the amenities proposed in the master plan.

These recreational trends, coupled with a burgeoning regional population, will put increasing pressure on the facilities and amenities offered at Bunker Hills park. As one of the most heavily used parks in the regional park system, insightful development in concert with responsible land stewardship will be required if recreational demand is to be met without compromising the integrity of the land resource.

Section III

Natural Resources Restoration and Management Framework

Overview

Bunker Hills Regional Park displays a diverse, interesting and unique natural landscape character. The park is also one of the only remaining sizable examples of oak barrens and prairie native plant communities, which puts land stewardship and preservation high on the priority list. This section provides an overview of the natural resources of the park and establishes a framework for restoration and management planning.

Natural Resources Analysis

The natural resource analysis considers the various natural aspects of the park, including its geology, hydrology, and ecology. The following provides a brief overview of each of these natural features.

Geology

The recession of two recent glaciers created ice impoundments that gave rise to an enormous lake fed by the Mississippi and St. Croix rivers. As the glaciers receded and the lake evaporated, large deposits of sand were left covering the lake basin, creating the Anoka Sandplain.

The geology of Bunker Hills Regional Park was formed billions of years ago when molten lava cooled and settled to form a large basalt bedrock-lined basin. Subsequently, sedimentary rock formed as the sediments transferred by water settled into the basin and dried. The recession of two recent glaciers created ice impoundments that gave rise to an enormous lake fed by the Mississippi and St. Croix rivers. As the glaciers receded and the lake evaporated, large deposits of sand were left covering the lake basin, creating the Anoka Sandplain.

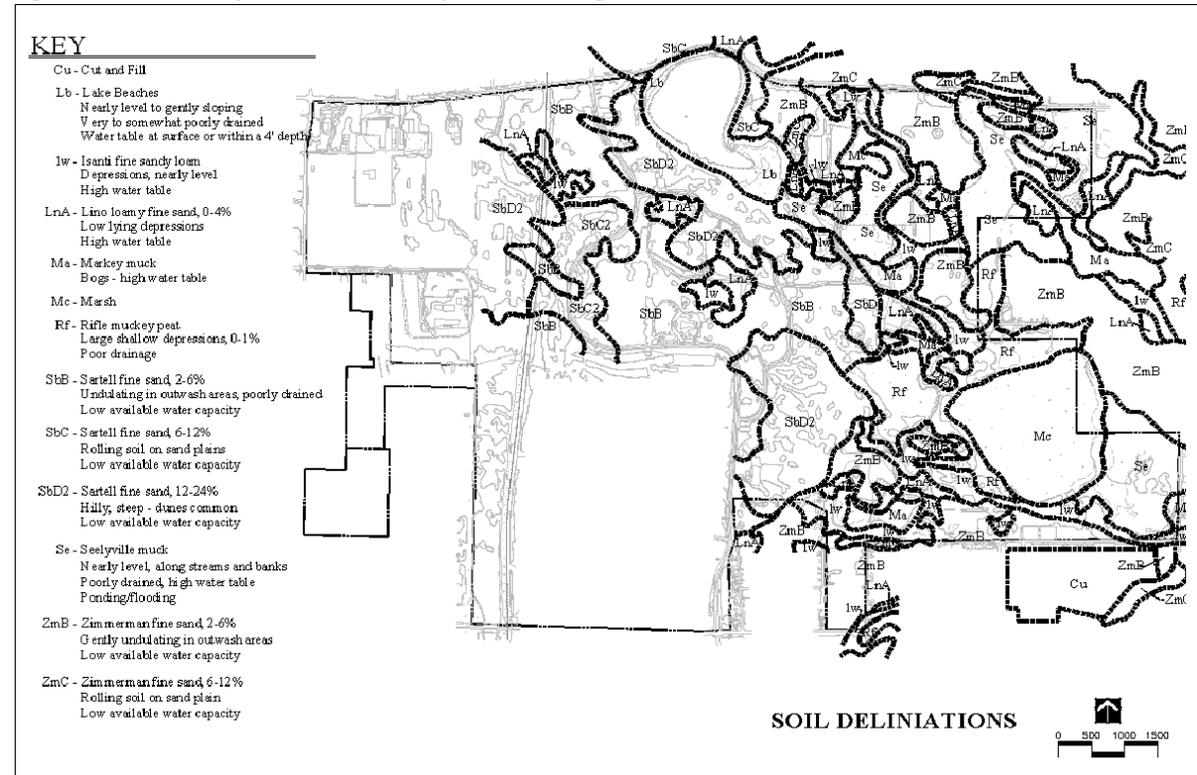
Soils and Slopes

The sandy soils that remained after the last of the glaciers receded cover much of the park. In low areas, basins, and drainageways, repeated cycles of recent sediment deposits and the decomposing of vegetation have created areas of muck and peat that lie on top of sand subsoils. Figure 3.1 illustrates the soil characteristics of the park.

The sandy soils that remained after the last of the glaciers receded cover much of the park



Figure 3.1 - Soils Map (Source: U.S. Department of Agriculture and Soil Conservation Service)

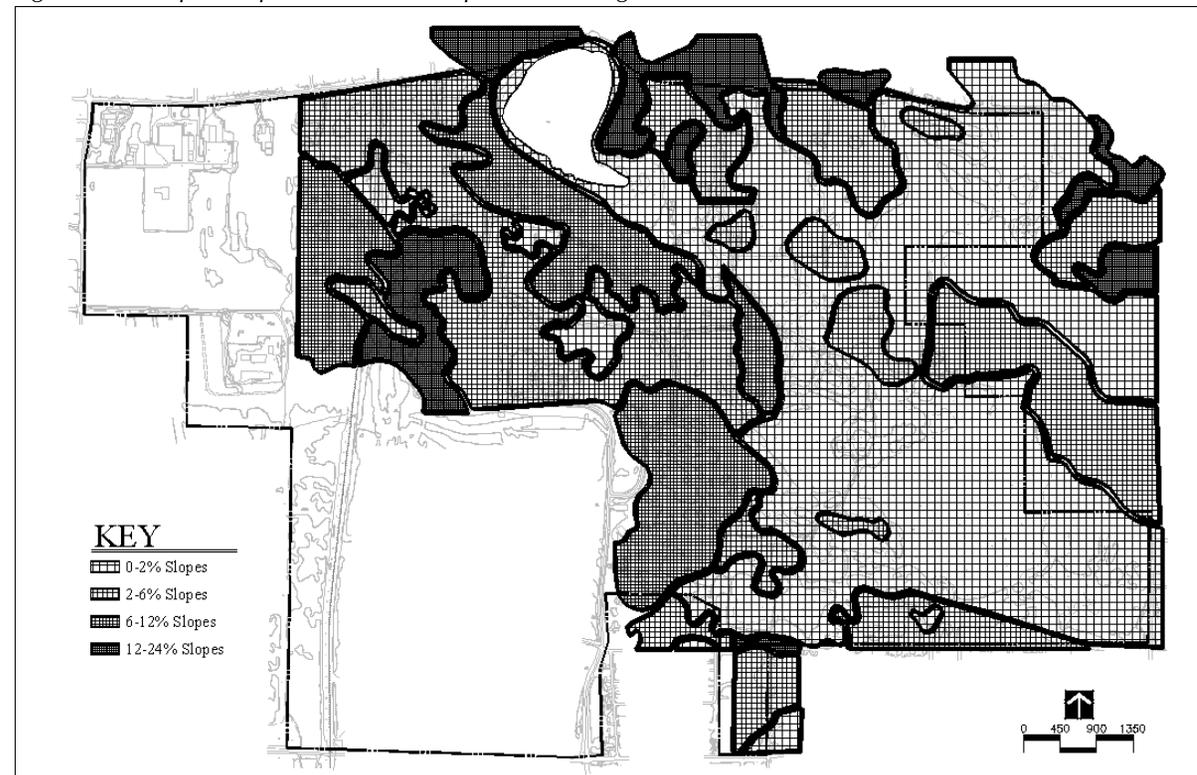


The fineness of the sands and open characteristics of the oak barrens and prairie systems allow wind and water to shift the sand, creating the dune formations exhibited in numerous areas of the site. Although these dunes contribute to the unique landscape of the park, they also underscore the erosive character of the sandy soils and the need for resource management and insightful development that minimizes impacts while providing for human needs. Figure 3.2 illustrates the topographic characteristics of the park.

The dune formations contribute to the unique landscape of the park. They also underscore the erosive character of the sandy soils.



Figure 3.2 - Slopes Map (Source: U.S. Department of Agriculture and Soil Conservation Service)



Hydrology

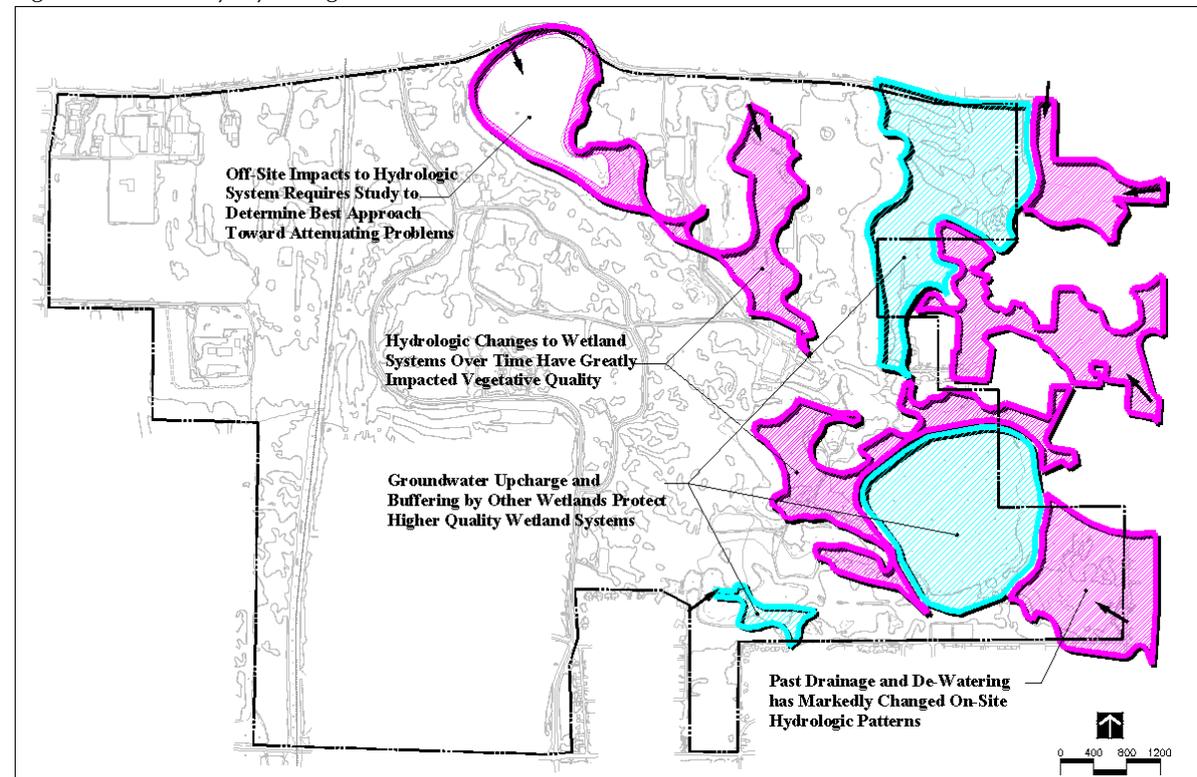
Since settlement, evidence of changes in the park's hydrological patterns is becoming more evident.

Site hydrology relates to the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere. In Bunker Hills Park, the established hydrologic patterns have a great influence on its ecology. Since settlement, evidence of changes in the park's hydrological patterns is becoming more evident, especially in the lowland and wetland ecological systems. Vegetative patterns within these areas are showing various signs of degradation due to unnatural water fluctuations and excessive nutrient loading from off and on-site sources. Attempts in the past to dredge, drain, or otherwise alter lowland areas and drainageways within and adjacent to the park have left some lasting impacts to its hydrology and ecology. These influences suggest degradation to many of the perimeter ecological systems as measured by bio-diversity, general ecological health, and sustainability. Figure 3.3 illustrates some of the primary hydrological patterns exhibited on the site and some of the suspected influences affecting those patterns.

Changes to hydrologic patterns are affecting the quality and sustainability of ecological systems within the park.



Figure 3.3 - Primary Hydrological Patterns



Addressing hydrological factors as part of the comprehensive restoration and management plan is important if healthy ecological systems are to be maintained within the park. Restoration efforts should focus on mitigating on and off-site influences where feasible to forestall continued degradation of wetland ecological systems. Key reclamation initiatives include:

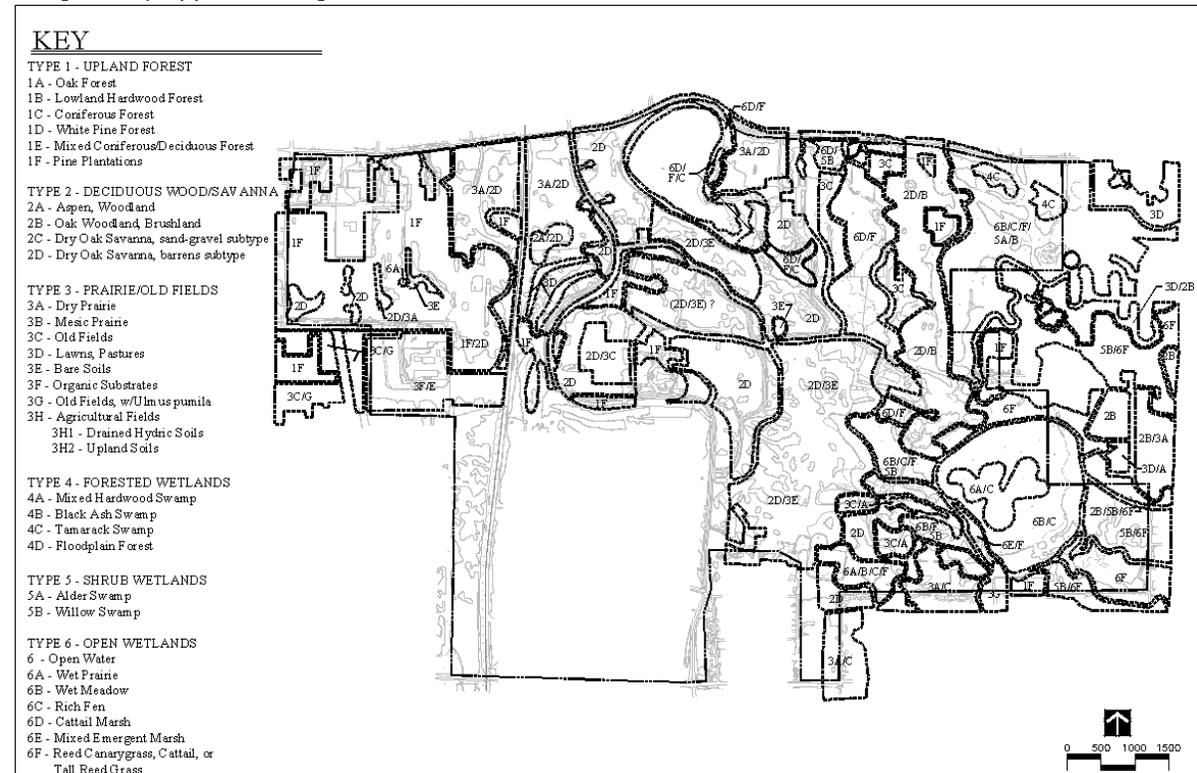
- < Comprehensive hydrologic study of park and adjacent properties to define hydrologic patterns and changes that are occurring in these patterns.
- < Attenuate off-site impacts to stabilize on-site hydrologic systems.
- < Restore essential hydrological buffers to forestall further degradation to wetland systems within the park.
- < Eliminate on-site impacts to hydrologic patterns, such as relocation of the stable operation, removal of manure piles, and stricter control of use of park land for pasturing.

Ecology

The ecological patterns and vegetative communities found within the park are those that are adaptable to the soil conditions, hydrologic patterns, and climate. Oak savannas/barrens, prairies, and open wetlands have historically been the dominant native vegetative communities.

The ecological patterns and vegetative communities found within the park are those that are adaptable to the soil conditions, hydrologic patterns, and climate. Oak savannas/barrens, prairies, and open wetlands have historically been the dominant native vegetative communities. County-wide surveys completed by the MnDNR in recent years indicate that some of the highest quality remaining oak savanna/barrens systems and prairie remnants left in this region are found in Bunker Hills Park. Clearly, the natural character of the park remains one of its most important contributions to the regional park system. Figure 3.4 illustrates a categorized ecological delineation of the park.

Figure 3.4 - Categorized Ecological Delineations (Minnesota County Biological Survey categories with sub-categories by Applied Ecological Services, Inc.)



To protect this valuable resource, developing and implementing an aggressive and comprehensive restoration and management plan is crucial.

To protect this valuable resource, developing and implementing an aggressive and comprehensive restoration and management plan is crucial. Left unchecked, the ecological systems within the park will continue to decline at increasing rates, making attempts at restoration more challenging and less certain as time goes on. The following provides a brief overview of the ecological conditions of each major vegetative community found within the park.

Typical oak barrens system within Bunker Hills Park. Older age groups of trees with limited regeneration capabilities and susceptibility to disease pose a significant threat to the long-term sustainability of these systems.



Given their age, the oaks need to be regenerated to create younger cohorts and new generations to replace the more vulnerable trees and those that are senescing or dying.

Deciduous Woodland/Savanna

Red and Bur oak with occasional white oak dominate most of the oak systems within the park. Higher and drier ridges exhibit primarily red oak, with some scatterings of gray dogwood. The majority of the oaks are fifty to ninety-year old multi-stemmed specimens reaching pathological maturity. Many of them are showing signs of stress, with wind throw becoming fairly common. A July, 1997 storm, for example, blew down significant areas of mature oaks and weakened or topped many individual trees. Increasing vulnerability to disease, such as oak wilt, will continue to plague the oak systems in the coming years.

The ground story vegetation in some of the oak barrens areas varies from shade-suppressed needle grass, sedges, little blue stem, and other prairie plants to areas with blackberry and raspberry, with invading poison ivy. Quack grass and European brome grass have invaded some areas, as well. Pines are disbursed along many of the edges of the oak barrens, some of which had been planted 30 or more years ago. Invasion of pines into the interior areas of the oak stands is also occurring, especially in areas of older oak stands with little natural regeneration occurring.

