

# TREXLER

**Nature Preserve**

2020 Master Plan Update

December 2020 DRAFT





## Project Steering Committee

Phil Armstrong, Lehigh County Executive  
Jana Brown, Miracle League  
Scott Burnet, Lehigh Valley Audubon  
William Carr, Pennsylvania Game Commission  
Kevin Clouser, Pennsylvania Game Commission  
Edward Eppler, Discover Lehigh Valley  
Steve Ferreri, Pennsylvania Game Commission  
Chris Garges, North Whitehall Township  
Karen Gradel, Allentown Hiking Club  
Marc Grammes, Lehigh County Commissioner  
Rick Hughes, Lowhill Township  
Lou Mazzante, Valley Mountain Bikers  
Alex Michaels, Discover Lehigh Valley  
Rick Molchany, Lehigh County Director of General Services  
Holly Morris, Lehigh County Community College  
Tim Nash, TREX  
Marty Nothstein, Citizen/Park Neighbor  
Geoff Reese, Lehigh Valley Planning Commission  
Janet Roth, Trexler Trust Executive Director  
Robert Stiffler, Lehigh County Director of Parks  
Lloyd Trego, Lehigh Valley Road Runners

## Lehigh County

### Commissioners

Marc Grammes  
Percy H. Dougherty  
Amy L. Zanelli  
Geoff Brace  
Nathan Brown  
Bob Elbich  
Dave Harrington  
Dan Hartzell  
Zakiya Smalls





# 1

## Introduction

- 2 Preserve Vision
- 3 Plan Purpose & Goals
- 4 Master Plan Process
- 4 Project Schedule
- 5 Project Team
- 6 Preserve Context
- 7 Preserve History

# 4

## Implementation

- 126 Probable Costs of Proposed Improvements
- 128 Stewardship Improvement Phasing
- 129 Capital Improvement Project Phasing
- 130 Design Permitting, and Engineering
- 131 Maintenance Recommendations & Responsibilities
- 134 Funding Sources

# 2

## Inventory & Analysis

- 12 Data Collection & Methodology
- 13 Site Reconnaissance
- 14 Public Participation
- 16 WikiMapping
- 18 Public Opinion Survey
- 22 Relevant Planning Documents
- 28 Demographics
- 30 Site Description
- 36 Preserve Management Units
- 38 Ecological Introduction & Assessment
- 46 North Range Assessment
- 50 Central Range Assessment
- 54 South Range Assessment

# 5

## Appendix

- Trexler Improvement Matrix & Cost Estimates
- Trexler Ecological Assessment
- Meeting Minutes
- Press Releases
- Public Opinion Survey Results
- 2006 Trexler Nature Preserve Master Plan

# 3

## Recommendations

- 60 Design Standards
- 64 Marketing, Branding, and Public Communication
- 66 Preserve Security
- 68 North Range Recommendation Intro
- 70 North Range Ecological Recommendations
- 74 North Range Trail Recommendations
- 80 North Range Facility Recommendations
- 86 North Range Signage Recommendations
- 88 Central Range Recommendation Intro
- 90 Central Range Ecological Recommendations
- 96 Central Range Trail Recommendations
- 102 Central Range Facility Recommendations
- 108 Central Range Signage Recommendations
- 110 South Range Recommendation Intro
- 112 South Range Ecological Recommendations
- 116 South Range Trail Recommendations
- 120 South Range Facility Recommendations
- 122 South Range Signage Recommendations









# Introduction

1



# Preserve Vision

In his will, General Harry C. Trexler offered the Preserve to the citizens of Lehigh County with the support of local government, business, educational, social, cultural, philanthropic, and environmental organizations.

The Trexler Nature Preserve is a public space where citizens of Lehigh County can better appreciate and understand our relationship with and impact upon the natural environment.

The Preserve protects and manages natural resources, offers educational opportunities, provides passive recreation, and remains a focal point for land conservation efforts within the Jordan Creek Watershed and the Lehigh Valley.

# Purpose

This master plan was commissioned by Lehigh County to build from the work completed in the 2006 master plan. This master plan update documents past Preserve efforts, identify new challenges, increase the understanding of how the Preserve is utilized, and develop recommendations that will protect and enhance the Preserve for present and future generations.

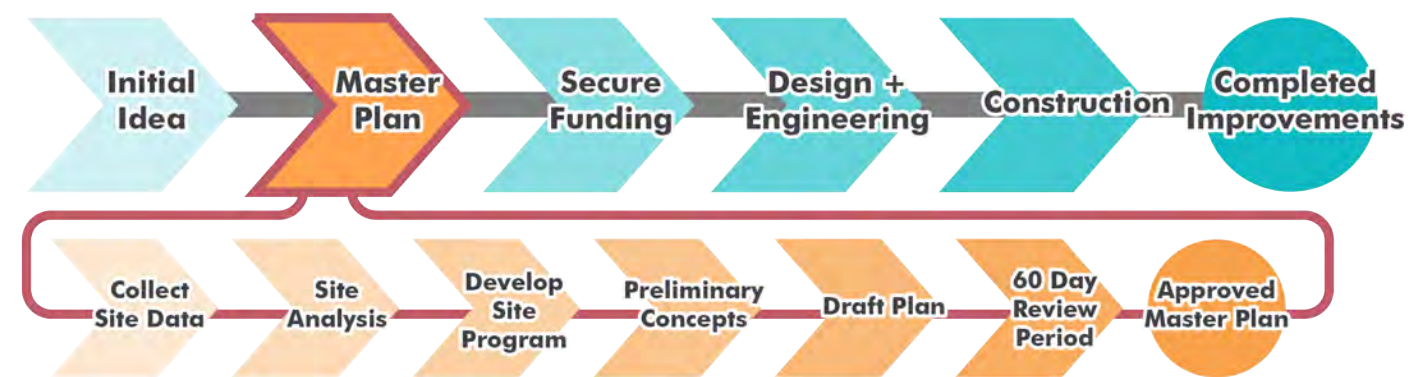
# Goals

- Enhance ecological health, sustainability, and diversity of the Preserve.
- Provide facilities that benefit the physical, mental, and social well-being of the people of Lehigh County, regardless of background, age, or ability.
- Promote the responsible use of Preserve resources.
- Educate visitors on the history and ecology the Preserve.





# Master Plan Process



The master plan is an early step in the stewardship process that seeks to develop public consensus for improvements to be implemented in the Preserve. The master plan provides estimates of probable costs of development and outlines a strategy for phasing improvements and securing funding from a variety of potential sources. The master plan is a guidance document and is intended to be flexible enough to adapt to the future desires and needs of the community.

Following the completion of this master plan, the next step toward implementation is to identify and acquire funding for improvements. Once funding is obtained, detailed design and engineering will commence to develop construction documents. Construction documents will be publicly bid and a contract awarded for construction.

A master plan is typically implemented through a series of phases, dependent upon funding, over a period of years.

# Project Schedule

Meeting Date	Meeting Purpose	
June 9, 2020	Committee Meeting 1	Project Kickoff & Brainstorming
September 3, 2020	Public Meeting 1	Project Background & Brainstorming
September 10, 2020	Committee Meeting 2	Review Public feedback / Initial Concepts
October 29, 2020	Committee Meeting 3	Draft Plan Recommendations
December 3, 2020	Public Meeting 2	Draft Plan & Draft Recommendations
January 21, 2021	Committee Meeting 4	Draft Plan & Public Comment Review
February 11, 2021	Public Meeting 3	Final Plan Presentation
March 4, 2021	Committee Meeting 5	Next Steps / Implementation

# Project Team

The project team was formed to guide the master plan process and was composed of:

- Steering committee
- County staff
- Consultants

The steering committee shared valuable insight throughout the master plan update process. Members of the committee guided the consultant team and provided feedback on existing conditions and analysis, as well as desired Preserve improvements.

County staff, led by Lehigh County Parks and Recreation Director, Robert Stiffler, helped to coordinate the process and provided input and comment on the plan.

The consultant team was led by Simone Collins Landscape Architecture, a planning and design firm with extensive expertise in parks, trails, greenways, and recreational facilities. Simone Collins was primarily responsible for trail, facility, and signage recommendations, and was assisted by Applied Ecological Services.

Applied Ecological Services, Inc. is a leading ecological consulting firm, dedicated to bringing the science of ecology to land-use decisions. Their knowledge of ecological systems provides a foundation for creating balanced improvements that are sustainable, cost-effective, and enduring. Applied Ecological Services tasks included baseline habitat and wildlife analysis, wildlife management plan, impacts mitigation analysis, meadow stewardship plan, invasive species plan, and waterways plan.



The consultant team visiting the Preserve, summer 2020

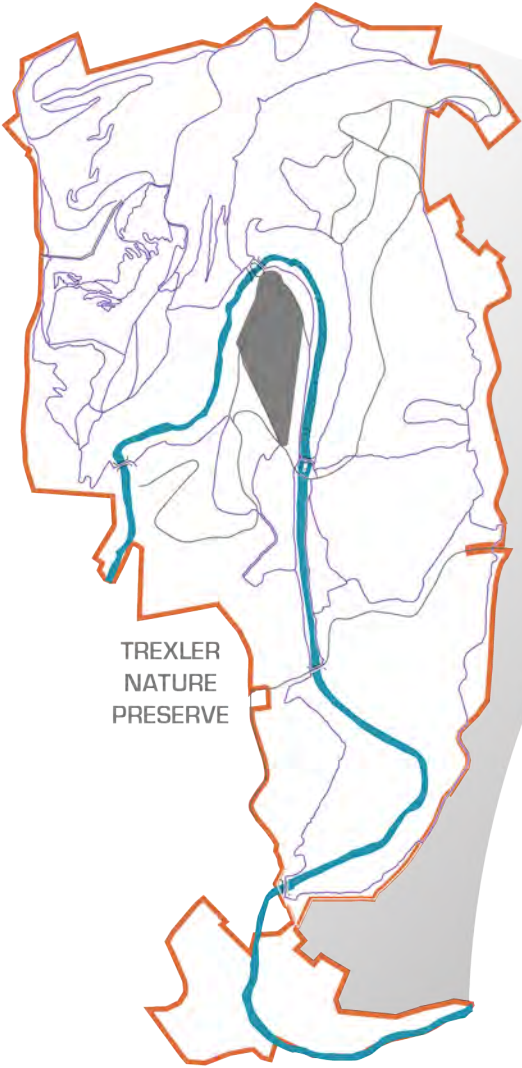
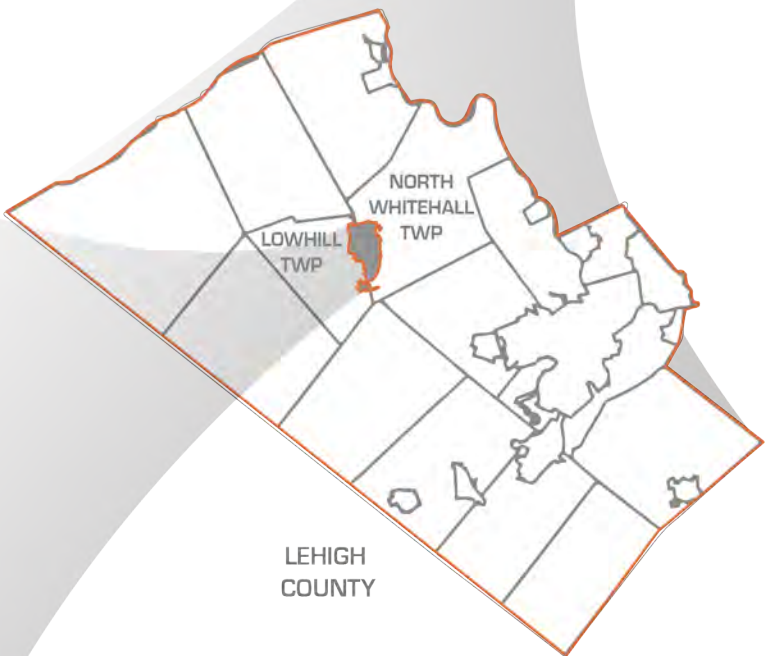




# Preserve Context

The Trexler Nature Preserve is located in the northwest portion of Lehigh County, in the Townships of North Whitehall and Lowhill, approximately eight miles northwest of the City of Allentown. The primary access to the site is via Game Preserve Road to the west of PA Route 309. Other major roads in the vicinity include PA 100, U.S. 22, and the Pennsylvania Turnpike (I-476).

The Preserve encompasses 1,108 acres with an additional 400 acres of adjacent County-owned land which are now formally part of the Trexler Nature Preserve.



# Preserve History

Harry C. Trexler (1854–1933) was an extraordinary businessman, civic leader, and philanthropist. He retired from the Pennsylvania National Guard in 1918, having achieved the rank of Brigadier General. A co-founder of Lehigh Portland Cement, Trexler was involved with many public utilities and held seats on several corporate boards as well as trusteeships at three area hospitals, two colleges, and a university. He served on the staffs of six Pennsylvania governors.