Some of the openings within the higher quality oak stands still exhibit a diversity of native plant species -- big blue, little blue, Indian grasses, sedges, bush clover, black-eyed Susan, golden aster, and a myriad of other plant species like lead plant, goats rue, purple prairie clover, and many others. Unfortunately, these are becoming less common as invasive and regionally non-native plant species (e.g., red pine) take greater hold on the park's oak barrens plant community.

Given the current conditions, it is imperative to begin an aggressive management program to restore and manage the oak systems within the park. Given their age, the oaks need to be regenerated to create younger cohorts and new generations to replace the more vulnerable trees and those that are senescing or dying. Also, the understory plant species in many areas are declining due to dense shade suppression resulting from an overstocked canopy and introduced shrub layer.

Prairie/Old Field

Dry prairie with savanna elements are common in some areas of the park. In a few instances, fires have been used to manage them, with a demonstrated response by native prairie species and forbs. The opportunity to expand this management practice is extensive and will result in a dramatic increase in vistas of native prairie and savanna landscapes. The northwest corner of the park in particular offers pockets of relatively high quality prairie remnants that would respond well to management. Areas where savannas interface with remnant prairies offer some excellent opportunities to foster restoration of productive ecotonal areas. A prairie restoration area near the entrance drive to the Activity Center is also exhibiting a dramatic response to management.

Remnant prairies within the park help define its character and sense of place. Recently adopted management programs should be continued to ensure that these qualities are sustained for future generations.



Once managed, many of the restored prairies can serve as seed sources for restoration of other areas within the park.

Big bluestem, Indian grass, various sedges, little blue stem, *Anemone cylindrica*, large flowered *Penstemon grandiflorus*, bush clover, green milkweed, and a myriad of other species are present in numerous areas of the park and simply require management to become more productive and established. Prescribed burning would benefit these areas by reducing invading pine cover and stimulating prairie and savanna vegetation.

Once managed, many of the restored prairies can serve as seed sources for restoration of other areas within the park. A myriad of other plant species already present could be easily harvested with a combine. Some of the areas adjacent to the rail line exhibit magnificent stands of needle grass and big blue stem. However, here, too, aggressive management is recommended to forestall invasive species from taking hold.

Although there is great opportunity, the challenges for restoring native prairie species in some areas of the park are substantial. For example, the free grazing of horses is having a degrading impact on the prairie and wetland systems in the eastern part of the park. The presence of a manure piles and the corresponding impediment to site hydrology, as well as grazing in the pasture area, have probably depauperized the area and shifted the vegetation toward weedy species. Changes in pasture land use and manure handling practices is a must if these areas are to be successfully restored.

In some areas of the site, un-designated horse trails and the past use of ATV's have greatly impacted the fragile soils and displaced native vegetation. Regrading and reseeding of these areas will be required if native species are to be reintroduced.

Control of invasive pine species is also an increasing concern. In some cases, seven to ten-year-old jack and red pines have already invaded. Fire should again be used to manage these invasions and stimulate native seed banks. A second phase of restoration could be used if the prairie system does not respond favorably. Introducing seeds like little blue stem and other prairie species will allow the prairie systems to take hold and adjacent savannas to invade and begin to break the fields up into a patchwork of savanna and prairie. Likewise, continued management will improve the diversity of the ecotone areas between the prairies and adjacent wetlands.

Open Wetlands

As with the other plant communities in the park, the wetland systems exhibit higher quality remnants and those that show signs of degradation from on and off-site influences. While generally restorable, the wetlands on the periphery of the site exhibit varying levels of degradation, much of which is due to hydrological changes that have occurred over time as adjoining land was developed. The higher quality wetlands tend to be in the interior of the park and are buffered by other wetlands.

Wetland areas are particularly susceptible to hydrologic changes and increases in nutrient loading from on and off-site influences.



Areas of high quality wetlands are one of the park's most important natural features. Protecting these through an aggressive restoration and management program is critical if these qualities are to remain.



The extent to which wetland systems have been affected by changes in hydrology or lack of management varies greatly across the site. In some locations, remnant blue joint grass and wet prairie remnants can be found. Other areas are being invaded by poison ivy, and on some of the tussocks there is ragweeds. In addition, wool grass (*Scirpus cyperinus*) invasion has occurred and there are some areas with patches of reed canary grass invading some of the higher quality and isolated wetland areas.

A larger historic sedge wet prairie dominated wetland can be found on the east side of the park. Sedge meadow species found include sedges (*Carex rugosperma* and *Carex rostrata*), lobe sedge (*Carex lacustris*), tussock sedge (*Carex stricta* and probably *Carex emoryi*) along with Joe Pye weed (*Eupatorium perfoliatum*). Areas along the periphery of the higher quality areas have been or are starting to be invaded primarily by narrow leaved cotton (*Typha angustifolia*). Reed canary grass and shrub invasions (primarily alder and silky or red osier dogwood) are also becoming more apparent.

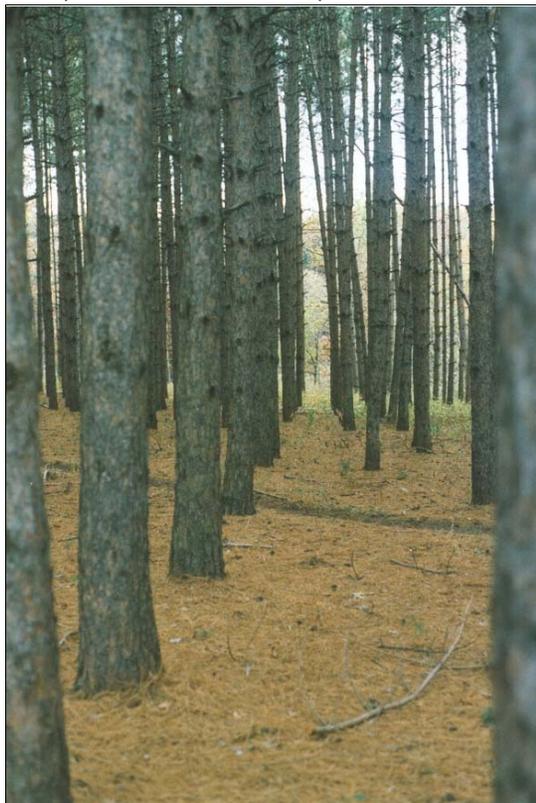
A common example of what is happening to the wetlands on the periphery of the site is an area northwest of the high school. The hydrologic and chemical characteristics of this area have been modified due to off-site development, with the causal affect being a transition from sedge meadow species such as wire grass, tussock sedge, lake sedges, pink meadow sweet (*Spiraea tomosa*), white meadow sweet (*Spiraea alba*), willows and so forth to an invading plume of reed canary grass. Although some isolated remnants of this magnificent sedge meadow remain, high quality examples will become more difficult to find unless restoration and management is undertaken. Prescribed burning and addressing the contaminant concern in hydrologic sources, along with prescribed herbicide management strategies, will likely be required.

In some of the old fields between the high school and the wetland there is tree stock, apparently an old nursery planted in rows. Wind rows with oak, spruce, pine, tartarian honeysuckle, and Siberian elm are also present in this area. Several drainage ditches traverse this area, which underscores the fact that hydrologic changes have occurred over the years both on and off-site.

In the area north of the stable operation remnant sedge vegetation can be found, but more prevalent are prairie grasses, weeds, and cattails. Drainage ditching adjacent to the pasture area and manure pile have been used to de-water and modify the southern end of this wetland area, which has resulting in canary grass and cattails being favored over a more diverse species aspect. The use of this area for heavy pasturing and manure piles will have to be discontinued if restoration of these ecological systems is to be successful. Discontinuing or relocating and down-sizing of the stable operation is suggested. Bio-filtration techniques should be employed adjacent to a relocated horse staging /stable operation to prevent or at least minimize future impact to the wetlands within the park. Pasturing areas also need to be limited and tightly controlled to forestall future ecological problems.

The restoration of the wetland systems offer numerous opportunities for education. An example of this relates to demonstration of how various vegetative communities respond to chances in hydrologic and topographic gradients from the wetland edges to the ridge tops that are high and dry with well drained sand silt soils and oak barrens plant communities.

Introduced pine plantations make up the upland forest plant communities in the park.



For the long-term health and sustainability of the park's ecological systems, removal of some of the pine plantations and thinning of others is necessary.

Upland Forest

Introduced pine plantations make up the upland forest plant communities in the park. Planted over 30 years ago in an attempt to prevent erosion and add interest to the park, the plantations are now too dense for their own sustainability and are spreading into adjacent ecological zones and out-competing native vegetation. This presents a significant threat to the ecological balance of the park.

In many of the denser pine plantations, red along with some Jack and Scotch pine on two to eight foot centers with diameters of four to 14 inches dominate. Most of these are in the 30 to 40 year age class. There is essentially no shrub layer, except for the occasional occurrence of European buckthorn on the edges. Two to four inches of needle litter and a dense overstory precludes any opportunity for other plant life. In a few small light gaps, weedy grasses are common – although small pockets of prairie remnant can also be found upon occasion. Also, in locations where the pine stand is thin, oaks are present. In these instances, management programs can initially focus on incrementally enlarging these openings and eventually reintroducing viable stands of oaks and recreating oak barrens plant communities. In some cases, the native seed bank in these openings may remain viable and reduce the need for more intensive restoration programs.

In a few locations, crab apple (*Malus florabunda*) either has been introduced or invaded. This invasive species can be cut and herbicide treated to reduce resprouting. There are a number of openings within the pine plantations that are dominated primarily by needle grass (*Stipa spartea*) with Big bluestem present, Ragweed (*Ambrosia psilostachya*), goldenrod (*Solidago nemoralis*), and either woodland sedge (*Carex foenia*, *Carex pennsylvanica*, and *Carex muhlenbergii*) also present as a sparse understory.

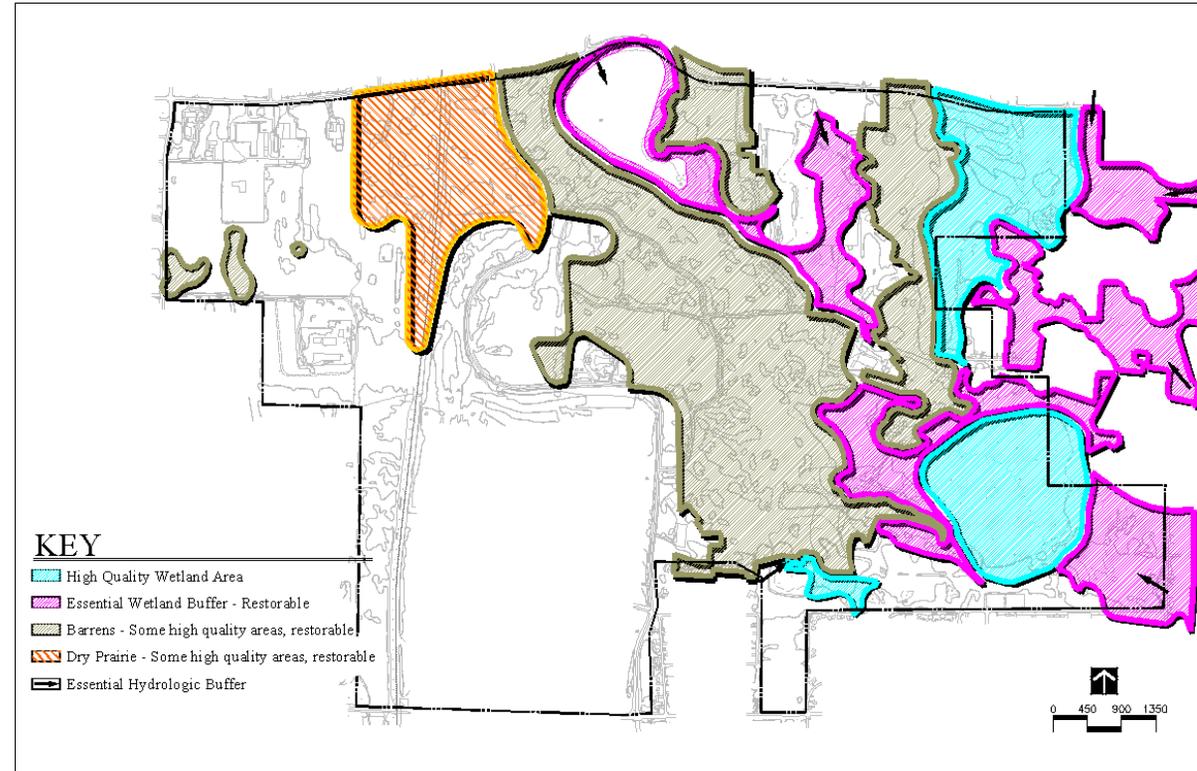
For the long-term health and sustainability of the park's ecological systems, removal of some of the pine plantations and thinning of others is necessary. This is especially true in areas adjacent to the higher quality oak systems. Staged thinning and even clear-cutting will be necessary in these instances. Prescribed burning will also be an important management tool, especially in preventing invasive spreading of pines. The high combustibility of the needle litter underscores the need for a careful approach to the fire management. Low-intensity cool spring burning under conditions of low wind speed and high relative humidity will reduce the duff layer and combustible fuels.

Primary Ecological Zone Delineation

The primary ecological zone delineation permits a broader perspective on the ecological characteristics of the park.

The primary ecological zone delineation in figure 3.5 permits a broader perspective on the ecological characteristics of the park. Taken together, the dominant vegetative communities within this zone define the ecological core of the park.

Figure 3.5 - Primary Ecological Zone Delineation



The ecological core encompasses the most ecologically sensitive and hence ecologically important areas of the park.

As illustrated, the ecological core encompasses the most ecologically sensitive and hence ecologically important areas of the park. Land within this core area serves as the ecological underpinning for defining the various land use and development of the master plan. In sync with the purpose of a regional park, natural resource preservation and land stewardship will be a key focus for much of this core area.

Park improvement activities within the ecological core will focus on restoration and management of the natural resources. Development will be a secondary consideration and generally limited to areas that have been previously developed or disturbed. The trail system will traverse the ecological core to permit human use and enjoyment of the area while minimizing impacts to the surrounding plant communities. The trails will also play an instrumental role in resource management (fire breaks and management boundaries).

Natural Resources Restoration and Management Framework

For the long-term ecological health of the park, a well-defined natural resource restoration and management plan must be implemented.

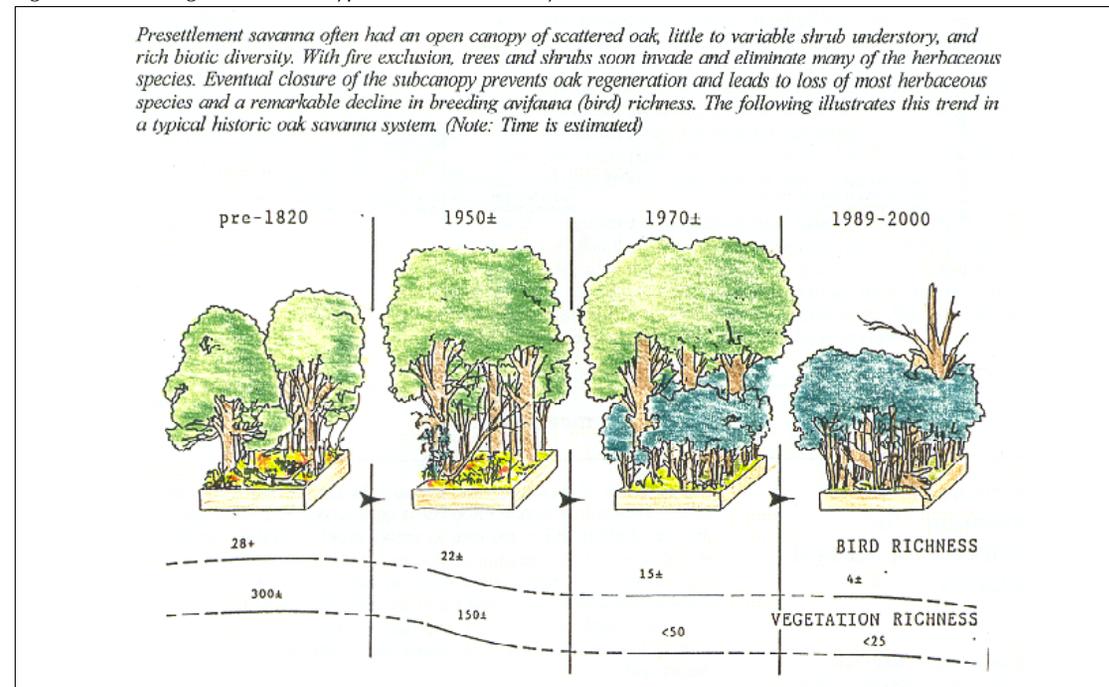
The impact of human activities since settlement (land and water alterations, pine planting, etc.) coupled with the curtailment of naturally-occurring events (wildfires) have served to change the ecological balance and character of the park. Some of these impacts will have lasting affects, while others can be addressed to forestall further degradation and help ensure a sustainable and healthy landscape for future generations.

For the long-term ecological health of the park, a well-defined natural resource restoration and management plan must be implemented. The following provides an overview of the restoration and management issues and a framework for plan development.