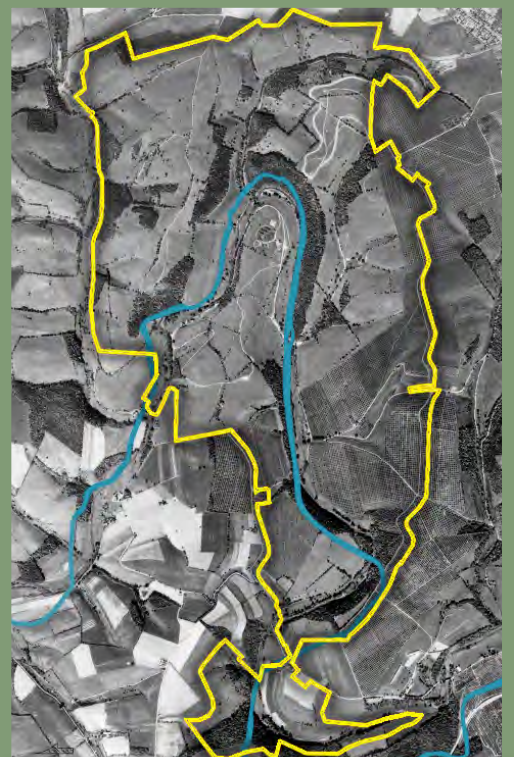
General Trexler was keenly aware of the value of leisure time and the importance of family and community activities. Instrumental in planning Allentown’s extensive park system, Trexler served as chairman of the city’s first planning commission. The general’s imprint on the landscape of both Allentown and Lehigh County is clearly visible today:

- At his own expense, Trexler hired a renowned landscape architect to beautify a vacant city lot, which later became Allentown’s first park, West Park.
- Trexler’s summer home, Springwood Farm, was conveyed to the City of Allentown after his death and is now known as Trexler Memorial Park.
- The General conveyed his game preserve property to Lehigh County in his will.

Harry Trexler owned a ranch in Jackson Hole, Wyoming at the beginning of the 20th century. An avid hunter, he possessed a keen understanding of man’s role in nature. Trexler witnessed the dramatic reduction in game populations, and became interested in protecting and restoring wildlife.

With the express purpose of saving the American bison from extinction, the General began purchasing small farms on the land that would (ultimately/eventually) become the Preserve in 1906. In 1911, he began purchasing the foundation stock of bison, elk, and white-tailed deer at a time when bison, elk, and deer had all been hunted to the brink of extinction. Trexler used the game preserve property to protect the animals from hunters as “breeding stock” to assure the species’ survival. When the County assumed responsibility in 1935, the preserve was reportedly home to 98 bison, 78 wapiti elk, and 269 Virginia deer.

Trexler bequeathed the Preserve site to Lehigh County, and the wording of his will provides important guidance for the master plan:

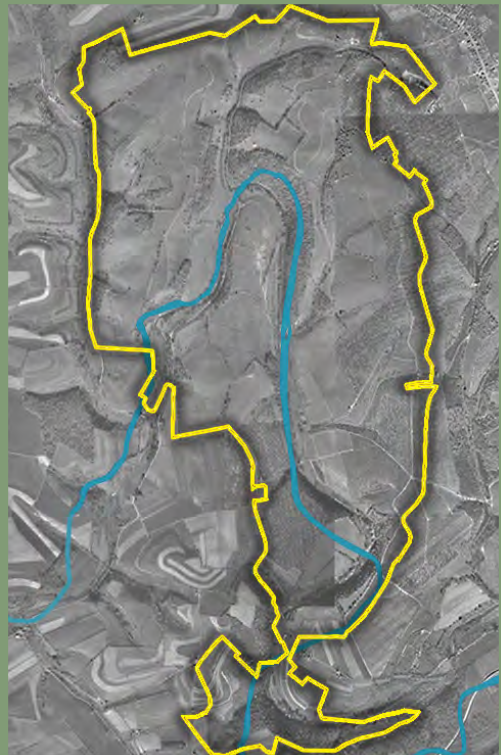


1938

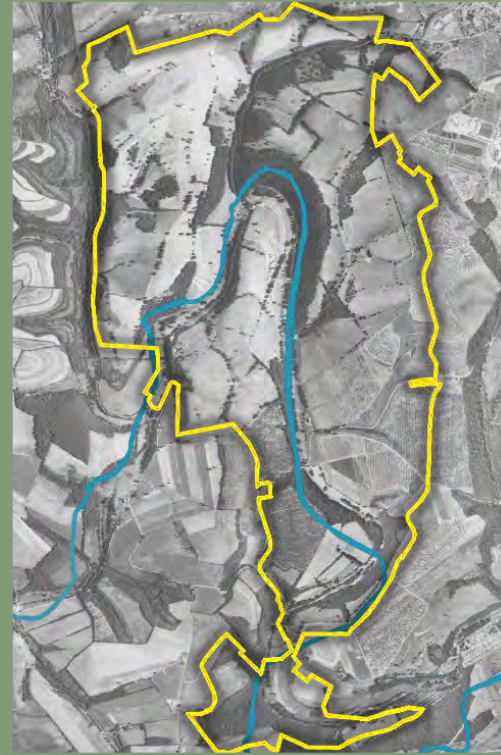


*“I further authorize and direct my Executors and Trustees to convey in fee simple to the County of Lehigh, for use as a public park, by the citizens of that County, my Game Preserve Property in North Whitehall and Lowhill Townships...”*





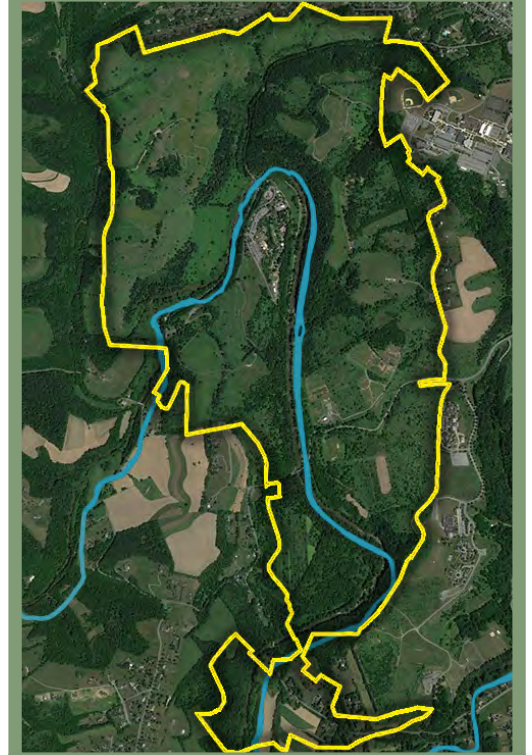
1958



1971



1999



2020

The assets of the Trexler estate have grown significantly since his death in 1933, and the administration of the Trexler Estate has evolved into the nonprofit Trexler Trust. The Trust provides millions of dollars annually for the maintenance and improvement of Allentown city parks, the Preserve site, and various local educational, charitable, and cultural projects.