Overall Trends in Natural Resource Quality

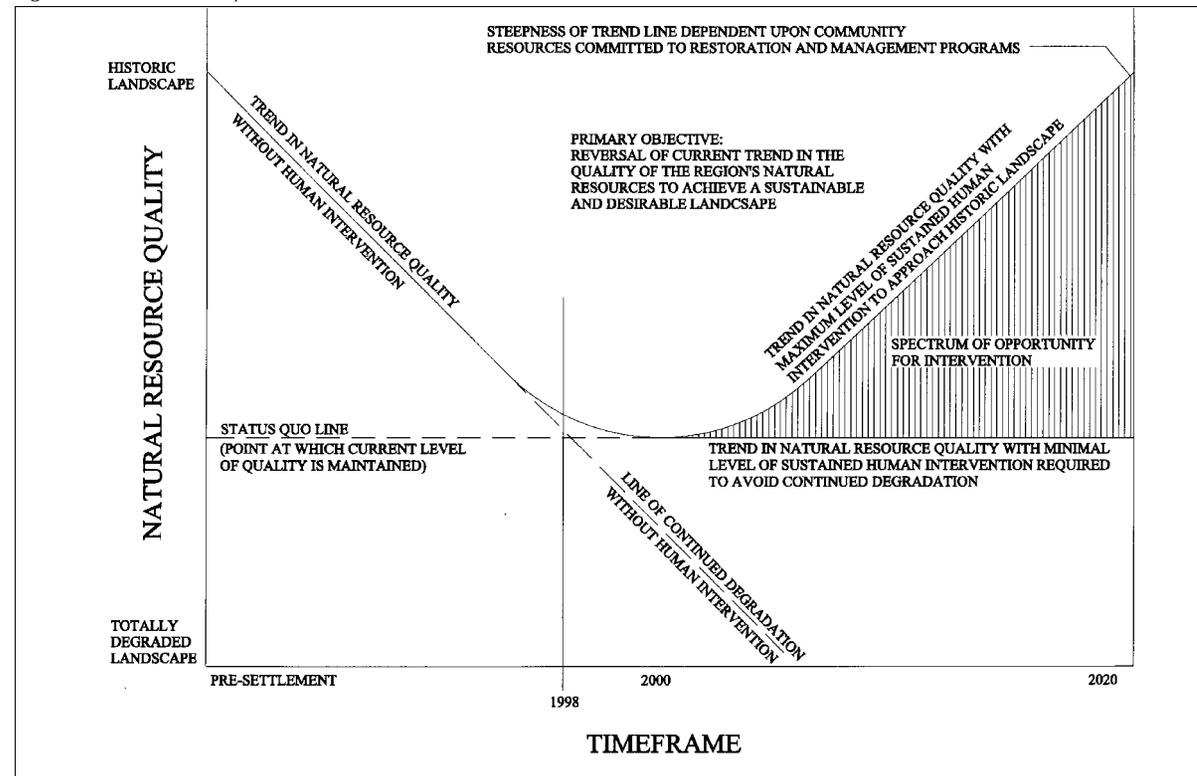
Without human intervention, it is expected that the overall trend of the natural resources within the park is toward continued decline, as measured by bio-diversity and general ecological health. Figure 3.6 graphically illustrates the ecological trend in a typical historic oak savanna system found in this and many other midwestern regions. This example is reflective of the type of trends that are apparent to varying degrees in the ecological systems previously defined. Figure 3.7 graphically illustrates the current trend in cumulative natural resource quality and defines the spectrum of opportunity for reversing this trend.

Figure 3.6 - Ecological Trend in Typical Oak Savanna System



Without human intervention, it is expected that the overall trend of the natural resources within the park is toward continued decline.

Figure 3.7- Trend Analysis



Cultural Impacts Affecting Natural Resource Quality

As stated, culture impacts both on and off-site have had an impact on the natural resources of the park. Off-site land and water alterations have changed the dynamics of the larger, regional ecology – leaving the park as a bit of an oasis and a small remnant of the historic landscape. Pine plantings 30 or 40 years ago have significantly changed the character of the park. The stable operation has impacted the ecological balance in that area of the park.

Other cultural activities have also contributed to the ecological concerns facing the park. Reckless use of off-road vehicles and ATV's have left some areas nearly devoid of vegetation and susceptible to increased erosion, especially along the western border of the park. The high erodability of the sandy soils have made even typical use of the park, such as hiking on a nature trail, cause for some concern.

Through insightful development and management of the park, a reasonable balance between human use of the park and ecological sustainability is achievable.

The spectrum of opportunity for reversing the trend in the quality and vitality of the natural resources within the park is quite broad.

The overall trend in ecological quality provides its own rationale for taking action.

With certainty, human use of the park has and will continue to have an impact on its ecological systems. But through insightful development and management of the park, a reasonable balance between human use of the park and ecological sustainability is achievable.

Spectrum of Opportunity for Restoration of Natural Resources

The spectrum of opportunity for reversing the trend in the quality and vitality of the natural resources within the park is quite broad. At a minimum, a certain amount of human intervention will be required to simply avoid continued degradation. At the other end of the spectrum, achieving a historic landscape quality can perhaps be approached -- although it is unrealistic to expect that a pre-settlement quality can be replicated given the impacts to the land over the years since settlement occurred. The framework presented here proposes that the county seek to achieve a sustainable landscape quality.

A sustainable landscape is defined as the point at which the county can indefinitely maintain a certain acceptable level of resource quality. This sustainable level is contingent upon two primary factors:

- < Public understanding of and support for the restoration programs
- < Resources committed to undertaking restoration and management of ecological systems

Individual and community values, policy-makers support, and financial resources will ultimately define the extent to which restoration and management programs are implemented.

Rationale for Undertaking Restoration and Management Programs

The overall trend in ecological quality provides its own rationale for taking action. The analysis makes it clear that the long-term prospects for preserving the quality of the natural resources within the park is suspect unless appropriate measures are taken in the near future. Further, the decline of the vegetation systems will likely be followed closely by reductions in wildlife species richness and the health and viability of other organisms in the ecological system.

There are many scientific reasons for taking action. The most compelling ones include:

- < Oak regeneration is not occurring and existing larger oaks are in serious decline.
- < Avian populations and richness are predicted to decline by more than half.
- < Native plant species have experienced significant declines.
- < Introduction and proliferation by non-native plant and introduced species represents a serious threat to soil, fauna, and native vegetation systems.
- < Serious erosion problems are associated with the collapse of ground cover vegetation beneath the shade of introduced shrubs and pines. With this erosion, loss of soil seed banks, roots, and tubers is occurring.

Restoration and Management Philosophy

Through a well-defined restoration and management program, a concerted, ongoing effort by the county, and an extensive public education campaign, a certain level of confidence can be gained that the current ecological trends can be reversed and a more sustainable and higher quality landscape achieved.

Management plans need to be flexible due to the variability exhibited by the temporal and spatial resources addressed by any plan.

A less scientific but equally compelling reason to take action is that citizens in this metropolitan region have an expectation that the natural resources that surround them will remain healthy and ecologically viable and that responsible land stewardship will remain at the forefront of our discussions and debate.

Through a well-defined restoration and management program, a concerted, ongoing effort by the county, and an extensive public education campaign, a certain level of confidence can be gained that the current ecological trends can be reversed and a more sustainable and higher quality landscape achieved.

The philosophical basis of this plan is heavily reliant on careful and efficient implementation of restoration and management programs. This philosophy focuses on creating ecologically valuable biological communities within the context of a disturbed landscape. The initial study of the park provides some fundamental information that serves as a baseline for developing a comprehensive plan and assessing the effectiveness of those plans.

Vascular vegetation in this project is being used as a surrogate for environmental quality. The assumption is that if the vascular vegetation communities are restored, then wildlife opportunities and human enjoyment benefits will also be realized. The restoration philosophy for this project should focus on creating and restoring ecological systems as efficiently and effectively as possible. It should not be the intent to slavishly re-create landscapes that were present 150 years ago. Some changes in the landscape and existing conditions simply preclude these opportunities. Therefore, it should not be a goal of this project to burden the residents of the region with restoration and management that would be neither practical nor achievable. The key outcome is to establish a program that reverses the current downward trend in the quality of the park's natural resources and achieve a sustainable landscape that can be perpetuated indefinitely.

Adaptive Management

Management plans need to be flexible due to the variability exhibited by the temporal and spatial resources addressed by any plan. Plans also change over time in response to new data and derived insights unique to the site. For these reasons, this framework should be viewed as being neither conclusive nor absolute. It is a starting point in an ongoing process that relies on monitoring to provide feedback on program effectiveness and for evaluation of the need for and justification of changes. This process of evaluation, adjustment, refinement and change is *adaptive management* and is fundamental to future management, maintenance, and restoration.

Restoration and Management Phases

To some degree, the testing and education phase is already moving forward in that the staff has already begun some baseline restoration work and other restoration programs.

Typically, a restoration and management plan is comprised of three phases:

- < Phase I: Testing and Education Phase -- broadens understanding of restoration needs, options, and opportunities. Also increases local residents' knowledge and understanding of restoration issues.
- < Phase II: Remedial Phase -- involves the major restoration and management tasks and consequently is usually the more expensive phase. Its focus is on returning the land to the biological and structural conditions desired and sustainable.
- < Phase III: Maintenance Phase -- represents the long-term management restoration program tasks associated with this project. This should be viewed as a routine maintenance program conducted annually at strategic times to achieve and maintain specific ecological and biological objectives in the subject properties.

Phase I - Testing and Education

To some degree, the testing and education phase is already moving forward in that the staff has already begun some baseline restoration work and other restoration programs. Likewise, county-wide educational programs are either already being implemented or are in the development stage. New programs should build upon these successes.

Developing test plots and pilot programs and developing a comprehensive educational campaign are parallel first steps toward restoring balance to the park's ecological systems. The former serves to help understand the needs, options, and opportunities for restoration and management of declining ecosystems within the city. The latter serves to increase residents' knowledge and understanding of these issues and instill a sense of importance and urgency in undertaking restoration programs. The following considers these issues in greater detail.

Testing and Pilot Programs

Small test or demonstration plots are the backbone of the initial testing program. Testing should occur in each ecological zone to test a cross-section of conditions found and to provide wider public exposure to the program. These tests will help determine which restoration practices are best suited for the setting.

It is recommended that the testing scenarios be tested in small research plots within the park. A few may be tested in a greenhouse setting to control as many variables as possible. Plots can also be field located to provide an opportunity for testing multiple research possibilities.

There are a variety of testable scenarios and treatments that can be used. Selecting the most opportune of these would be done as the testing program is implemented. Likely test and demonstration plots encompass:

- < Regeneration of oak forests -- to stimulate new growth.
- < Reduction of shrub cover -- to increase light to the ground layer and stimulated growth.
- < Reduction of cool season grasses (and associated duff) -- to stimulate native species soil seed banks.
- < Reduction of noxious weeds and woody plants -- to give competitive edge to native plant species. instead of invasive, non-native plants (i.e., Garlic mustard, European buckthorn, Tartarian honeysuckle, and Reed canary grass).
- < Reintroduction of ground cover plants and seed -- to reestablish native seeds.
- < Establishment of native plant nurseries and gardens -- for educational purposes.
- < Establishment of community outreach programs -- so residents establish a personal stake in the project.

Testing Standards

Standardized ecological field sampling methods are recommended used for undertaking each of the programs. This ensures conformance with scientific standards and reliability of testing outcomes. Data is collected, analyzed, and used to set the parameters for full roll-out of the restoration and management plan throughout the park system.

Effect of Testing and Pilot Programs

There are a number of visible ecological impacts of the test plots that are worth highlighting, especially when prescribed burns are used. These include:

- < Access into plot areas will be restricted for several hours during prescribed burning treatments.
- < Site may appear burned for several days until grass green-up occurs if prescribed burning is conducted in the spring.
- < After a short period of time, native and other rare plants will begin to benefit from prescribed burning.
- < Overall aesthetics of the site will be improved as new growth asserts itself.
- < Personal security will be improved due to increased visibility through the understory.
- < Creation of healthy assemblies of native species will restrict further invasion by non-native species.
- < Soils on the site will again be stabilized through the reintroduction of native plant species and the reduction of non-native ones that create dense shade.
- < Water quality benefits will be realized with soil stabilization and nutrient entrapment.

Education Programs

Education plays a key role in the successful implementation of restoration programs. Although these programs are scientifically proven to vastly improve natural landscapes, they will change the visible characteristics of the areas being restored. The public's understanding of what is happening becomes paramount to their support of the full roll-out of restoration programs.

Standardized ecological field sampling methods are recommended used for undertaking each of the programs.

Education plays a key role in the successful implementation of restoration programs.

Although set up for research purposes, the testing and pilot programs will also serve as in-the-field educational tools. Direct exposure to restoration practices and their impact on the surrounding environment will give residents working knowledge of restoration programs. This approach sets the stage for Phases II and III of the restoration and management plan.

Phase II - Remedial Phase

The remedial phase focuses on returning the land to the biological and structural conditions desired and sustainable.

The remedial phase focuses on returning the land to the biological and structural conditions desired and sustainable. The period of time required to conduct the remedial restoration phase depends on the level of effort required, condition of the ecological systems, opportunities and constraints (i.e., access, weather, biological response), and level of funding available for the program.

The remedial phase employs a variety of restoration techniques in a major effort to restore vegetation and habitat structure and biological diversity and restore ecological and bio-geochemical functions. Tasks undertaken during this phase include reducing introduced nonnative and other undesirable trees and brush, removal of previous debris and substrate fill areas, addressing erosion and contamination problems, and other general tasks. In some projects this phase may involve machine/mechanical planting of native plants, including larger trees and other plants.

Phase III - Maintenance Phase

The maintenance phase focuses on long-term management tasks, which are viewed as a routine maintenance program conducted annually at strategic times to achieve and maintain specific ecological and biological objectives.

The maintenance phase focuses on long-term management tasks, which are viewed as a routine maintenance program conducted annually at strategic times to achieve and maintain specific ecological and biological objectives. This phase will require an ongoing effort designed to achieve a desirable and sustainable ecological system within the context of available funding, other resources, and the public's commitment.

After significant investments in human energy and funding in Phase II, restoration shifts to a low-intervention program during the maintenance phase. This is less costly and provides an excellent opportunity for long term citizen and student involvement.

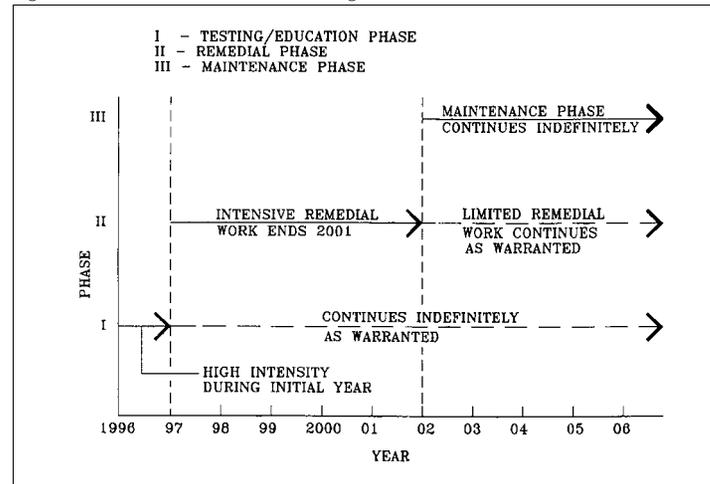
Once established, the maintenance phase is guided by both regular management techniques and by strategies that are implemented on a rotational basis through identified subunits. The park would be divided into ecological units and sub-units that are convenient to manage (i.e., prescribed burning units demarcated by existing and convenient hiking trails that serve as safe fire breaks, and so forth).

It is during the maintenance phase that the restoration plan would become part of the park's general operations and maintenance function. Along with this comes routine training and education of maintenance staff.

Restoration and Management Timeframes

The restoration work tasks are consistent between the remedial and maintenance phases. The primary distinction between the two phases lies in the intensity of the work involved to achieve a set of objectives, and the use of one restoration technique over that of another. For example, the initial thinning of dense clusters of pines in a given area may require substantial effort during the remedial phase. Under the maintenance phase, continued thinning will still be necessary, but require substantially less effort. Figure 3.8 illustrates how the level of restoration effort lessens as the management plan moves from the remedial into the long term maintenance phase.

Figure 3.8 - Restoration and management timeframes



As the figure illustrates, the remedial phase can take up to five years to complete. This timeframe is highly dependent upon the magnitude of the work involved to complete restoration tasks and the resources committed to this effort. The maintenance phase begins once remedial work is completed and continues on indefinitely at a sustainable level.

Overview of Restoration Techniques

The restoration and management plan requires implementing specific tasks to meet performance criteria and achieve improvements to the ecological systems in the park.

The restoration and management plan requires implementing specific tasks to meet performance criteria and achieve improvements to the ecological systems in the park. Forthcoming is an overview of specialized yet straight forward techniques used to carry out the specific restoration tasks. Of the techniques listed, prescribed burning is the single most useful and important management method required for restoration. The other restoration techniques and strategies are most often used to prepare a site for prescribed burning or as a means to reintroduce proper conditions and species into sites.

Of the techniques listed, prescribed burning is the single most useful and important management method required for restoration.

Prescribed Burning

Prescribed burning is generally defined as:

"...the highly controlled use of fire under optimal weather and environmental conditions to achieve specific ecological objectives"

Wildfire and fires started by indigenous people and natural causes have played an important role in the evolution and maintenance of many biological systems throughout North America. It is now being realized just how essential the role of fire is in maintaining grasslands, wetlands, savannas, barrens, and numerous forest types. It is also now realized that fire suppression can result in gross changes in the aspect, appearance, and ecological functions of natural systems.

Fire suppression is often followed by a decline in the richness and diversity of native plants and animal species, increased litter, shading, phytotoxin build-up in substrates, decreased availability of essential nutrients and increased homogeneity in habitat structure and spatial heterogeneity. Reduced nutrient cycling and increasing domination by few species often results. In some ecosystems, shifts in wildlife and increases in shade tolerant and less flammable plant species accompany fire suppression.

Prescribed burning has been the primary prairie management tool, but only recently have efforts been made to use fire for the maintenance and restoration of other ecological systems. No other technique comes close to the impact that this naturally occurring phenomenon has on restoring and preserving natural ecological systems. It is a fundamental component of the restoration program to which there is no reasonable substitute. Conducted by trained personnel, prescribed burning has proven to be safe.

Weeding and Brushing

Weeding and brushing are the primary techniques used where dense brush and little combustible fuel occurs.

Preparation of the site so that prescribed burning can be introduced will be necessary in some locations given the extent to which invasive species have established themselves. Weeding and brushing are the primary techniques used where dense brush and little combustible fuel occurs. Manual reduction of existing dense shrub growths will be required to open these areas. Once open, prescribed burning can be used. This will be especially successful if native ground cover vegetation regeneration responds directly to the reintroduction of fire.

If the use of fire is hampered in areas with nonnative cool season grasses, alternatives to consider to facilitate eventual use of fire include:

- < Very careful and discriminate use of herbicides -- used where the evergreen growth of cool season grasses do not carry fire. Direct plant contact with a wick applicator and the herbicide *Rodeo* or *Roundup* have provided quick and safe initial control of the grasses.
- < Low mowing of the grasses (0.5 to 1 inch height) -- can reduce green foliage and, after drying, litter can be used as fuel to carry a fire.

Herbicide is generally applied to cool season grasses after they have reached a height of 5-8 inches and display a new flush of green, actively growing foliage. It is applied at prescribed rates by trained and licensed field specialists. On larger pieces of property, wick applicators with adjustable boom heights are very useful for "wicking" plants.

Carefully overseeing the process is critical regardless of the method used. Although the herbicides used are incorporated within several hours after application, and wick application (in contrast to spraying) involves a very small quantity of herbicide, the areas that are treated would be field labeled and guarded to manage human-use for the first couple hours after application. The herbicides used, such as *Roundup*, have very low toxicity to humans and wildlife and will not present a threat when used properly.

Prescribed fire usually follows 5-15 days after the herbicide treatment or after the mowed grasses are dry enough to burn, which varies depending on weather conditions.

Seed Harvesting and Disbursement / Planting

Reintroduction of vegetative species will likely be required in areas where natural seed banks are lacking or in areas offering little opportunity for self-regeneration. In these instances, it is recommended that reintroduction be generally limited to species that have historically occurred in the area.

In some cases, the use of nonnative vegetative species may be warranted. An example of this is display gardens with plant species that may or may not have historic relevance. Another example is the use of short lived nonnative species (i.e., annual rye grass) which may assist in stabilizing badly eroding slopes. The key point is to understand the use of these plant species and their propensity for getting out of control, which is the case with buckthorn.

Plant propagation and the introduction of seeds and plants for local species should continue concurrently with other management and restoration strategies to achieve restoration objectives. Observations suggest some soil seed banks are present within the park and vital to restoration programs. But to restore these and other areas, additional seeds from native species (either propagated and cultivated for seed production or wild picked seeds) should be gathered or produced in ample quantity and quality to enable prompt introduction during the early years of restoration.

For species that are no longer present in the area, appropriate locations should be identified for seed harvesting, propagation, cultivation and eventual introduction purposes. In as much as possible, seeds should come from areas close to the site of introduction. The bounds for collection for any introduction program are typically limited to the physiographic province (i.e., natural area division) of the recipient location.

Reintroduction of vegetative species will likely be required in areas where natural seed banks are lacking or in areas offering little opportunity for self-regeneration.

Performance criteria establish a set of standards that are readily understandable to the lay person yet achieve scientific objectives.

Performance Criteria

Performance criteria establish a set of standards that are readily understandable to the lay person yet achieve scientific objectives. Realizing these performance benchmarks indicates that a desirable end is being achieved -- namely a sustainable landscape that brings the natural resources of the park closer to their pre-settlement qualities.

With strong public support and adequate resources, the forthcoming performance criteria are achievable in the this setting. Generalized performance criteria includes:

- < Brushing -- achieve 90% mortality of all treated stems within a three to five year period (resulting in a 90% reduction in the non-native woody plants and undesirable shrub material).
- < Native ground cover vegetation -- achieve a cover value in meter square quadrant samples of 50-70% grasses and sedges, and 30-50% cover of native forbs within a three year period.
- < Planted areas -- achieve performance comparable to the native ground cover vegetation objectives within three years.
- < Light at the ground story -- achieve available light to the ground story to exceed 40% of ambient at 75% of the stations established along the study transects (as measured using light meters held at a height of 1 meter above the ground).
- < Aesthetics and visibility -- achieve increased visibility within forested communities at up to 60% of all sight line positions at distances of 200-400 feet. (using a two square foot white card held at a 2 meter height).

At appropriate times, additional standardized ecological evaluation methods should be used to ensure that restoration objectives are being met. This also ensures that the achievements made in restoration are in sync with scientific parameters.

Overview of Restoration Approach Associated with Ecological Systems

The restoration techniques listed above, as well as other appropriate practices, will be used to achieve specific improvements to natural resources within the park. The following table provides an overview of the restoration and management approach related to the ecological systems previously defined.

Restoration and Management Approach Framework

The loss of mature oaks through wind and disease is a major ecological concern requiring aggressive restoration and management programs to forestall further decline.



Under the right conditions and thoughtful management, new oak regeneration can and is occurring in the park.



Ecological System	Overview of Restoration and Management Approach
<p>Deciduous Woodlands / Savanna</p>	<p>Lack of oak regeneration and virtual dominance by older age classes of oaks is a major ecological concern within the park. The dominant oaks are reaching pathological maturity and will begin to degenerate rapidly. This is very problematic because older trees do not regenerate vegetatively. They are also increasingly susceptible to disease, such as oak wilt, as they grow older. Also, the overstocked canopy is not allowing for natural succession to take place and for new age classes of oaks to be fostered.</p> <p>A precipitous decline in breeding bird use is also occurring with the decline in oak barrens systems. Recent studies document the decline from over 28 native breeding bird species in quality oak systems to only 4 in serious degraded ones.</p> <p>Managing the invasive, non-native plant species and stabilizing the soils through the reintroduction of native species at the ground level and understory are critical to preserving the oak savanna systems.</p> <p><u>Management /Restoration Practices:</u></p> <ol style="list-style-type: none"> 1) Herbicide treatment and manual reduction of undesirable introduced shrubs. 2) Removal of excessive litter and fallen trees to open up the understory and allow for prescribed burning to take place. 3) Prescribed burning on a regular (1-3 year) rotation. 4) Seeding with locally collected native plant seeds where native species seed banks are not present or do not respond to the above treatments. 5) Stimulation of oak regeneration through the introduction of acorns and seeding oaks. 6) Monitoring and reporting of results.

Restoring native prairie species in the pasture lands will be one of the key restoration challenges.



Prescribed burning in recent years is proving to be an essential tool for restoring native prairies in the park.



Prairie/Old Fields

The prairie remnants that remain in the park and those that have been restored in recent years highlight the possibilities that restoration and management offer. In some areas of the park, however, a significant proportion of non-native grasses and other nonnative plants provide little opportunity for native ground cover species to establish or persist, or to flower and reproduce and thus many species are steadily declining. Also, some of the most eroded areas of the park caused by human activities are in the prairie areas. There is serious doubt in some of these cases that many native species, except those with long-lived soil propagules, have much chance for survival under current conditions.

Since non-native grasses and other aggressive perennial plant species often end up dominating many of these areas, establishing and spreading desirable native ground cover species will not occur without management.

Management /Restoration Practices:

- 1) Remove shrubs and stumps and other non-burnable vegetation. Herbicide treatment to reduce existing persistent non-native grasses. Mowing will also be necessary.
- 2) Prescribed burning on a regular (1-3 year) rotation.
- 3) Seeding with locally collected native plant seeds where native species seed banks are not present or do not respond to the above treatments.
- 4) Inter-seeding of native prairie grasses and forbs in existing old fields conducted by no-till drilling or scattered by hand after prescribed burning. Tillage is not desirable as this could stimulate weed species seeds.
- 5) Monitoring and reporting of results.

Restoring biodiversity within the wetland systems is a key component of the management plan for the park.



On-site factors, such as the pasture land and feed lot for the stable, will have to be more aggressively managed if wetland restoration is to be successful.



Open Wetlands

As illustrated in previous figures, some of the wetlands are showing signs of significant deterioration through excessive nutrient loading and hydrology changes associated with urban storm sewer systems, the stable operation, as well as other sources. Although not thoroughly investigated in this study, the ecological changes observed suggest that the surface water hydrology and chemistry and perhaps shallow/ground water chemistry have been altered by on and off-site development and the addition of high levels of macro-nutrients. Additional study of site hydrology and nutrient loading and remedies for these occurrences is recommended if a higher quality, more diverse wetland ecosystem is to be achieved. It is also important to maintain adequate buffers along the perimeter of the park to minimize any future degradation to the higher quality wetlands found on the site.

Gaining a more complete understanding of hydrologic patterns is a recommended first step in restoring the wetlands. Field observation suggests that there are unique hydrologic factors that can be either contributing to or preventing changes to the site’s ecology. For example, the high quality wetland on the southeastern side of the park appears to exhibit groundwater up-charge characteristics, which helps sustain a healthy and diverse wetland system in this area.

Several plant species (i.e., cattails, and reed canary grass) may require special management attention. The purple loosestrife (a noxious weed) population in the region has been spreading rapidly and will definitely require management as it further invades the wetlands.

Management /Restoration Practices:

- 1) Undertake study to define overall hydrologic characteristics.
- 2) Attenuate on and off-site impacts to historic hydrologic systems where achievable.
- 3) Prescribed burning on a regular (1-3 year) rotation.
- 4) Spray herbicide treatment to reduce existing persistent non-native/undesirable grasses.
- 5) Seeding with locally collected native plant seeds where native species seed banks are not present or do not respond to the above treatments.
- 6) Monitoring and reporting of results.

Prescribed burning is one of the key restoration techniques that is currently being used in the park to forestall the succession of pine trees into historic oak barrens and prairie landscapes.



**Upland Forest
(Pine Plantations)**

Managing the pine plantations through thinning and removal should continue. Over time, many of the pine stands should be replaced with plant communities with more of a historical connection to the site. Also, some pine stands, such as along the “A” road, that interfere with the visual aspects of the native landscape should be phased out and replaced with more desirable plant species.

Management /Restoration Practices:

- 1) Continue managed thinning operation to improve overall health of pine stands that are to remain.
- 2) Remove pine stands that interfere with the native plant communities, especially those in the core ecological zone.
- 3) Herbicide treatment and manual reduction of undesirable introduced shrubs.
- 4) Prescribed burning on a regular (1-3 year) rotation to reduce the overall propensity for pine propagation. (Caution is advised in that the ground layer in many locations may be too combustible and pose a concern about burn control.
- 5) Seeding with locally collected native plant seeds where native species seed banks are not present or do not respond to the above treatments.
- 6) Stimulation of oak regeneration through the introduction of acorns and seeding oaks.
- 7) Monitoring and reporting of results.

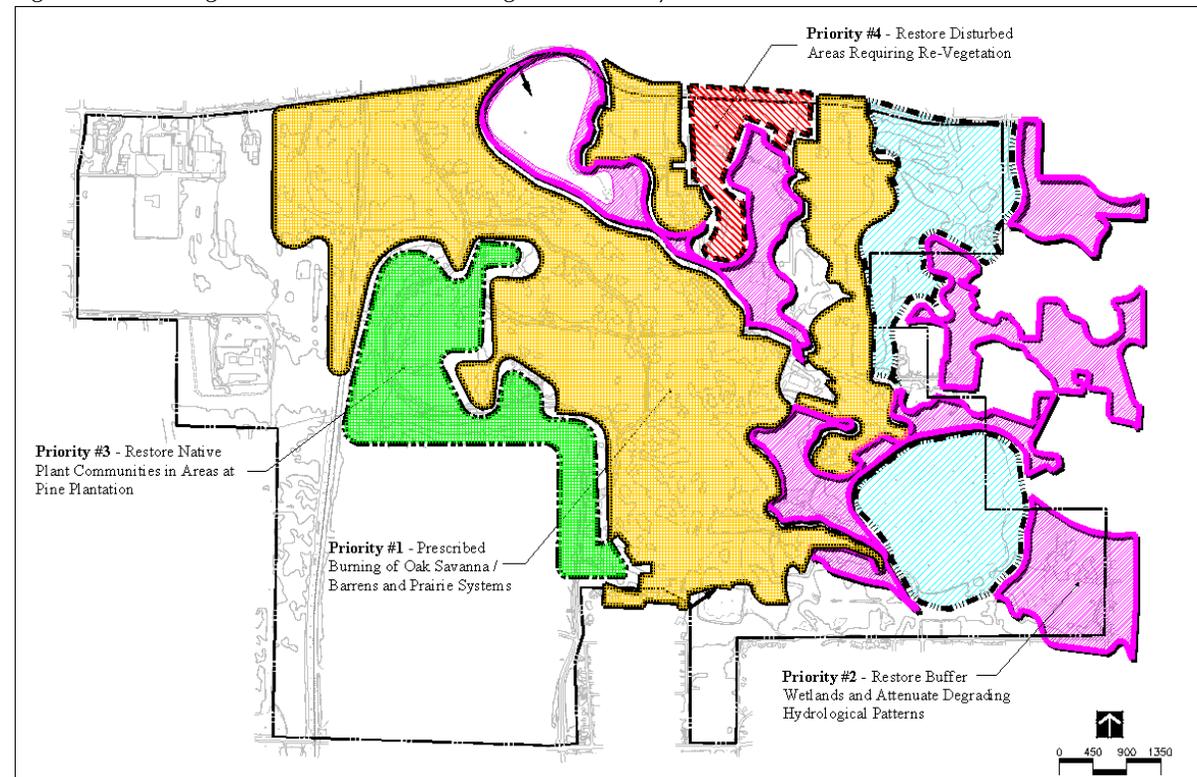
Summary of Ecological Restoration and Management Priorities

Summarizing the priorities for restoring the ecological systems within the park is difficult to do with exactness. In reality, many of the restoration tasks will proceed concurrently or in lock-step fashion with other tasks for practical reasons. Also, various restoration programs will be underway in different areas of the park at any given time. Some generalizations, however, can be made to provide direction and establish a context for undertaking restoration programs. The following defines a number of key overall restoration priorities:

- < Prescribed burning of oak savanna/barrens and prairie systems – this is a fundamental requirement for restoration.
- < Restore buffer wetlands and attenuate on and off-site hydrological patterns that degrade on-site wetland systems.
- < Restore native plant communities in areas with extensive pine plantations.
- < Restore disturbed areas requiring re-vegetation.

Figure 3.9 defines these priorities on a map of the park.

Figure 3.9 - Ecological Restoration and Management Priority Areas



Wildlife Habitat Potential

The wildlife found within a landscape is a reflection of the habitat. Previous studies conducted through local universities and the Audubon Society and observations during field work reveal a diversity of wildlife already present. Under the vegetative restoration plan as defined in this section, the potential for expanding the type and number of wildlife species is extensive. This is especially true of birds species, who would benefit from improved food and nesting sources associated with prairies, oak savannas, and wetlands.

The following chart provides a representative list of wildlife that can be increasingly supported within the park as restoration programs are implemented.

Birds:

- < Peewee
- < Black-capped chickadee
- < Blue jay
- < Gold finch
- < Red eye vireo
- < Red start
- < Cedar waxwing
- < Myrtle warble
- < Red-tailed hawk
- < Cat bird
- < Yellow throat
- < Pied-billed grebe
- < Great blue heron
- < Green heron
- < American bittern
- < Canada goose
- < Mallard
- < American widgeon
- < Blue-winged teal
- < Wood duck
- < Redhead
- < Canvasback
- < Lesser scaup

- < Red-tailed, marsh, and sparrow hawks
- < Ruffed grouse
- < Ringed neck pheasant
- < Sora
- < Killdeer
- < Woodcock
- < Wilson's snipe
- < Solitary sandpiper
- < Least sandpiper
- < Common and Black tern
- < Meadowlark
- < Rock dove
- < Mourning dove
- < Great horned owl
- < Belted kingfisher
- < Flicker
- < Downy and Hairy woodpecker
- < Robin
- < Barn swallow
- < Purple martin
- < Bluejay
- < Nuthatch
- < Marsh wren

Mammals:

- < White-tailed deer
- < Eastern chipmunk
- < Least chipmunk
- < Coyote
- < Skunk
- < Short-tailed screw
- < Little brown bat
- < Raccoon
- < Short-tailed weasel
- < Mink
- < Red and Gray fox
- < Woodchuck
- < Ground squirrel
- < Red and Fox squirrel
- < Pocket gopher
- < White-footed deer mouse
- < Meadow mouse
- < Muskrat
- < House mouse
- < Porcupine
- < Cottontail

Reptiles and Amphibians:

- < Eastern gartner snake
- < Red bellied snake
- < Eastern painted turtle
- < Common (gray) tree frog
- < Wood frog
- < Leopard frog
- < American toad
- < Spring peeper
- < Tiger salamander
- < Green frog
- < Chorus frog
- < Red-backed salamander
- < Snapping turtle
- < Prairie skink
- < Hog-nosed snake – eastern and western
- < Bull snake

Section IV

Universal Design Framework

Overview

In recent years, extensive public debate has been focused on equal access to indoor and outdoor public spaces for all individuals. The Americans with Disabilities Act of 1991 (ADA) turned past guidelines and standards into law, forever changing the way accessibility issues are to be addressed.

But the ADA is not an end unto itself. It is simply another step toward a design philosophy that ensures accessibility for all. The challenge is to move beyond the ADA to a more encompassing approach to design. This section defines how that challenge will be addressed in this park setting.

The Principle of Universal Design

It becomes self evident that design philosophy must continue to evolve if a barrier-free environment is to be realized in the design of parks.

As stated in the recently published design guide *Universal Access to Outdoor Recreation* (PLAE, Inc. 1993), past criteria for barrier-free design (elimination of barriers to access) were based upon the needs of average human beings or the needs of the wheelchair user (which was often thought to represent the broadest spectrum of disabling conditions). In fact, the majority of people with disabilities are ambulatory and do not require a wheelchair. In reality, the range of abilities and disabilities goes well beyond these limited definitions. It has become evident that design philosophy must continue to evolve if a barrier-free environment is to be realized in the design of parks. Universal design is an approach to design that seeks to achieve this philosophy by combining the basic principles of barrier-free design with a more comprehensive view of human beings, as expressed by the Enabler Model in figure 4.1.

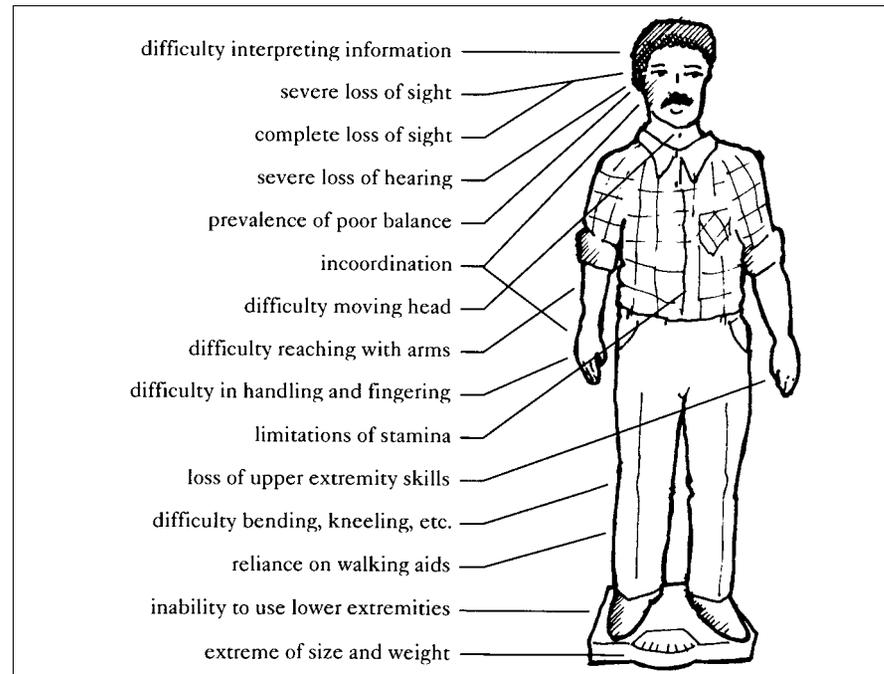
The Enabler Model brings to light the broad spectrum of disability concerns that must be considered if universal design is to be achieved. The model serves as a conceptual aid that helps designers and lay persons empathize with those who will actually be using a site, building, or facility, and encourages a more comprehensive and integrated view of people with and without disabilities. As such, it forms the basis for a design philosophy that today is becoming known as universal design. *Universal Access to Outdoor Recreation* establishes a comprehensive view of this philosophy and serves as the basis for the forthcoming discussion.