Under Lehigh County jurisdiction, the Preserve property became a ritual family destination; a site fondly remembered by virtually every local child, parent, and grandparent for the beautiful scenery, the natural environment, the excitement of fording the Jordan Creek, and the sight of elk, deer, bison, and (after Trexler's death) palomino horses.

Nationwide efforts to restore bison, elk, and deer, of which General Trexler's game preserve was a part, were successful. None of the three animals is considered endangered today. Bison and elk are considered livestock. Elk roam freely in many parts of northern and western Pennsylvania.

Deer have replenished to the point of controversy, and many Pennsylvanians consider the animal to be too abundant. During the 1980s, the exterior fence of the game preserve was severely compromised, allowing the captive herd out of and wild deer in to the property. Today, the captive deer population has been completely assimilated into the native, wild population that roams freely.

Legally, the deer now belong to the citizens of Pennsylvania and are regulated by the Pennsylvania Game Commission.

General Trexler also showed an interest in horse breeding. He purchased 12 Percheron horses (draft horses for working his many farms throughout northwestern Lehigh County), and the herd grew to 100 within ten years. As combines and other machinery became available to increase farm productivity, the need for the horses on the farms declined. General Trexler sold his entire herd of Percherons in 1928.

In the decades after the general's death, the captive herds have declined in size. The bison herd was reduced to seven yearlings by an outbreak of tuberculosis in 1956 and completely destroyed by an epidemic of tuberculosis in 1960.

For 40 years after the County assumed management of the site, the Preserve was open only on Sundays, operating with informal petting and feeding exhibits. In 1969, the Game Preserve Commission engaged McFadzean, Everly & Associates to plan and develop a children's zoo at the site. The 29-acre zoo was dedicated on 18 May, 1975. The exhibits became more formalized, and the animal collection was expanded to include exotics from Africa, Asia, and Australia.

In November of 2004, a local nonprofit organization, the Lehigh Valley Zoological Society, assumed management of the zoo under a lease arrangement with the County. The zoo is now formally named the Lehigh Valley Zoo. As a separate operating entity, the Lehigh Valley Zoo is not part of the Trexler Nature Preserve 2020 Master Plan Update.

Today, the Preserve contains over 1,500 acres of land which span three diverse ranges: north, central, and south. In addition to the bison and elk enclosures, the County manages over twenty miles of trails throughout the Preserve. A wide range of user groups currently enjoy the Preserve:

- Walkers
- Runners
- Hikers
- Horseback Riders
- Cyclists
- Naturalists
- Students
- Educators









# Inventory & Analysis

# 2





# Data Collection & Methodology

The data in this master plan update was compiled from various sources, including Lehigh County, Wildlands Conservancy, the Pennsylvania Game Commission, previous planning studies, and field reconnaissance data obtained by the consultants.

Field maps and planning documents were created using Geographic Information System (GIS) base mapping. This information was combined with base aerial photography, municipal boundaries, roadways, sidewalks, parcels, and other identifying land use features.

# Site Reconnaissance

The consultant team frequently visited the Preserve during the master plan update process.

Simone Collins visited the Preserve in June and July, 2020 to walk the entirety of the site, document existing conditions, and take site photographs which would be used throughout the project process. The consultants returned to the site in October to bike the Border Trail as well as several interior trails. This experience helped the consultants better understand the quality of existing facilities and informed the necessity of certain Preserve improvements.

Applied Ecological Services visited the Preserve throughout the master plan update process to conduct wildlife species counts, document invasive species, study existing hydrology, and document a variety of important existing ecological conditions.





Public Participation

Community input is a critical component of any successful master plan.

In compliance with state and local health protocols in response to the Covid-19 pandemic, the consultant team conducted all public and committee meetings virtually during the master plan update.

The public identified important existing conditions and provided critical feedback on desired Preserve elements and proposed solutions.

The consultant team worked with Lehigh County to ensure that the public had adequate opportunity to voice their opinions and incorporated ideas generated through public discussion wherever appropriate.

Committee and public meetings served as critical benchmarks during the project process; they informed the public on project progress and provided an opportunity for feedback and discussion. Attendance lists and meeting minutes can be found in the appendix of this report.

Committee Meeting 1 – June 9, 2020

The consultant focused on collecting background information for the site and discussing preliminary goals for the master plan update. The consultants led a brainstorming session to gather goals, facts, and concepts for the Preserve.

Public Meeting 1 – September 3, 2020

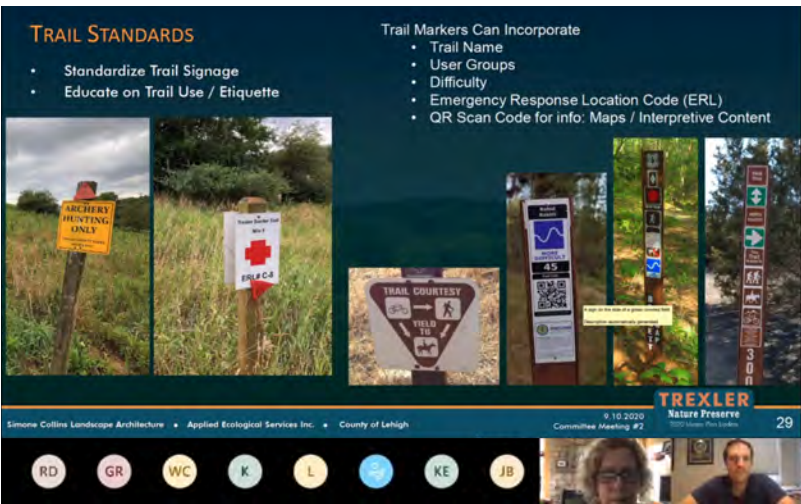
The consultant team was introduced to the community and provided an overview of the master plan process. Site inventory and analysis were presented that highlighted the site characteristics, including elevation changes, steep slopes, hydrology, soils, and slope aspect. The consultants led a brainstorming activity session for the Preserve, gathering the public goals, facts, concepts, and ideas for potential partners.

Committee Meeting 2 – September 10, 2020

At this meeting, the consultant team presented preliminary inventory and analysis data for Preserve ecology, trails, facilities, and signage. The project team shared early results from the online public opinion survey and the online wikimapping platform.