By focusing attention on this broad spectrum of needs, facility design can accommodate people with varying degrees of abilities and disabilities. This is distinctly different than simply accommodating a set of accessibility requirements that ensure compliance to the law but may not ensure accessibility for all people to a variety of outdoor settings.

Figure 4.1 - Enabler Model.

Source: *Universal Access to Outdoor Recreation*
(PLAE, Inc. 1993)

The Enabler Model brings to light the broad spectrum of disability concerns that must be considered if universal design is to be achieved. The model serves as a conceptual aid that helps designers and lay persons empathize with the people who will actually be using a site, building, or facility, and encourages a more comprehensive and integrated view of people with and without disabilities.



Under this paradigm, universal design attempts to consider all degrees of sensory awareness, all types of locomotion, and all levels of physical and intellectual function. By doing so, the needs of individuals with varying desires, abilities, and expectations can be reasonably accommodated in an appropriate setting. The end result is that individuals with and without disabilities are accommodated in a manner that meets their *expectations* for a specific outdoor space or setting.

The philosophical underpinnings of universal design as defined by *Universal Access to Outdoor Recreation* includes:

- < People purposely choose settings for their recreation activities.
- < Choices are made with the expectation of achieving specific recreation experiences.
- < Desirability to present as diverse a spectrum of activities and recreation setting opportunities as practical for a given site.

The forthcoming recreation opportunity spectrum (ROS) and outdoor recreation access classifications serve as a means to achieve this end. They are flexible guidelines that set the framework for making appropriate accessibility decisions that permit universal access within the context of the public's expectation for a certain type of setting.

Recreation Opportunity Spectrum (ROS)

Under the ROS framework, it is not necessary or desirable to develop all recreation equally. From the ROS perspective, each site should be developed or modified in a manner that achieves harmony between recreation expectations and the environmental setting. Development must be tailored to complement the setting.

Outdoor Recreation Access

Applying the principles of universal access requires a defined implementation approach and a set of guidelines. The ROS is a recreation management approach used by the USDA Forest Service that is in keeping with the principles of universal design. The ROS framework is based on a continuum of possible combinations of recreation settings, activities, and experiential opportunities, as well as the resulting benefits that can accrue to the individual (by improving physical and mental well-being) and society.

To be manageable, the recreation opportunity spectrum is divided into four classifications that cover the full spectrum of outdoor recreation environments. These classifications are divided primarily in terms of perceivable modifications to the natural environment and the related influences these modifications have upon customer expectations. The following briefly defines the four ROS classifications:

- < **Urban/rural areas** – are highly developed and evoke expectations of easy access.
- < **Roaded natural areas** – are less developed than urban settings, but still contain a relatively high number of modifications to the environment. These areas evoke an expectation for a moderate level of accessibility and a reasonable expectation for “like” experiences.
- < **Semi-primitive areas** – are rarely developed, and evoke an expectation of difficult access.
- < **Primitive areas** – have few, if any, modifications. These evoke expectations for the most difficult access that require specific skills and capabilities.

Under the ROS framework, it is not necessary or desirable to develop all recreation equally. From the ROS perspective, each site should be developed or modified in a manner that achieves harmony between recreation expectations and the environmental setting. Development must be tailored to complement the setting. As an example, it is reasonable to expect that the access to the wave pool would be greater than access to the less accessible natural areas within the park. What is important is that the level of access must be in line with what is expected by the public – whether they are able-bodied or disabled – for a particular setting.

Under the Universal Access to Outdoor Recreation framework, there are two classifications for paths in outdoor recreation sites. The following defines the accessibility guidelines for each:

- < **Outdoor recreation access routes** – are paths that provide access to the primary developed recreation areas and facilities within a site. These routes typically provide an easy to moderate level of accessibility.
- < **Recreation trails** – are paths that provide access to other, lesser developed recreation activities and facilities within a site. Guidelines for these trails are less stringent than those for outdoor recreation access routes.

Application of Universal Design Principles

Since the concept of universal design is still in its relative infancy, it has yet to become common practice in the design professions. The challenge, then, is to consciously apply the principles of universal design to this park setting to determine what is most appropriate given the circumstances.

At the very least, the outcome of this approach is that more people of different levels of ability will have life enriching experiences in the park. At the very most, the park will serve as an example for others to follow, ultimately furthering the cause of making universal access an integral part of all design processes.

Applying ROS and Outdoor Recreation Access Classifications

Of the four ROS classifications defined above, two are found to have direct application in this park: urban/rural and roaded natural. The rationale for the use of these two classification are as follows.

Urban/Rural: Considered the primary ROS classification due to the park's location within a major metropolitan area. To varying degrees, the expectation of the user will be for relatively easy access to all major facilities and amenities. Development areas under this classification include:

- 1) Entrance gate/contact station (primary site access points)
- 2) Entrance drive and parking facilities.
- 3) Campground facilities.
- 4) Picnic facilities.
- 5) Wave pool.
- 6) Activities Center.
- 7) Archery range (practice range and some field ranges as appropriate for setting and intent of range).
- 8) Environmental Study/Learning Center.
- 9) Horse staging area.
- 10) Trail systems (trails in recreation development zones will provide easy access to facilities while some of the more remote trails in the Roaded Nature area will be more challenging as appropriate for the setting).

Roaded Natural: Is the secondary ROS classification and applies to over half the site that will be less developed than the areas listed above. Under this classification, the expectation of the user will be a moderate level of access in line with the outdoor experience being encountered. In this area, site features would not be extensively modified to provide easier access if doing so would dramatically change their character and negatively impact the experience of the user. In these instances, every attempt should be made to provide like experiences so that all users have an opportunity to appreciate the inherent character and quality of the park.

Providing access to site facilities and amenities essentially parallels the ROS classifications listed above.

Outdoor Recreation Access Routes: Easy to moderate access will be provided to all facilities listed under *urban/rural*.

Involvement of Representative Populations in the Design Process

Recreation Trails: Provide moderate to difficult access trails leading to and through the site's less developed areas. These trails will offer a broad spectrum of accessibility options that enable individuals of varying ability to appreciate the park at their own level of capability.

Section V - Development Master Plan considers the application of universal design principles for each of the site development initiatives.

Since universal design is still an evolving approach to design, achieving universal access is simpler in concept than in practice. Anticipating the needs of people with varying degrees of abilities and disabilities is a formidable task since it is often very difficult to understand the specific needs of individuals with different abilities when one does not share those limitations. Therefore, it becomes imperative that the design process include individuals that represent a cross-section of people with and without disabilities. As the project moves into design implementation phases, efforts should be made to involve representatives of divergent populations in the detail design of specific facilities. This approach helps to ensure that the design for any given facility will actually serve the intended populations.

Section V

Development Master Plan

Overview

The master plan is dynamic and will continue to evolve and be fine-tuned as it moves through implementation steps and benefits from management and operational experiences and updated recreational demand forecasts in the years to come.

Land Use Zones

Land use zones describe the park by functional use areas.

The Development Master Plan is a direct outgrowth of the site and natural resource analysis and public process. The plan consists of four key components:

- < Restoration and Management Plan
- < Land Use Zones
- < Development Program
- < Accessibility/Universal Design Plan

Land use zones and the development program are considered in this section. Natural resource restoration and management was discussed in Section III and universal design in Section IV.

Master Plan Context

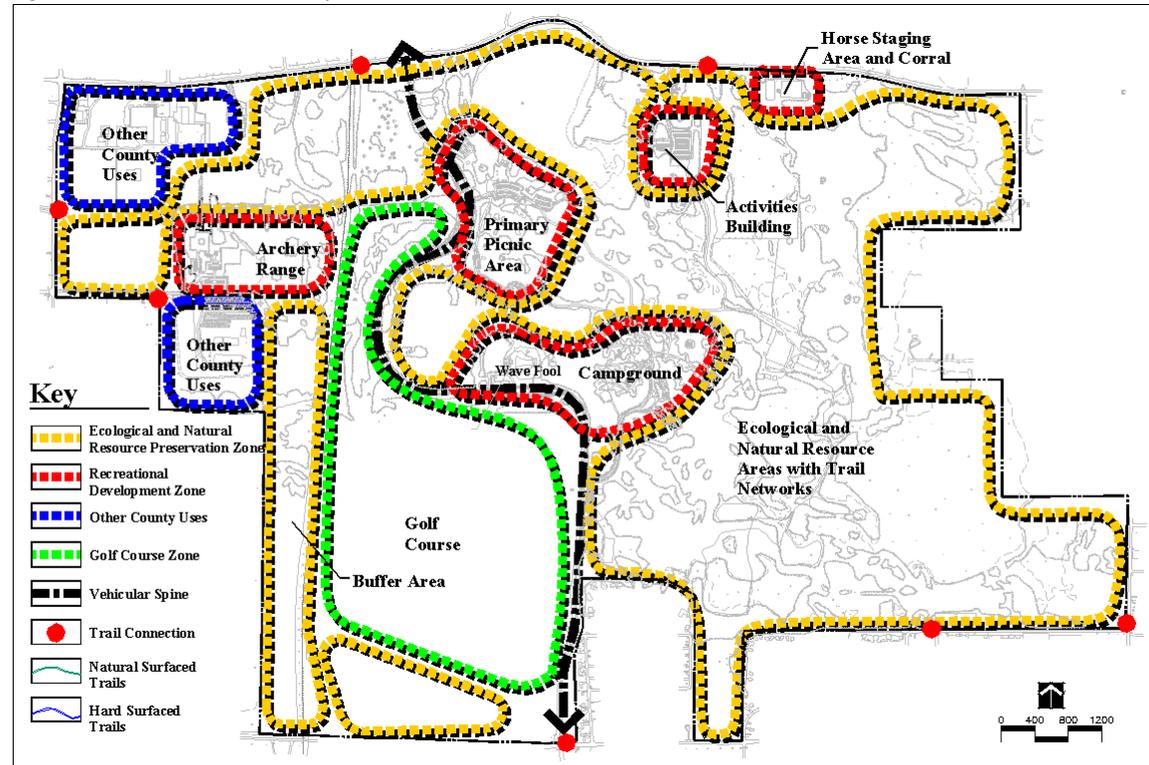
The master plan is dynamic and will continue to evolve and be fine-tuned as it moves through implementation steps and benefits from management and operational experiences and updated recreational demand research in the years to come.

Land use zones describe the park by its functional uses, which range from resource protection to recreation. By considering the park from this broader perspective, the most appropriate use of the land resource within the context of its natural features and development program can be discovered. In this case, four distinct land use zones emerge:

- < Ecological and Natural Resource Zone
- < Recreational Development Zone
- < Other County Uses Zone
- < Golf Course Zone

Figure 5.1 illustrates the land use zones on a park map.

Figure 5.1 - Land Use Zones Map



Ecological and Natural Resource Preservation Zone

The Ecological and Nature Resource Preservation Zone encompasses the core ecological area

The Ecological and Nature Resource Preservation Zone encompasses the core ecological area as defined in Section III, which is characterized by a variety of plant communities and ecotonal areas (which refers to the transition area between two plant communities). The program for this zone focuses on:

- < Ecological preservation
- < Passive outdoor recreation
- < Nature interpretation/education

Developed facilities within this zone are limited to trails, which serve both passive recreational needs and provide avenues for management of the natural resources.

The Recreation Development Zone defines a variety of areas for public recreation.

In the northwestern corner of the park there are a variety of non-park county facilities located on land acquired in 1966 through tax forfeiture.

Bunker Hills Golf Course is a nationally recognized golf facility built on county land acquired in 1966.

Recreational Development Zone

The Recreation Development Zone defines a variety of areas for public recreation. In general, the recreational use areas shown on the master plan accommodate all of the past activities, although redesigned to better serve the public.

As figure 5.1 illustrates, all of the recreational facilities are located along the periphery of the ecological zone. This allows for human access, use, and appreciation of the park while avoiding excessive and unnecessary encroachment of built facilities into the core ecological zone. It also reduces the extent of park infrastructure, which reduces long-term maintenance obligations.

Other County Uses Zone

In the northwestern corner of the park there are a variety of non-park county facilities located on land acquired in 1966 through tax forfeiture. Facilities in this area include:

- < County Compost Site
- < County Highway Main Facility and Maintenance Garage*
- < Park Maintenance Garage
- < Metropolitan Mosquito Control building
- < Radio Communications Facility*
- < Sheriff's Patrol Station*

(* – indicates areas that are located on 80 acres that lie outside recognized regional park boundary)

These land uses were approved through past Anoka County Board action and will continue to serve the public in a non-park capacity. The interrelationship of these facilities with the park will continue to be minimal. Where feasible, visually incongruent elements will be screened from the park through vegetative and topographic buffering. The county park maintenance facilities will be linked with the park via roads and trails to allow for ease of maintenance.

Golf Course Zone

Bunker Hills Golf Course is a nationally recognized golf facility built on county land acquired in 1966. Through a long-term lease arrangement with the County, the City of Coon Rapids operates the course as an enterprise. A portion of all receipts goes to Anoka County through the lease agreement. Although not directly under the County's control, the golf course does provide a significant recreational opportunity.

The direct interrelationship of the golf course with the park will also be limited, although winter ski trails will remain a key joint facility. The redesigned "A" road will serve as a divider between the park and the golf course, allowing for a clear distinction to be made between the two.

Development Program

The development program defines the uses of the park and facilities to support those uses.

"Leave the park natural and beautiful. Don't wreck it by overdeveloping."

"The sense of discovery is the great charm of the site. Don't lose that."

-- Comments made during a public meeting that reflect public sentiment.

The development program defines the uses of the park and facilities to support those uses. The program is an outgrowth of recreational demand research, the public participation process, and an assessment of the success of past park uses. Figure 5.2 illustrates the park master plan and identifies the primary development components. A description of each of these components follows.

As stated in the previous section, the challenge with a resource-based park such as this is to exercise due restraint in its development. The forthcoming development program seeks to achieve a balance between providing facilities and amenities that allow the public to enjoy the park while still retaining its natural character. Universal design considerations are also defined for each program item to ensure that access issues are considered for each park amenity.



Figure 5.2 - Bunker Hills Regional Park Master Plan for Development



Main Entrance Features/Contact Stations

Vehicular access to the primary use areas will be limited to a north and south entrance associated with the new parkway

Photo of new location for south park entrance feature, which is to be located north of all existing residential properties to create a stronger sense of entry and avoid disruption to the nearby neighborhood.



Vehicular access to the primary use areas will be limited to a north and south entrance associated with the new parkway, currently known as “A” road. As the first visual cue, these entrances will be designed to create a sense of park entry and expectation for the visitor. Figure 5.3 provides a character sketch of the entrance feature.

Figure 5.3 - Character sketch of Park Entrance



Once through the entry points, visitors will approach contact stations with attendants during peak hours of park use. These stations will accomplish several key objectives:

- < Regulate park access and use levels
- < Monitor traffic flow
- < Orient visitors to park facilities and offerings

< Collect fees

Automatic gates will be located near each contact station to close the park during off hours. Since the contact stations will leave a lasting impression on the visitor, architectural style will be important and will be similar to the other buildings in the park. Figure 5.4 illustrates the contact station layout and its relationship to the park entrance.

Figure 5.4 - Park Entrance and Contact Station



Universal Access Consideration: Pedestrian access routes should be easy.

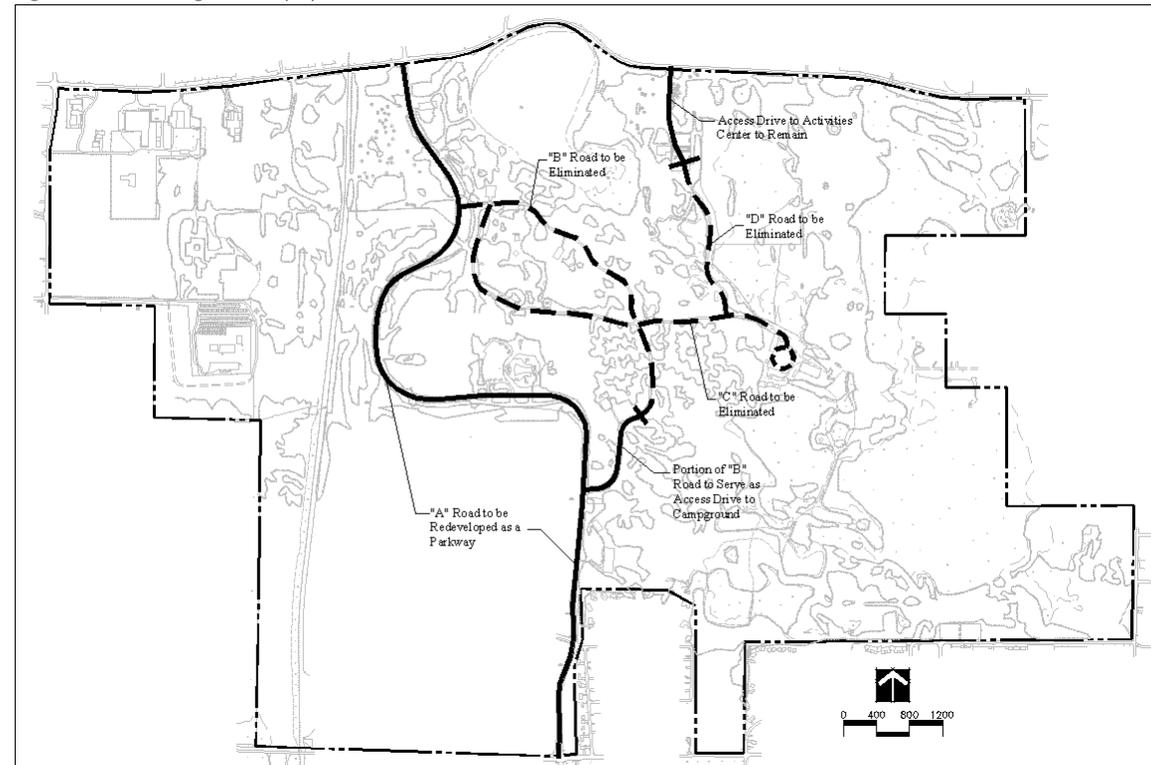
Park Roadways and Drives

Photo of existing "A" Road alignment. The parkway concept would follow the same general alignment but will create a more appealing experience as one travels through the park.



Redesigning the internal roadway system is one of the most significant infrastructural changes proposed for the park. By eliminating all but the "A" road, the road system will be greatly simplified and less intrusive while still effectively servicing the various park use areas. Figure 5.5 illustrates the current roadway system and defines which roads are to remain and be removed.

Figure 5.5 - Existing roadway system within Bunker Hills Park



The master plan also calls for turning the "A" road into a parkway, whereby the it will be designed in response to the park's natural land features. In some areas, the parkway will be split into one-way traffic as dictated by the natural topography and vegetation patterns. These one-way separations add interest to the drive and allow for safer and less congested access to parking lots and primary use areas, such as the wave pool and picnic facilities. Figure 5.6 illustrates a character sketch of the parkway concept for the "A" road.

As illustrated, the parkway becomes an important visual amenity by exhibiting the natural character of the park. It also provides an appealing recreational experience for those with limited time or are less mobile.

Figure 5.6 - Character sketch of parkway concept for Bunker Hill Park Parkway ("A" road)



Universal Access Consideration: Pedestrian access routes to and from adjacent facilities will be easy.

Internal Park Trail System

The internal park trail system will be extensive and offer a variety of park experiences.

Each trail type will follow alignments that respond to, rather than extensively alter, the natural contours and features of the land.

The internal park trail system will be extensive and offer a variety of park experiences. The system will be designed for year round use and consist of two primary trail types:

- < Type I Park Trail (Hard-Surfaced)
- < Type II Park Trail (Natural-Surfaced)

Each trail type will follow alignments that respond to, rather than extensively alter, the natural contours and features of the land. Trail location will also focus on enhancing the user's experience through sequential and varied experiences, ranging from intimate settings to broad vistas.

Although the trail system will be fairly extensive, physical and visual overlap between trail types and other park amenities will be kept to a minimum. This will provide the visitor with a sense of solitude that is in keeping with the character of the park. With the elimination of some of the internal roads and relocation of existing facilities, like the stable, the opportunity for a more extensive and appealing trail system is one of the highlights of the master plan. Each is considered on the following pages.

Landscape character for Type I Park Trail traversing through oak barrens. Trails will follow natural landforms and vegetation patterns.



Landscape and trailbed character of soft-surfaced trail.



Type I Park Trails (Hard-Surfaced)

Type I Park Trails are hard surfaced (asphalt) and serve the broadest spectrum of trail users, including walkers, bikers, and in-line skaters. The master plan calls for approximately 10 miles of trails looping through the various natural areas and interconnecting with various facilities. Although the master plan illustrates specific locations for trails, actual trail alignment will be established in the field in response to topography and vegetation. In as much as possible, existing trail alignments will be continued, although poorly located trails will be phased out and replaced over time. Trail layout will also take into consideration input from local trail groups and advocates to ensure that all user needs are accommodated and that the trail system is safe and functional. Given recent trends, a trail width of 10 feet is recommended for the primary trail loops, which will vary in length from less than a mile around the campground to over 5 miles.

Trail connections to the surrounding communities and neighborhoods will be extensive and in keeping with the policy of Anoka County Parks. The master plan identifies seven defined access points that link directly to established or planned local-level and regional trail systems. A bollard system will be used to prevent non-authorized vehicle use of the trails.

Universal Access Consideration: The Type I Park Trails (Hard-Surfaced) trails fall under two ROS classifications: urban/rural and roaded natural, with expectations of easy to moderate access. Trails that service individual facilities will provide easy access. The park-wide trail system will offer loops for all levels of ability – some offering easy access while others being more challenging yet still offering a moderate level of accessibility.

Type II Park Trails (Natural-Surfaced)

In contrast to the hard-surfaced trails, these trails will be left as natural as possible to accommodate summer trail users that prefer a more natural and challenging setting. (Aggregate surfacing will be used on these trails if erosion becomes a problem.) In winter, these trails will be extensively used for cross-country skiing and snowshoeing. The master plan calls for approximately 5 to 5.5 miles of trails looping through the natural areas of the park. In winter, these trails will link up with those traversing the golf course, forming a latticework of winter skiing opportunities. Important in this regard is that the new trails will virtually eliminate road crossings internal to the park, which is currently a major concern of skiers. A connection to Blaine High School will benefit their ski program and outdoor education classes.

As with the hard-surfaced trails, the master plan illustrates specific locations for natural-surfaced trails. Actual trail alignment, however, will again be established in the field in response to topography and vegetation. Trail layout will also take into consideration input from local ski groups and advocates, ensuring that user needs are accommodated and that the trail system is safe. A trail corridor width of 14 feet is recommended for the primary loops to suit both traditional and skate-style skiing. Note, however, that this represents the clear area necessary to accommodate skiers. In the summer, a narrower trail width (6 to 8

feet) is recommended to create a more intimate setting and minimize erosion from a meandering foot path. Trail loop distances will range from one to six kilometers and offer a variety of challenge levels.

With marked success in other regional facilities, lighting the cross-country ski trails will become a priority once the trail system is established and tested over several seasons by the various user groups. The lighting system selected will be designed to be as unobtrusive as possible and in keeping with the park's character.

Universal Access Consideration: The Type II Park Trails (Soft-Surfaced) trails fall under two ROS classifications: roaded natural and semi-primitive, with expectations of moderate to difficult access. As a soft-surfaced trail, the level of difficulty will be more challenging than Type I trails, which is in keeping with user expectation.

Type II Park Trails (Natural-Surfaced) for Alternative Trail Uses

Natural-surfaced trails will also be used to varying degrees for alternative trail uses such as horseback riding, sleigh rides, snowshoeing, skijorring (skier pulled by a dog), and dog sledding

Natural-surfaced trails will also be used to varying degrees for alternative trail uses such as horseback riding, sleigh rides, snowshoeing, skijorring (skier pulled by a dog), and dog sledding. Currently, the demand for most of these alternative uses is limited, with horseback riding being the only established one. This suggests that the trail system as master planned will effectively accommodate these emerging uses into the foreseeable future.

With respect to horseback riding, evidence suggests that the demand for public horse trails is somewhat limited. Although an ill-defined collection of trails exist, the propensity for horse owners to bring their horses to the park appears relatively small. Given the limited demand, it is anticipated that portions of the natural surfaced trail system will suffice for both pedestrian and horse use with minimal conflicts. Note, however, that environmental impacts from horses using soft surface trails will require close monitoring to avert on-going problems. Either limiting horse use of trails in certain areas or adding a more resilient surface to the trailbed may be required in problem areas.

With respect to mountain biking, the erodability of the sandy soils underscores that this use is not well suited for this park and therefore no trails have been provided.

Observation Points, Overlooks, and Sitting Areas

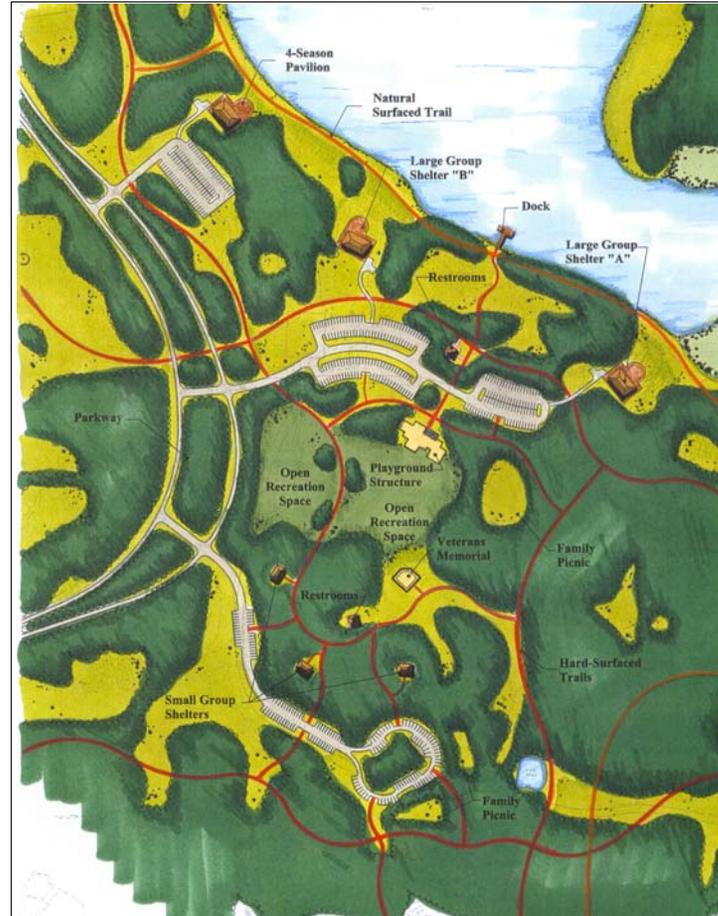
In concert with the trail system, observation points, overlooks, and sitting areas will be provided throughout the park. The master plan suggests a couple of key overlooks offering compelling views of the park. Observation points and other sitting areas will also be provided to take advantage of dramatic views, as well as intimate settings. The design for these will be simple in character and meant to blend into the natural aesthetic of the park.

**Group and Family Picnic Area /
General Recreation Area / Veterans
Memorial**

The existing picnic and general recreation areas will be extensively redeveloped to offer a wider variety of picnic and recreational opportunities within the park.

The existing picnic and general recreation areas will be extensively redeveloped to offer a wider variety of picnic and recreational opportunities within the park. Figure 5.7 illustrates the general layout of and relationship between these use areas.

Figure 5.7 - Master plan layout for group and family picnic area, general recreation area, and Veterans Memorial



Family Picnic Facilities

Family picnic facilities consist of picnic tables, grills and small open spaces adjacent to the general recreation area, parking lots, and trail system.

As the plan illustrates, a variety of settings – ranging from very private sites at the end of the loop parking lot to the more public ones near the children’s play area – will be available to the park user.

Universal Access Consideration: At least half of the sites will offer easy access via paved access trails. The rest will be walk-up sites with no trail but a modest grade.

Small Group Picnic Shelters

Three small group picnic shelters are proposed south of the general recreation area and near the Veterans Memorial. Each of these will be about 200 square feet in size and have a capacity of 20 people. Picnic tables, grills, water tap, and electric will be provided.

Architectural style of each shelter will compliment the natural setting and be sited in response to the natural landforms.

Universal Access Consideration: All shelters will offer easy access via paved access trails.

The large group picnic shelters overlooking the lake are expected to remain popular park amenities.

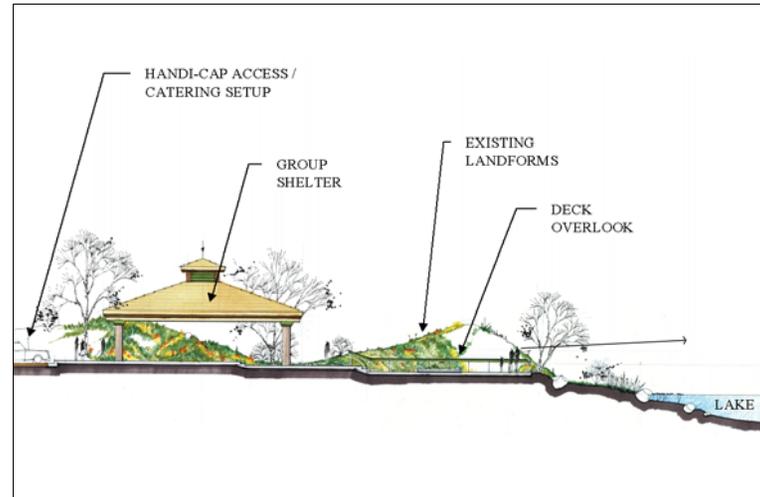
Photo of view overlooking lake near picnic shelter locations.



Large Group Picnic Shelters

The large group picnic shelters overlooking the lake are expected to remain popular park amenities. The new shelters will replace existing ones that are nearly worn-out and inadequate to meet current and future needs. The master plan calls for siting two large group picnic shelters to overlook the lake. Each would be about 1,400 square feet in size and have a standard capacity ranging from 150 to 200 people. Patio and deck spaces adjacent to these structures will allow for groups up to 300 to be occasionally accommodated. Figure 5.8 depicts a character sketch of a large group picnic area overlooking the lake.

Figure 5.8 - Character sketch of large group picnic shelter overlooking the lake.



As the sketch illustrates, each shelter will be set into the natural landforms to create an appealing setting and sense of separation from the other nearby shelters, parking lots, and trails. Picnic tables, grills, water tap, and electric will be provided at each shelter. Architectural style of each shelter will compliment the natural setting

Universal Access Considerations: A hard-surface trail will provide easy pedestrian access to each shelter. Vehicle access will be limited to handicap short-term parking, supplies drop-off, and caterers.

4-Season Pavilion

A 4-season picnic pavilion also overlooks the lake. In the summer months, the pavilion will be used for group picnics, social gatherings, and public meeting space. At about 2,000 square feet, its capacity would be up to 150 people. Patio and deck spaces adjacent to the structure allows for groups of up to 300 to be occasionally accommodated. As with the picnic shelters, the pavilion will be set into the natural landforms to create an appealing setting and sense of separation from the nearby shelters, parking lots, and trails. Restrooms, tables and chairs, cooking facilities, grills, water tap, and electric will be provided. The architectural style will again compliment the natural setting and be sited in response to the natural landforms.

Universal Access Considerations: A hard-surface trail will provide easy pedestrian access. Vehicle access will be limited to handicap short-term parking, supplies drop-off, and catering service setup.

Three restroom buildings are envisioned to service the picnic and general recreation area.

The cornerstone of the general recreation area is the large children's play structure sized to accommodate several hundred children and offer extensive and varying play value.

The centrally-located general recreation area provides recreation space for picnickers and general park users.

Restroom Facilities

Three restroom buildings are envisioned to service the picnic and general recreation area. The largest restroom structure (400 square feet) would be centrally located between the two large group picnic shelters and the general recreation area. A second, smaller structure (200 square feet) is proposed near the small group shelters and the Veterans Memorial. The third restroom would be constructed as part of the 4-season pavilion. The two independent restrooms will service the picnic and general use area as well as general park and trail users passing through the area. The architectural style will compliment the natural setting and be similar to the other buildings.

Universal Access Considerations: A hard surface trail will provide easy pedestrian access to each building.

Children's Play Structure

The cornerstone of the general recreation area is the large children's play structure sized to accommodate several hundred children and offer extensive and varying play value. By design, it will blend into the natural land features and appear architecturally in character with the park setting. At over 8,000 square feet, the structure will offer a variety of play values, varying levels of physical challenge, and a variety of social settings for children to explore. It too will be designed for universal accessibility. Sitting areas, game tables, bike racks, water fountains, and trash receptacles will also be provided near the structure.

Universal Access Considerations: A hard-surface trail will provide easy pedestrian access. The structure itself will also be designed for universal access and like experiences.

General Recreation Area and Veterans Memorial

The centrally-located general recreation area provides recreation space for picnickers and general park users. Development will be limited to grading the area for field games and open play. The trail and vegetation will bisect the open area to create two separate spaces to accommodate more than one group. The extent of manicured grass will be kept minimal to avoid detracting from the natural park setting. The space will be available on a first-come basis and will not be programmed for local sports use. Benches, bike racks, drinking fountain, and trash receptacles will also be provided in this area.

The veterans memorial will remain in its current location. Opening up the views across the general recreation area will make the monument more visible to the general park user. Flower gardens will be added to the area around the monument to improve the overall aesthetic of the area.

Universal Access Considerations: A hard-surface trail will provide easy pedestrian access to the general recreation area, veterans memorial, and other facilities.

As with the new parkway, parking lots will be designed in response to the park's natural land features.

Campground

The existing campground will be redeveloped and expanded to serve a broader cross-section of campers.

The existing campground entrance will be relocated and completely redesigned to be more appealing and functional.



Parking Lots and Access Drives

As with the new parkway, parking lots will be designed in response to the park's natural land features. Although sizable (250-300 spaces), the parking lots adjacent to the large group picnic shelters will be broken up with islands and spread out through curvilinear layouts to reduce their visual impact.

The entrance drive and parking lots servicing the small group shelters will also be designed in response to natural land features, and to take advantage of existing road alignment where feasible. This drive and parking area (150-200 spaces) is also designed to serve general park users looking to stay away from the busier areas of the park. With a curvilinear layout, the opportunity to find a quiet place for lunch or casual viewing of nature will be convenient and unobtrusive.

Universal Access Considerations: A hard surface trail will provide easy pedestrian access from parking lots to the park facilities in this area. Handicap parking spaces will also be provided.

The existing campground will be redeveloped and expanded to serve a broader cross-section of campers. Approximately 59 sites are proposed within the three campground loops. Figure 5.9 illustrates the overall layout concept for the campground.

Figure 5.9 - Conceptual plan for campground



Each loop, or portion thereof, offers varying levels of utility service to individual campsites – ranging from primitive walk-in to modern. Each campsite will be sited to retain the natural character of the land, maintain a sense of privacy, and minimize disruption to mature vegetation. The only full-service campsite will be for the campground host, where water, sanitary sewer, electricity, and telephone will be provided. The following table highlights the types of campsites that will be developed and provides an overview of the amenities for each type.

Several relatively small open play areas will be provided in the campground and located to be accessible from each of the camp loops.

Approximately 59 sites are proposed within the three campground loops.

Each loop, or portion thereof, offers varying levels of utility service to individual campsites – ranging from primitive walk-in to modern.

Each campsite will be sited to retain the natural character of the land, maintain a sense of privacy, and minimize disruption to mature vegetation.

Table of campsite types and typical amenities.