Public Meeting 1 - 9.3.2020



Committee Meeting 2 - 9.10.2020

Committee Meeting 3 – October 29, 2020

At this meeting, the consultant team presented preliminary draft ecological, trail, facility, and signage recommendations.

Public Meeting 2 – December 3, 2020

The consultant team presented to the public the draft master plan update, which included draft ecological, trail, facility, and signage recommendations.

Committee Meeting 4 – January 21, 2021

The consultant team reviewed the public and committee comments received to-date on the draft master plan update.

Public Meeting 3 – February 11, 2021

At this meeting, the consultant team presented the final master plan update to the public and noted the variety of comments received and modifications made to the draft plan.

Committee Meeting 5 – March 4, 2021

At this meeting, the consultant team reviewed the final master plan update along with additional comments received. The focus of this meeting was to delineate next

steps for implementation of Preserve improvements.

Key Person Interviews

Twenty (20) key person / key organization interviews were conducted during the master plan process. The interviews provided input from key persons and organizations in the area, including those who have responsibilities in the operations and safety at the Nature Preserve. A record of key person interviews can be found in the appendix of this report.

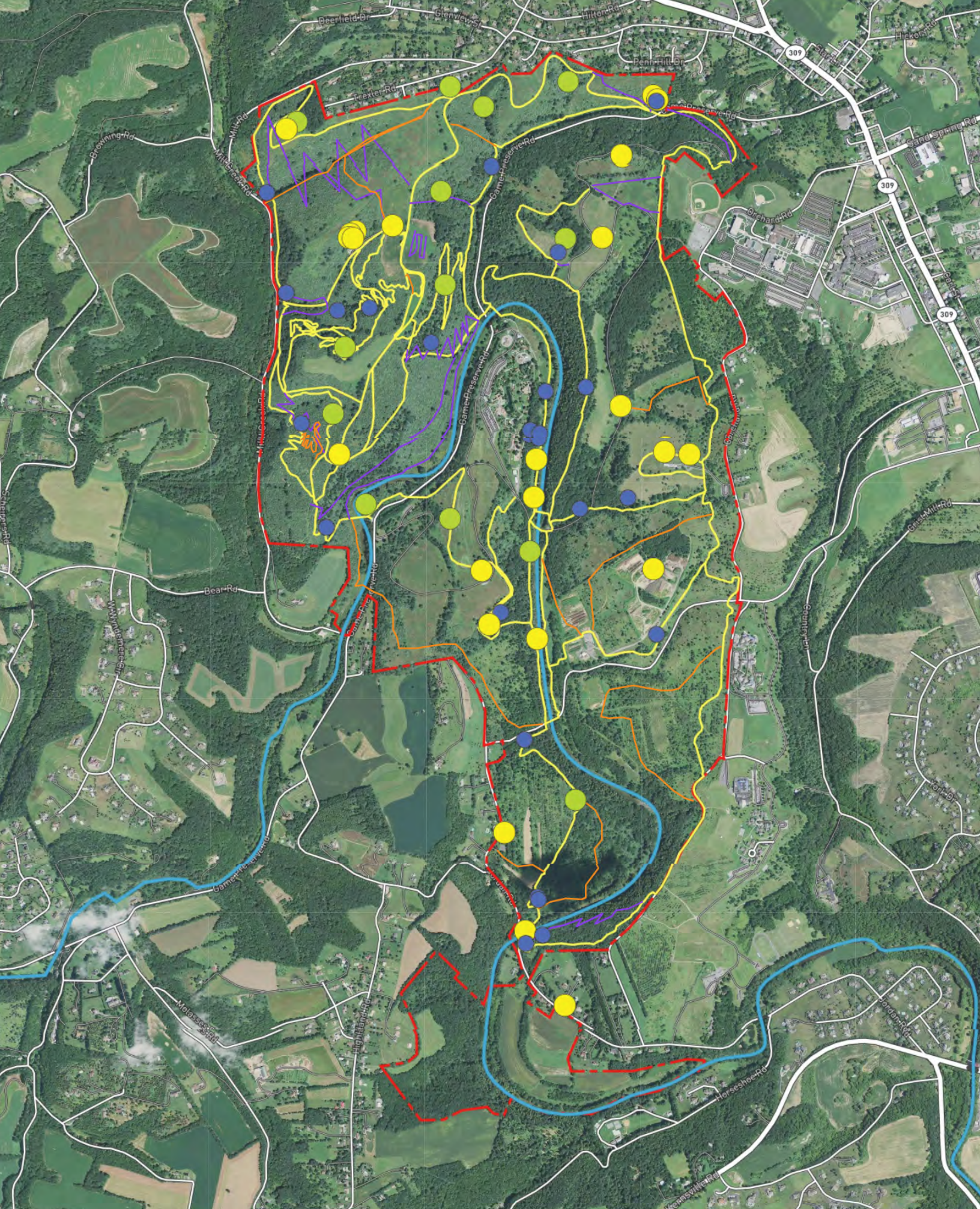
Transparency

All meetings included opportunities for comment and discussion during online meetings. Notes from meeting conversations are included in the project appendix.

GOALS	FACTS	CONCEPTS			PARTNERS
Improve Public Access	Existing Trails	Restroom Facility in the North Range	Ease of Use of Trails	Road Parking Better Advertise	Whitehall Townships
Restoration Plan	Three Ranges	Best management Practices for Trail Design	Separate and define uses at the Ford	Update Mile Markers on Border Trail	State Game Commision
Better Access	Camping for Scouts Groups Only	Improve Trail Wayfinding	Keep Rustic Appeal of Trails	More parking in North Range	DCNR
Simplify Trail Maintenance	Old Packhouse Road Turns into Jordan Road	52 cars parked along Jordan			Allentown Hiking Club
	Rouge Parking Taking Place				Valley Mountain Bikers (VMB)

Virtual Brainstorming Session and Card Technique - Public Meeting 1 - 9.3.2020





## WikiMapping

The consultant team established an online mapping platform in which Preserve visitors were able to identify important existing conditions (such as destinations, existing trails, points of interest) as well as desired improvements (trails modifications, desired facilities, etc.)

This method of virtual engagement is an important element of the public involvement process, and even more so during the virtual meetings during the Covid-19 pandemic.

A total of 88 map comments were received during the master plan update, and were organized by the following categories:

25

'Facts We Should Know' 

13

Points of Interest 

12

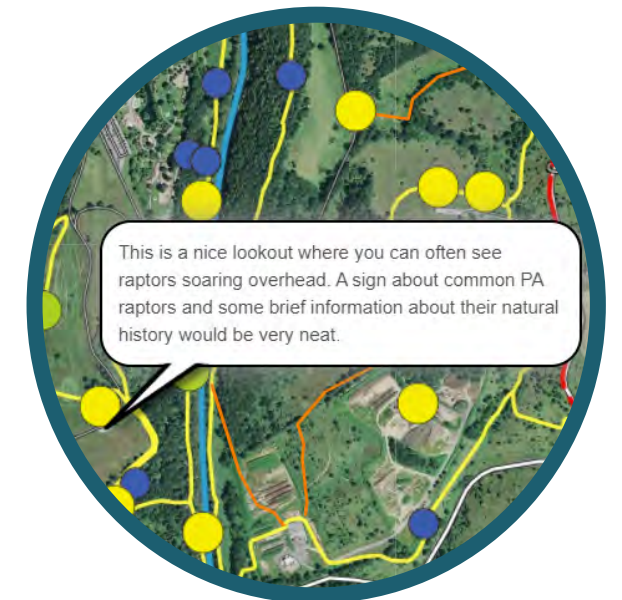
Existing Paths Delineated 

23

Proposed Amenities / Activities 

15

Proposed Trail Modifications 



Examples of public WikiMapping comments



# Public Opinion Survey

A 33-question public opinion survey was created by the consultant team with the intention to gather important user information as related to the Trexler Nature Preserve.

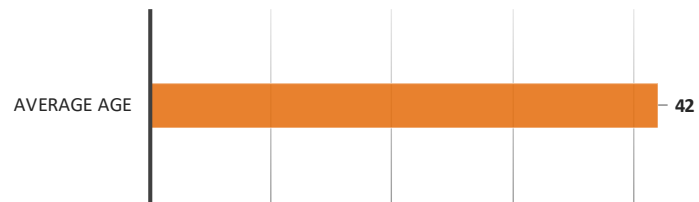
This survey solicited background data from respondents, including:

- Age, location, and length of respondent residency
- Current recreation habits
- Priority of desired Preserve improvements

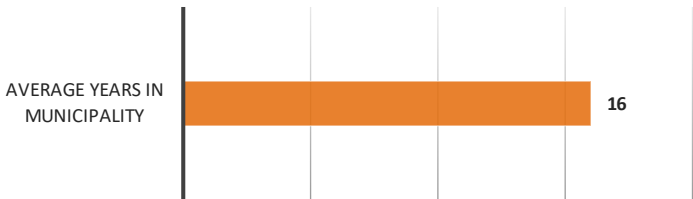
A total of 457 responses were received during the master plan process.

A sample of survey results are presented in this chapter. Complete survey results can be found in the report Appendix.

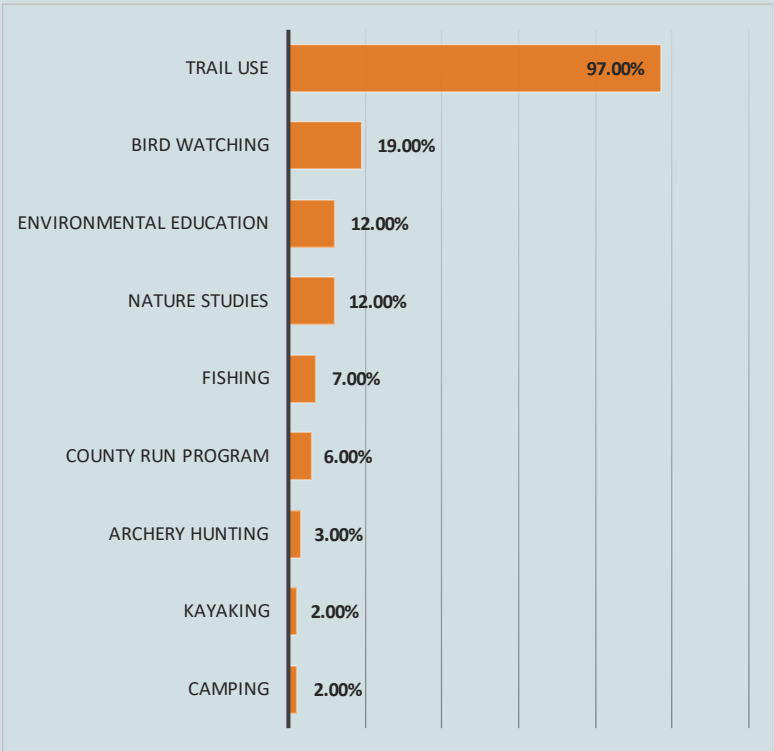
## What is your age?



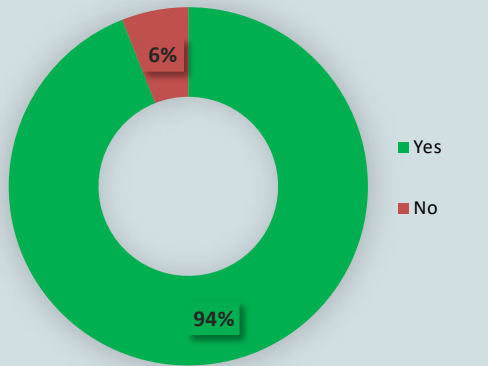
## How long have you lived in your current municipality?



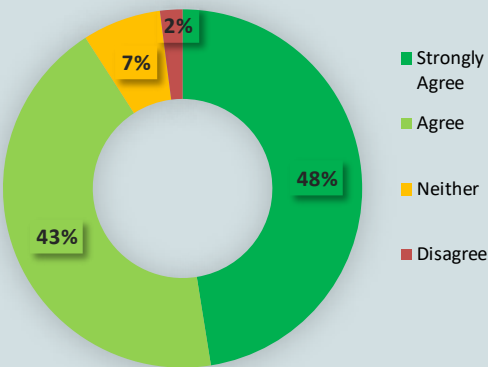
## What activities do you partake in at Trexler Preserve?



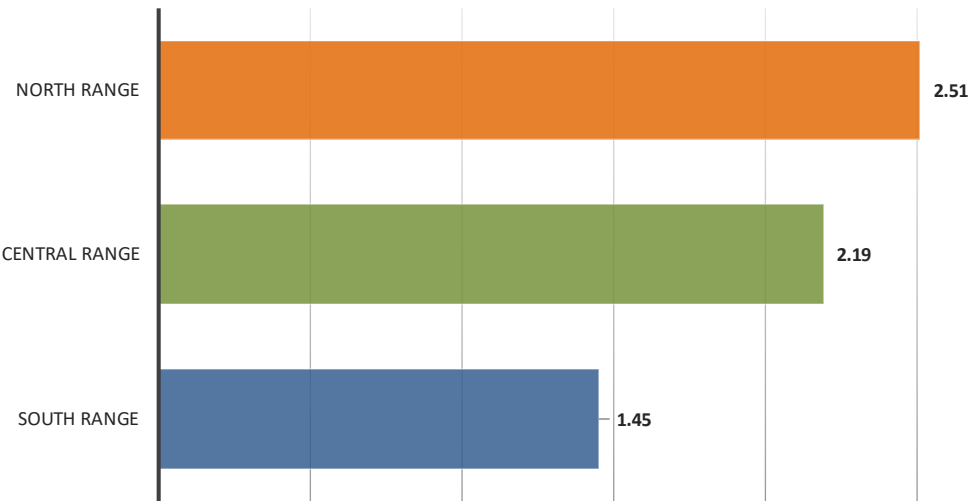
## In the past 12 months, have you participated in any activities the Preserve?