Type	Typical Amenities	Type	Typical Amenities
Level I - Primitive < Tents only < Private and natural setting < Minimal utilities provided	< Walk-in sites with primitive or rustic appeal – focus on natural setting and privacy. Nearby parking. < Cleared area adequate for basic site amenities < Level tent pad - can be open grass, timber edger, or wood platform depending on site opportunities or constraints < Picnic table or other type of platform for cooking and eating – with aggregate pad < Small level open area for general use – may have frame structure for mounting rain tarp < Grill < Water nearby (not at individual site) < Utility post (water stand, hanging hooks, etc.) < Site number stake	Level III - Modern < Small campers and rec. vehicles < Natural setting < Electric and water provided to varying degrees	< Spur site with rustic appeal – focus on natural setting < Level aggregate parking pad typ. 12' wide. Length varies from min. of 40' up to 60' < Parking bumper at end of pad < Level tent pad - grass, minimal improvements < Picnic table on level area – with aggregate pad < Level open area for general use (no structures) < Grill < Water service < 30 to 50 amp electrical service - near center of pad < Site number stake
Level II - Semi-Modern < Tents and smaller campers < Private and natural setting < Minimal utilities provided	< Spur site with primitive or rustic appeal – focus on natural setting and privacy < Level aggregate parking pad typ. 12' wide. Length varies from min. of 30' up to 60' < Parking bumper at end of pad < Level tent pad - can be open grass, timber edger, or wood platform depending on site opportunities or constraints < Picnic table on level area – with aggregate pad < Level open area for general use – may have frame structure for mounting rain tarp < Grill < Water nearby (not at individual site) < Utility post (water stand, hanging hooks, etc.) < Site number stake	Group Camp < Groups of 50 to 60 < Tents only < Natural setting	< Primitive or rustic appeal – focus on natural setting < Level tent pad area for 12 - 15 tents < Picnic tables on level area - with aggregate pads < Level open area for general use (no structures) < Bonfire area with wood rack and sitting area – rustic benches < Larger grill < Water service < 50 amp electrical service < Level aggregate pad for caterer setup area < Utility access drive < Appropriate signage Note that a site that can accommodate 3 to 4 campers will be provided in this loop.

The new design for the campground calls for existing campground roads to be reused where feasible to minimize impacts to native vegetation.



During the summer, the building will serve camper needs, as well as general park visitors using the trail system. In winter, the building will be available for public meetings, group gatherings, and as a warming facility.

A sanitary dump station will be provided along the main entrance road.

Universal Access Considerations: Universal design principles will be applied throughout the campground, with accessible campsites being provided for each type of campsite listed in the previous table. Asphalt or compacted surface trails meeting universal design and ADA requirements will provide easy pedestrian access to all campground facilities.

Campground Roads and Parking

A portion of the existing “B” road will be reused as the main access to the campground. At 20 to 22 feet in width, the main campground road will be wide enough for ease of access yet remain reasonably intimate and natural. The loops through the campground will be one-way at 12 to 14 feet in width. All road alignments will respond to natural landforms and vegetation patterns to avoid disruption to the natural character of the site. Surfacing for the main road will be asphalt, with either asphalt or aggregate being used for the campground loops. Individual campsite pads will be aggregate. Visitor parking will also be provided along each camp loop road.

A one-way drive in front of the multipurpose building allows for ease of access and parking for campground registration. A 30 car parking lot is centrally located between the multipurpose building and group camp area. In summer, the lot will service the group camp, as well as provide overflow parking for the multipurpose building. In winter, it will be used more extensively for the multipurpose building activities. The lot will be designed in response to natural landforms and vegetation patterns.

Universal Access Considerations: Asphalt or compacted surface trails meeting universal design and ADA requirements will provide easy pedestrian access to all campground facilities. An number of sites will be developed with accessible furnishings and direct access to restrooms via ADA accessible trail.

Multipurpose Building (Year-Round), Restrooms/Shower Buildings, Amphitheater

A year-round multipurpose building will be located off the campground entrance road. During the summer, the building will serve camper needs, as well as general park visitors using the trail system. In winter, the building will be available for public meetings, group gatherings, and as a warming facility. The table on the following page defines the overall building program.

In conjunction with the multipurpose building, two centrally-located restroom/shower buildings will service the three campground loops. All campsites will be within 400' of a restroom facility for camper convenience.

Each of the buildings will be set into the natural landforms that surround them. The architectural style of the buildings will be natural in character and similar to the other park buildings.

Table defining multipurpose building program

Space	Program/Description	Square Footage
Campground Registration/Office	Service counter, small concessions area, files, desk, computer station, cash register, floor safe, etc. Registration area is separate from small office.	300 Square Feet
Restrooms	2 unisex restrooms (one interior entrance and one exterior) for registering campers, staff, programs, group campers, and trail users. Each restroom will have 1 urinal, 1 toilet, hand dryer, counter, mirror, and baby changing counter.	130 square feet each
Storage Area	General storage and stocking space for maps, literature, food beverages, picnic kits, snow shoes, skies, etc.	200 square feet
Multipurpose Room	Gathering area for entering campers, park info display, winter concessions or vending, fire place, small program area, winter warming area, general seating/lounge, etc.	700 square feet
Outdoor Patio/Deck	Seating, small programs, fire pit, general gathering area, drinking fountain, vending machine (summer), viewing and observation platform, etc.	500 square feet
Mechanical Room	Furnace, water heater, pressure tank, electrical boxes, sink, cleaning supplies and equipment, other basic supplies, etc.	100 square feet
Outdoor Storage	Fire wood storage area	100 square feet

An amphitheater will be built near the multipurpose building for campground events, nature programs, and informal group use.

An amphitheater will be built near the multipurpose building for campground events, nature programs, and informal group use. It will be relatively small with a basic capacity of 30 to 40 and an overflow capacity of up to 150 people. A small stage and some rustic seating will be built into the natural landform. Grass seating will be used to accommodate the larger groups. A fire ring will be built into the stage area for informal group gatherings and small group programs.

Universal Access Considerations: All of the buildings and the amphitheater will have easy access and meet both universal design and ADA requirements.

Activities Center

The function of the activities center will remain essentially unchanged.

The parking lot adjacent to the Activities Center will be redesigned to better accommodate traffic and pedestrian flow and be more visually appealing.



The function of the activities center will remain essentially unchanged, whereby it will continue to be used for:

- < Anoka County Parks administrative functions
- < University of Minnesota Extension administration functions and 4-H programs
- < Public meetings

With the activities center functioning relatively independent from other park uses, the south entrance to the parking lot is no longer considered a vital vehicular link and will be eliminated. Benefits of closing the road include:

- < Minimizing roadway intrusions into the environmental core of the park
- < Improving control of access to park facilities
- < Reducing infrastructure redevelopment and long-term maintenance costs

Bunker Lake Boulevard will remain the main entrance to the activities center. The parking lot will be redesigned to improve traffic movements and pedestrian safety. Adding planting beds and flower gardens will improve the overall aesthetic appeal of the parking lot. A small patio and various sitting areas will make the outdoor areas more appealing for lunch and workday breaks. Other improvements to the activities center area include:

- < Winter plug-ins for employees.
- < Parking spaces for activity vans.
- < Improved parking lot lighting.
- < Improved utility access to the back of the building (larger parking area and redesigned loading dock).

Figure 5.10- Conceptual layout plan for Activities Center parking lot



Figure 5.10 illustrates a conceptual plan for reconfiguring the parking lot by the activities center.

Universal Access Considerations:

The activities center will have easy access and meet both universal design and ADA requirements. Improvements to the loading dock in the back of the building will improve accessibility to the lower

level of the building.

Archery Range

The master plan calls for the archery range to be relocated to better serve the long-term needs of the archers.

The master plan calls for the archery range to be relocated to better serve the long-term needs of the archers and minimize potential conflicts with other park uses. Its current location will be restored and become part of the environmental core of the park. Future uses within this area will be limited to trails.

The existing building and accompanying parking lot adjacent to the "A" road will remain until a new building can be constructed at the relocated archery range. Although not ideally sited nor architecturally appealing, this building provides programming space for a variety of local groups and thus warrants being retained, at least in the short-term.

The new range will be between 45 and 50 acres in size. Access to the site will be from Hanson Boulevard. Key program items for the new range include:

- < Outdoor practice range (minimum of 90 meters).
- < Field ranges, including animal, broadhead, and field round courses.
- < Multipurpose building with indoor range, restrooms, event staging area, vendor setup, storage, etc. (Note that this structure will also be available to other groups as is the current building.).
- < Parking lot.
- < Overflow parking/informal group camping.
- < Picnic shelter and patio adjacent to building and practice range.
- < Range perimeter delineation (signage, posts, etc).

Note that the final layout for the archery range will be designed with direct input from the archery group as part of their on-going partnership with Anoka County Parks.

Universal Access Considerations: The archery group will continue their past practice of making the range accessible to their members with all levels of ability as appropriate for the challenge level of the course. Universal design principles will be applied as appropriate in this rather unique setting.

Wave Pool (Aquatic Center)

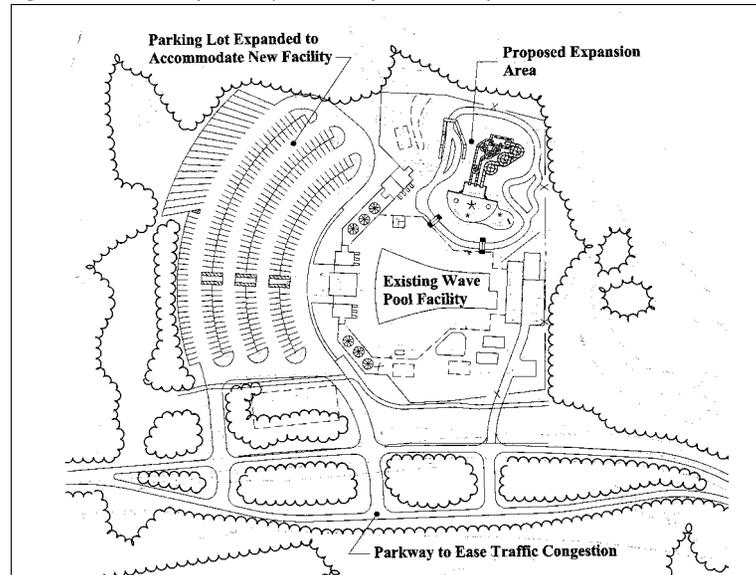
The existing wave pool has been a very successful enterprise within the park.

The existing wave pool has been a very successful enterprise within the park since it was opened in 1988. Currently, the wave pool offers the following amenities:

- < Wave pool (800 capacity)
- < Concessions area for food vending
- < Deck area for sunbathing, relaxing, and picnicking (2 shelters)
- < Sand volleyball open games area
- < Restroom and shower facilities
- < Tube rental area

Based on strong user demand, expanding the wave pool continues to be a strong consideration. A separate master plan has been developed to identify expansion opportunities. Figure 5.11 illustrates a conceptual master plan for an expanded wave pool facility.

Figure 5.11 - Wave pool layout with potential expansion.



The list of potential new amenities includes:

- < Lazy River
- < Slides (speed, flume, and tube)
- < Plunge pool
- < Splash pool
- < Wet play area
- < Maintenance building
- < Video games shelter
- < Expanded building with restrooms and concessions

Universal Access Consideration:
All wave pool activities and events will offer easy access and like experiences to all user groups.

Environmental Learning Center

For a number of years, Blaine High School has been working with Anoka County Parks on developing an environmental learning center for ecological field study, recreational activities, demonstration of natural succession, and wildlife sanctuary. The success of their teaching programs clearly warrants continuation and even expansion of this relationship. Proposed improvements to the learning center include:

- < Boardwalk through wetland (replacement and expansion) – to permit greater access to learning environments.
- < Dock in open water area – for water sampling.
- < Observation platform overlooking marsh – for wildlife observation
- < Nature interpretive trail – to access various ecological areas and ecotonal zones for science study. Preference is for minimal disruption to natural area, with brush piles being left or created, no mowing, and direct access to natural resource restoration and management zones.
- < Natural amphitheater – simple setting for outdoor teaching
- < Ropes course – for strength and confidence building

In addition to physical improvements to the learning center, school representatives from the science department also expressed interest in expansion of student programming opportunities. As an example, developing a programmatic link between the school and county with respect to the natural resources restoration and management program was considered an ideal learning opportunity.

Horse Staging Area and Corral

Under the new master plan, the stable operation and pasture land will be removed from the core of the environmental area.

Under the new master plan, the stable operation and pasture land will be removed from the core of the environmental area to forestall continuing degradation of the surrounding ecological systems. With the exception of the county stable, the existing facilities are in generally poor shape and substandard with respect to accessibility and overall quality. Once the existing facilities are removed, extensive ecological restoration will be undertaken to reestablish a viable natural landscape. Future uses of the area will be limited to trails.

The master plan shows the horse staging area and corral relocated to the north side of the park with direct access from Bunker Lake Boulevard. This location improves vehicle access to the horse staging area and minimizes any conflicts with other park uses. Depending on demand, potential development for general public use includes a parking lot, corral, and an outdoor riding ring with announcing booth/restroom building.

With respect to the existing stable operation run by a private vendor, future replacement of this facility will depend greatly on the economic viability of the operation. With the general demand for horse-riding opportunities relatively low compared with other recreational pursuits, the viability of Anoka County Parks being able to fund redevelopment of the stable operation to its current level is suspect. This is not to preclude the possibility of a private vendor offering a variety of horse-related recreational opportunities, such as a bridle path or trail rides, sleigh rides, and hay rides. These activities are part of the park's history and can still be provided out of the horse corral area, with the vendor being responsible for providing horses to the park on an ongoing or as-needed basis.

The development timeframe for removal and relocation of the existing horse facilities and stable depends on the lease arrangement with the stable operator and funding opportunities. Relocation is also predicated on whether or not the demand for these facilities manifests itself. With anecdotal evidence suggesting limited overall demand for horse-related facilities for public use, a phased development approach is recommended to avoid building facilities that may not be warranted. As more complete demand information for a horse staging area, corral, and trails is obtained, decisions can be made as to how extensive these facilities should actually be developed within the park. Also, given the vulnerability of the park's ecological systems, expansion of these facilities must be considered within the context of their environmental impacts. Bio-filtration of storm runoff and other mitigation techniques must be incorporated with any development of horse facilities to avert environmental problems.

Maintenance Facilities

The current park maintenance building located near the campground will be removed. It is in generally poor shape and will be difficult to access once the roadway system is reconfigured. Storage and other maintenance functions out of this building will be shifted to the park maintenance facility in the northwest corner of the park. The trail system, the parkway, and a variety of maintenance drives proposed in the master plan allows maintenance vehicles to service all of the facilities within the park.

Miscellaneous Site Amenities and Improvements

All site amenities will be in character with the setting and reflect the architectural style used for building and structures when appropriate.

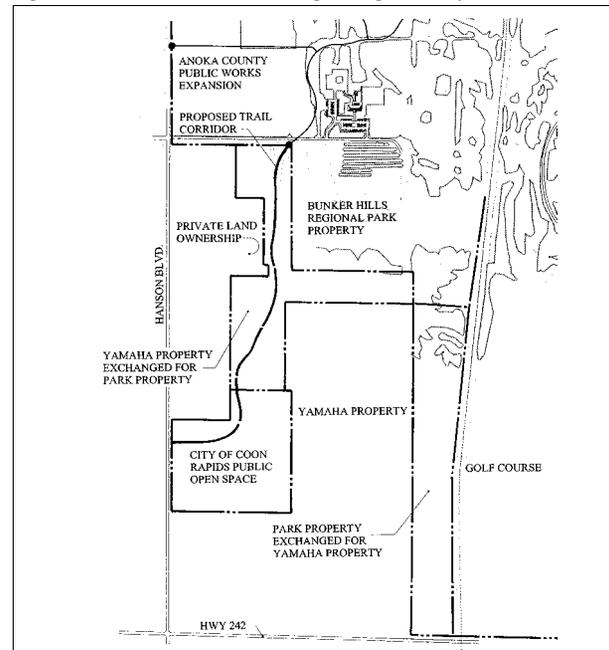
All site amenities will be in character with the setting and reflect the architectural style used for building and structures when appropriate. The more common site amenities include:

- < Interpretive signage – will be extensive throughout the site as the current nature programs evolve.
- < Benches.
- < Trash receptacles.
- < Bike racks.
- < Boardwalks – designed to blend into the natural setting. Natural looking but long-lasting materials will be used.
- < Signage program – orients visitors to park facilities in a consistent, cohesive, and unobtrusive manner.
- < Demonstration flower gardens – provide added visual appeal to specific areas in the park, like near the Activities Center and Veterans Memorial. Local societies, like Hosta and Iris Societies, could assist in design and maintenance.

Future Land Exchange Opportunity/Acquisition

On the southwest corner of the park adjacent to the railroad right-of-way lies a finger of land that is currently park property. Separated from the park by the railroad tracks and golf course, the parcel's primary value lies with it being a buffer between public and private uses. From a natural resource perspective, the area is showing signs of decline in ecological quality. Past uses of off-road vehicles in the area has also had a detrimental impact.

Figure 5.12 - Park land exchange for greenway corridor.



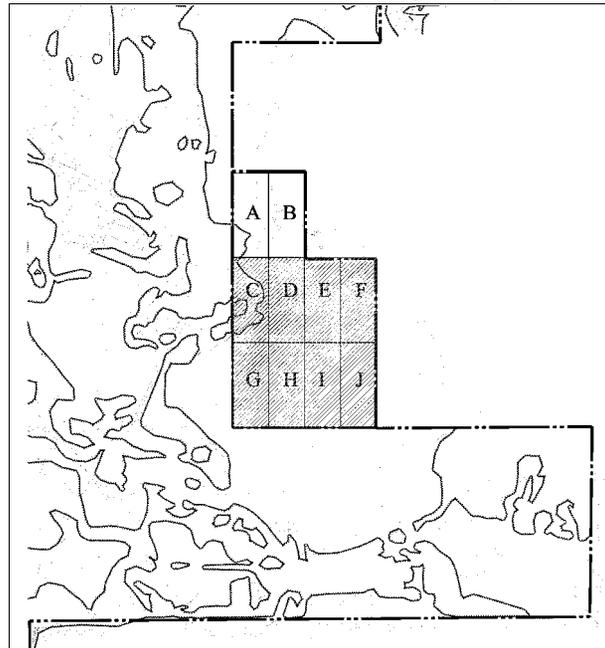
Directly west of this parcel the Yamaha Corporation has a test facility. Further west, the city of Coon Rapids has an open space area that will likely be developed for a public park, with a key trail link to their and the regional trail system. Linking this property to Bunker Hills park via a trail corridor offers desirable recreational value.

In this context, the opportunity exists to exchange about 47.5 acres of land with the Yamaha Corporation to establish a greenway corridor between the park and city property. Given its isolation and current ecological status, the finger of land under park ownership would be exchanged for a like amount of Yamaha property to form the greenway corridor. Figure 5.12 defines the land areas being considered as part of the land exchange. It also illustrates how the greenway corridor would provide an important link between regional parks and trails to local ones.

The timeframe for any action remains undefined. The current land owners are interested in the land exchange concept because it would give them direct access to the rail line. Unfortunately, the current use of the property for a test track precludes the owner from actively pursuing a land exchange in the short-term. However, they also do not want to preclude the possibility of doing so in the future as their land use needs change. A continued periodic dialogue has been agreed to between Anoka County Parks and the land owner. Note that any action in this regard would require approval by the Metropolitan Council.

Anoka County has also been pursuing the acquisition of about 50 acres on the east side of the park. The proposed acquisition, which has been an approved part of past acquisition plans for the park, consists of 10 five acre parcels. Figure 5.13 illustrates these parcels.