## “The Preserve trails are well maintained”

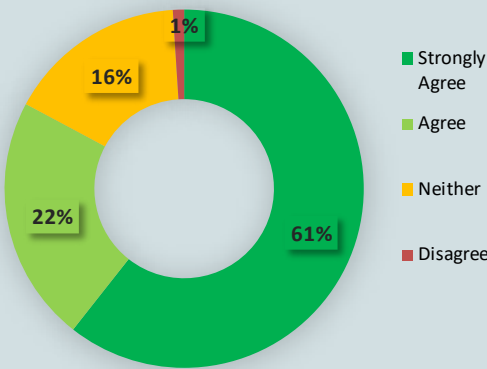


## Please rank the three ranges in order of which you visit the most.

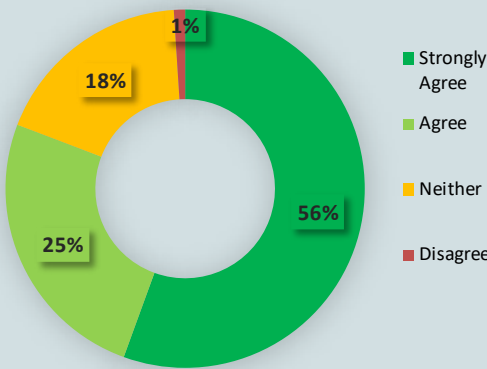


## Do you Agree or Disagree with the following statements:

“The preservation of the buffalo herd is important for the identity of Trexler”

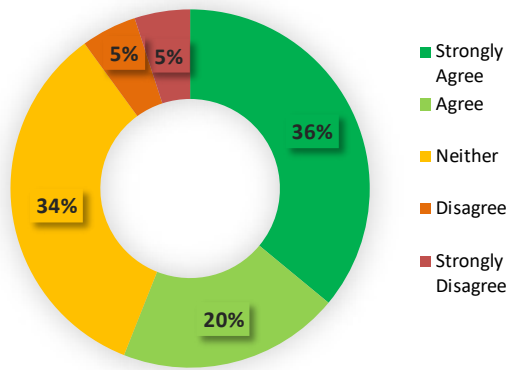


“The preservation of the elk herd is important for the identity of Trexler”

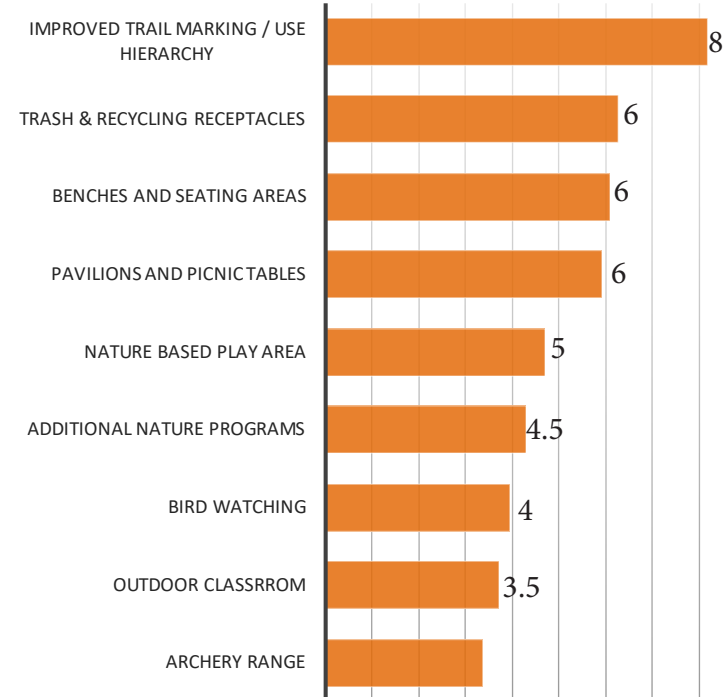




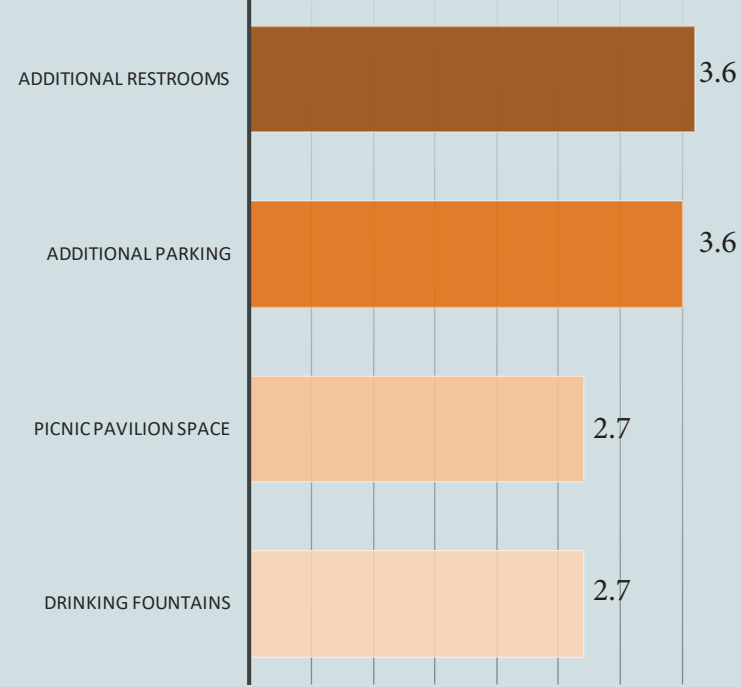
How do you feel about the following statement, “I would be upset if the Jordan Creek Ford were to be closed to vehicular use.”