*Figure 5.13 - Proposed land acquisition on east side of park.
Note that parcels "A" and "B" are no longer being pursued.*



Note that parcels "A" and "B" are no longer being actively pursued for acquisition by Anoka County. These parcels already have public utilities and an appraised value of \$30,000 to \$32,000 each. At this price, the cost-benefit of acquiring these parcels is not justified relative to other acquisition and development priorities. Anoka County will, however, continue to pursue the acquisition of the remaining eight parcels as the opportunity presents itself.

Section VI

Implementation and Operations Plan

Overview

The extensive redevelopment defined in the master plan for Bunker Hills Regional Park will require substantial capital investment. In all likelihood, implementation will occur over a number of years as funding through various sources becomes available. The following considers the overall costs associated with developing and operating the park under the new plan. Implementation strategies are also considered.

Cost Analysis

The cost analysis table defines the potential costs associated with each component of the master plan.

The cost analysis table defines the potential costs associated with each component of the master plan. It is based on a combination of site-specific development issues and projects of similar size and complexity. The costs are also based on having the work completed by contractors and outside specialists. It does not take into consideration work that could be performed by County staff, volunteer groups or through other means. Costs associated with natural resource restoration and management are also not included.

The cost figures are intended to be used for budgeting purposes, project phasing, and comparing the relative cost of one item to that of another. The costs are in 1998 dollars. Although the intent is to be conservative, it must be recognized that actual costs will vary depending on the bidding environment when each aspect of the master plan is implemented.

Master Plan Component	General Description of Cost Items Included in Estimate	Cost Estimate (In Dollars)
Parkway ("A" road) Redevelopment	<ol style="list-style-type: none"> 1) Removals, including existing roadbed as required to construct new roads 2) Grading and roadbed preparation 3) 28' wide roadbed for two-way traffic and 14' wide for one-way traffic, plus turn and by-pass lanes. Asphalt surfaced, no curb and gutter 4) 20 car parking lot. Asphalt surfaced, with curb and gutter 5) 22' access drive to multipurpose building in campground ("B" road) – to entrance to multipurpose building 6) Storm sewer systems (culverts, diversions, catch basins and piping) 7) Roadway striping 8) Street lighting at intersections 9) Landscaping and re-vegetation 10) Bollards and wheel stops 	630,000
Eliminate Old Park Roads and Parking Lots (Except "A" Road)	<ol style="list-style-type: none"> 1) Removal of existing road bed 2) Grading to match surrounding landforms 3) Re-vegetation 	195,000

Main Entrance Features and Contact Stations	<ol style="list-style-type: none"> 1) Removals, grading and site preparation 2) Park entrance monuments (north and south) 3) Contact station/gatehouse buildings (north and south) 4) Automatic gate (north and south) 5) Street/pedestrian lighting 	200,000
Type I Park Trails (Hard Surfaced) – 7 miles	<ol style="list-style-type: none"> 1) Removal required for building new trails 2) Grading, and trailbed preparation 3) 10' wide asphalt trail with aggregate base 4) Overlooks and seating areas associated with these trails 5) Storm sewer systems (culverts, diversions) 6) Pedestrian lighting at road crossings 7) Landscaping and re-vegetation 	720,000
Type II Park Trails (Soft Surfaced) – 5 miles	<ol style="list-style-type: none"> 1) Removal of existing hard surfaced trails as required to stabilize subgrade and general removals required for building new trails 2) Grading, and trailbed preparation 3) 10' wide asphalt trail with aggregate base 4) Overlooks and seating areas associated with these trails 5) Storm sewer systems (culverts, diversions) 6) Landscaping and re-vegetation 7) Trail lighting for skiing is not included 	190,000
Parking Lots and Access Drives for Picnic and General Recreation Area (Except 4-Season Pavilion)	<ol style="list-style-type: none"> 1) Removals 2) Grading and roadbed preparation 3) Entrance drives and parking lots (total of 380 to 420 parking spaces). Asphalt surfaced. Curb and gutter in parking lots. 4) Storm sewer systems (culverts, diversions, catch basins and piping) 5) Roadway striping 6) Street lighting at intersections and access point to park facilities 7) Landscaping and re-vegetation 8) Bollards 	410,000
Parking Lots and Access Drives for 4-Season Pavilion	<ol style="list-style-type: none"> 1) Removals 2) Grading and roadbed preparation 3) Entrance drive and parking lot (total of 80 to 90 parking spaces). Asphalt surfaced. Curb and gutter in parking lots. 4) Storm sewer systems (culverts, diversions, catch basins and piping) 5) Roadway striping 6) Street lighting at intersection and access point to pavilion 7) Landscaping and re-vegetation 8) Bollards 	115,000
Family Picnic Areas	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) Picnic area amenities for 20 sites (picnic table, grill, trash containers, drinking fountain/water tap nearby, etc.) 4) Asphalt access trails to universally accessible sites 	60,000

<p>Small Group Picnic Shelters (3 Shelters)</p>	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) 3 picnic shelters to with 20 person capacity each, including pavements 4) Basic amenities (picnic tables, grills, trash containers, drinking fountain/water tap, etc.) 5) Asphalt access trails for pedestrians and vehicles 6) Security lighting 	<p>170,000</p>
<p>Large Group Picnic Shelters (2 Shelters)</p>	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) 2 picnic shelters to with 150 person capacity each, including pavements 4) Utilities (water from well near restroom and electric) 5) Patio/deck adjacent to shelter 6) Basic amenities (picnic tables, grills, trash containers, drinking fountain/water tap, benches, etc.) 7) Asphalt access trails for pedestrians and vehicles 8) Security lighting 	<p>385,000</p>
<p>4-Season Pavilion</p>	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) Pavilion with 100 person capacity, including pavements 4) Utilities (well, sanitary sewer, and electric) 5) Patio/deck adjacent to shelter 6) Basic amenities (picnic tables, grills, trash containers, drinking fountain/water tap, benches, etc.) 7) Asphalt access trails for pedestrians and vehicles 8) Security lighting 	<p>370,000</p>
<p>Restroom Facilities (2 Buildings)</p>	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) 2 restroom buildings 4) Utilities (well, sanitary sewer, and electric) 5) Basic amenities (drinking fountain/water tap, bike rack, benches, etc.) 6) Asphalt access trails for pedestrians 7) Security lighting 	<p>280,000</p>
<p>Children’s Play Structure</p>	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) Large children’s play area (universal accessibility), with container and sand/resilient surfacing 4) Basic amenities (drinking fountain/water tap, benches, bike rack, etc.) 5) Arbor structure with sitting area 6) Asphalt access trails 7) Security lighting 	<p>260,000</p>
<p>General Recreation Area and Veterans Memorial</p>	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) Basic amenities (drinking fountain/water tap, benches, bike rack, etc.) 4) Asphalt access trails 5) Security lighting 	<p>75,000</p>

Campground Roads, Campsites, and Utilities	<ol style="list-style-type: none"> 1) Removals 2) Grading and roadbed/camp spur preparation 3) 22' entrance drive from multipurpose building to camp loops. Asphalt surfaced, no curb and gutter 4) 14' campground loops and campsite spurs. Aggregate surfaced. 5) Storm water systems (culverts, diversions, catch basins and piping) 6) Utilities to some campsites (water, electric) 7) Campground trails (aggregate surfaced meeting accessibility requirements) 8) Basic campsite amenities (picnic tables, fire ring/grill, wheel stop, etc.) 9) Landscaping and re-vegetation 	575,000
Campground Multipurpose Building and Amphitheater	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) Multipurpose building 4) Patio/deck adjacent to building 5) Utilities (well, sanitary sewer, and electric) 6) Amphitheater (small stage and seating for 40 people, wood construction) 7) Basic amenities (drinking fountain/water tap, bike rack, benches, etc.) 8) Asphalt access trails for pedestrians 9) Security lighting 	340,000
Campground Restroom/ Shower Buildings	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) 2 restroom buildings 4) Utilities (water from well near multipurpose building, sanitary sewer, and electric) 5) Basic amenities (drinking fountain/water tap, bike rack, benches, etc.) 6) Asphalt access trails for pedestrians 7) Security lighting 	252,000
Improvements to Activities Center Parking Lot and Site	<ol style="list-style-type: none"> 1) Removals 2) Grading and roadbed preparation 3) Parking lot redesign and repaving. Asphalt surfaced with curb and gutter in parking lot only 4) Storm sewer systems (culverts, diversions, catch basins and piping) 5) Walkways and patios 6) Roadway striping 7) Street lighting at intersections and access point to park facilities 8) Landscaping and re-vegetation 9) Miscellaneous Improvements (Flagpoles, benches, picnic tables, loading dock redesign, etc.) 	200,000
Archery Range Relocation	<ol style="list-style-type: none"> 1) Removals 2) Grading and roadbed preparation 3) Parking lot development. Aggregate surfaced with wheel stops 4) Storm sewer systems (culverts, diversions, catch basins and piping) 5) New building 6) Walkways and patios (concrete) 7) Target range development 8) Landscaping and re-vegetation 9) Miscellaneous Improvements 	500,000

Wave Pool Expansion	<ol style="list-style-type: none"> 1) Removals 2) Parking lot expansion 3) Aquatic pool features 4) Dry play areas 5) Restrooms and concessions building expansion 6) Picnic areas and shelter relocation 7) Video games shelter 8) new mechanical building 	3,500,000
Environmental Learning Center Improvements	<ol style="list-style-type: none"> 1) Boardwalk replacement 2) Miscellaneous site improvements 	100,000
Horse Staging Area and Corral	<ol style="list-style-type: none"> 1) Removals 2) Grading and site preparation 3) Parking lot development. Aggregate surfaced with wheel stops to control vehicle encroachments into natural areas 4) Storm sewer systems (culverts, diversions, catch basins and piping) 5) Corral, with wood fencing 6) Announcing booth with restrooms 7) Vender office and storage building 8) Riding ring with wood fencing 9) Walkways. Aggregate surfaced. 10) Landscaping and re-vegetation 11) Miscellaneous Improvements (benches, picnic tables, loading dock redesign, etc.) 	375,000
Miscellaneous Site Amenities and Improvements	<ol style="list-style-type: none"> 1) Budget figure for various park amenities not defined above 	50,000
Total Master Plan Cost Estimate		9,952,000
Construction Contingency (10%)		995,200
Total Master Plan Cost Estimate with Contingency		10,947,200
Professional Fees and Charges (Surveying, Design, Engineering, Etc.) (10%)		1,094,720
Total Master Plan Cost Estimate with Contingency and Professional Fees and Charges		12,041,920

Implementation Strategy (Project Phasing)

Given the overall magnitude of the potential costs, it is reasonable to expect that development of the park will occur over a period of time to coincide with funding opportunities. The following implementation strategy suggests various groupings of master plan components into a number of implementation phases. Components were grouped in consideration of the following criteria:

- < Existing facility exhibits an immediate concern (i.e., safety, dysfunctional, detrimental to long-term vitality of park)
- < Existing facility is worn out and no longer effectively services public need
- < Existing and/or expanding demand warrants development/redevelop of a certain facility

- < Facility is required to support high priority items (parking, for example)
- < Facility cost

The following table groups the line items listed in the cost estimate into various phases based on their priority ranking relative to other items. Note that phases are not linked to specific timeframes. Actual project phasing will be a function of funding availability.

Implementation Phase	Implementation Focus and Master Plan Components Recommended Under this Phase	Total Costs (In Dollars)
Natural Resources Restoration and Management Plan Implementation	Implementing a natural resource restoration and management plan for the park should be a major short and long-term priority. Numerous areas of the park are exhibiting a high degree of degradation to the key ecological resources which warrant immediate attention.	Undefined
Phase I – Initial Infrastructure Redevelopment (Already funded)	Focus is on redeveloped of worn out infrastructural components. Recommended Components Under This Phase: < Campground renovation \$1,167,000 < Main entrance features and and contact stations \$200,000 Note: Use of force account equipment and labor will offset a portion of direct costs to keep Phase I development within the \$1,139,000 grant funding available for this phase of work.	\$1,367,000
Phase II – Continued Infrastructure Redevelopment and Expansion of Existing Facilities	Focus is on continued redeveloped of worn out infrastructural components. Focus also shifts to expansion of successful facilities. Recommended Components Under This Phase: < Parkway redevelopment \$630,000 < Eliminate old park roads \$195,000 < Trail system expansion \$910,000 < Family picnic area \$60,000 < Small group picnic shelters \$170,000 < One large group picnic shelter \$192,000 < Two restroom buildings \$280,000 < General recreation area \$75,000 < Parking and drives to support above \$300,000 < First phase of archery range relocation \$100,000	\$2,912,000

<p>Phase III – Expansion of Existing Facilities</p>	<p>Focus is on continued expansion of successful facilities. Recommended Components Under This Phase: < Children’s play structure \$260,000 < One large group picnic shelter \$193,000 < Parking and drives to support above \$110,000 < Environmental learning center \$50,000 < Miscellaneous site amenities \$50,000 < 4-season pavilion \$370,000 < Parking for 4 season pavilion \$115,000 < Complete archery range relocation \$260,000 < Activities center area \$90,000 < Horse staging area and corral \$375,000</p>	<p>\$2,173,000</p>
<p>Phase IV – Expansion of Existing Facilities</p>	<p>Focus is on continued expansion of successful facilities. Recommended Components Under This Phase: < Wave pool \$3,000,000</p>	<p>\$3,500,000</p>
<p style="text-align: right;">Total Project Costs - All Phases</p>		<p>9,952,000</p>
<p style="text-align: right;">Contingency (not factored into above)</p>		<p>995,200</p>
<p style="text-align: right;">Total Project Costs - All Phase with Continuity</p>		<p>10,947,200</p>
<p style="text-align: right;">Project Fees and Charges</p>		<p>1,094,720</p>
<p style="text-align: right;">Total Project Costs - Fees and Continuity</p>		<p>12,041,920</p>

Operations Plan

The operations of Bunker Hills Regional Park falls under the jurisdiction of the Anoka County Department of Parks and Recreation. Policy and goal-setting are done through the Anoka County Parks and Recreation Committee and the Anoka County Board of Commissioners.

Ordinances

Public use and enjoyment of the park system are controlled by the Ordinance Regulating Parks in the Anoka County Parks System. The ordinance was last revised February 11, 1997. The ordinance also incorporates pertinent Minnesota statutes. Issues addressed in the ordinance include:

- < Regulation of Public Use
- < General Conduct and Behavior
- < General Parkland Operation
- < Protection of Property and Natural Resources
- < Regulation of Activities
- < Enforcement

The Anoka County park ordinances are enforced by the Anoka County Park Rangers. During the summer months, park rangers are patrolling by horse, bicycle, all-terrain vehicles, golf carts, on foot and in cars. During the winter, a ski patrol unit covers the groomed cross-country ski trails. Local police departments and the Anoka County Sheriffs Department also respond to incidents in the park system.

General Operations

The Operations and Maintenance unit of the Department of Parks and Recreation has an annual budget of approximately \$3.2 million. There are thirty-eight permanent employees and nearly one hundred seasonal employees hired as gate attendants, rangers, concession workers, lifeguards, maintenance workers, and naturalists. Volunteers also help with the Wargo Nature Center, Arbor Day plantings, park cleanups, flower bed maintenance, and a variety of other events. Area schools participate in natural resource activities and displays at the Banfill-Locke Center for the Arts. Contractual agreements are in place for trash removal, Bunker Hills Stables operation, the archery club, and campground hosts.

Revenue generated from the facilities and services at Bunker Hills Regional Park, not including the Wave Pool, totals approximately \$27,000. The contracts with the archery club and the stables' operation bring in \$11,250. Camping fees create \$5700 in revenue. Rental of rooms within the Activity Center totals \$3000. Picnic shelter reservations account for the final \$7050

The improvements of the picnic areas, rest room buildings, and campgrounds along with the addition of two gate houses are expected to dramatically increase revenue. Conservative projections increase camping revenue from \$5700 to \$15,000 annually. Gate income is difficult to project. The Metropolitan Council estimated that 455,500 visitors came to Bunker Hills in 1996. Accounting for walk and bicycle traffic and multiple visits by the same people, revenue from the parking fees could reach \$75,000.

The municipal golf course is operated by the City of Coon Rapids on leased property within Bunker Hills Regional Park. The Wave Pool is operated as an enterprise unit. The annual expenses total \$480,000 with revenue projected at \$500,000. Future plans call for additional features including water slides, a wet-play area and "lazy river". Coupled with the wave pool, this type of aquatic facility will attract more people who will stay longer. This will also increase use for the campgrounds, trails and picnic facilities. The gate houses will be busy while bringing in additional revenue.

Maintenance

Maintenance of the facilities along with the 1600 acres within Bunker Hills Regional Park presents a challenge for the Parks and Recreation Department. The natural resources division monitors the various ecosystems, manages the wetlands, restores native species, manages disease centers and controls invasive plants. The compost site also is operated through the natural resources division. The maintenance division is busy year-round with a host of regular and special duties, including:

- < Mowing
- < Plowing
- < Tree Work
- < Trail grooming
- < Repairs
- < Shelter Cleaning
- < Building Upkeep
- < Road Repairs
- < Trash Pick up
- < Construction
- < Vandalism
- < Pool Operation
- < Gardens
- < Utility Work
- < Landscaping
- < Greenhouse Operation

Waste management has become an integral part of the maintenance throughout the park system. Recycled materials are utilized in picnic tables, benches, playgrounds, and signs. Recycling containers are made available. In selected areas, fewer trash receptacles are available with the hope to train the public to “pack out” their waste. Other trash is hauled through a contractual arrangement with a private vendor who complies with all state and local laws.

Programming

Recreational programming presently occurs within the park and opportunities will increase with new facilities. Anoka County Libraries sponsors entertainment during the summer. “Ski by the Light of the Moon” happens every winter. Natural resource seminars are offered educating the public on a variety of seasonal topics. Plans are to increase interpretive programming at the improved campgrounds utilizing the year-round building and possible amphitheater area. The trails through the park will offer exploration of wetlands, oak savannahs, sand plain, and native prairie.

Marketing and Promotion

Promotion of Bunker Hills Regional Park happens through a variety of sources. Seasonal brochures invite everyone to enjoy the many opportunities available. Brochures specific to shelter reservations and room rental promote the choices available. Press releases, flyers, posters and mailings notify area residents. Most of all, word-of-mouth advertising is the most successful method. Positive word-of-mouth advertising is created through staff trained to serve the public, clean buildings and grounds, quality programming, accessible features, and well-managed natural resources.