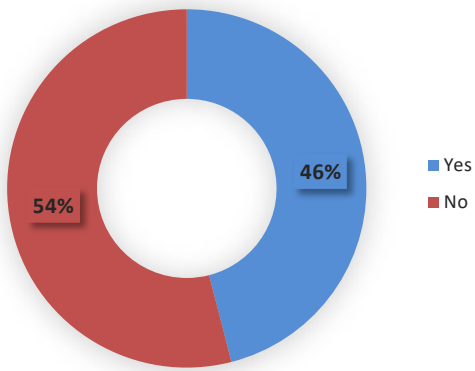
Rank these potential new or additional facilities and activities in order of importance.



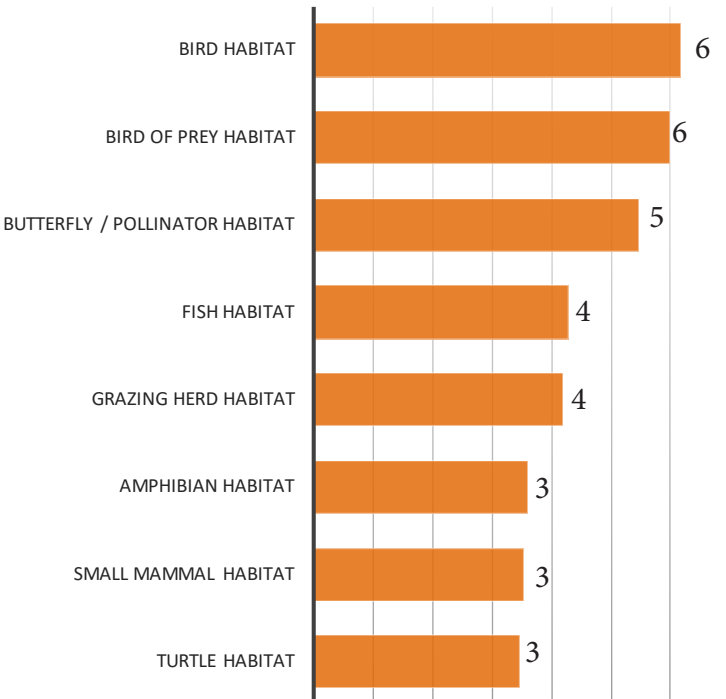
How important do you feel the following amenities / facilities are for a better and more comfortable experience at Trexler?



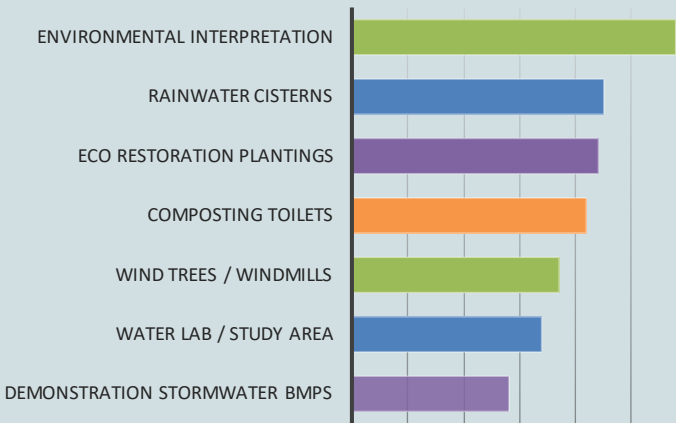
Should the Preserve explore water quality and habitat improvements that would require the removal of the Ford?



Rank the type of wildlife / habitat in level of importance to you.

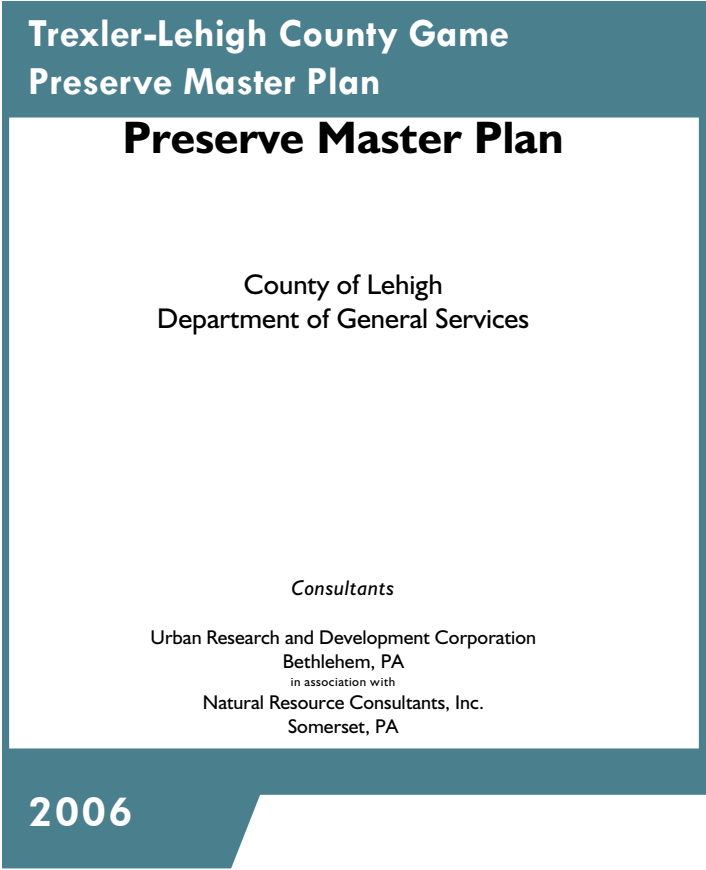


Rank the priority of ecologically-driven facilities and activities to be considered for the Preserve





# Relevant Planning Documents



The purpose of the 2006 Trexler-Lehigh County Game Preserve Master Plan was to present improvements that would open the game preserve to the public, in accord with General Trexler’s wishes and the agreement between Lehigh County and the Trexler Trust. The plan was intended to provide a vision for an improved game preserve site open for the use and enjoyment of Lehigh County citizens, and guide Lehigh County in spending the \$2.75 million as required by the legal agreement with the Trexler Trust.

Recognizing the value of open space, the needs of Lehigh County citizens, and the wishes of General Trexler, the Trexler-Lehigh County Game Preserve Master Plan described the following vision for the future of the property:

‘The Trexler-Lehigh County Game Preserve is a safe, public space that fosters an understanding of man’s relationship with and impact upon the natural environment. The preserve is the focal point for land conservation efforts within the Jordan Creek watershed. The preserve protects and manages natural resources and offers appropriate educational and passive recreational opportunities for children and adults that promote:

- The physical, mental, and social well-being of people.
- The health, sustainability, and diversity of the natural environment.
- The responsible use of resources.

The game preserve is offered to the citizens of Lehigh County through the will of General Harry C. Trexler and with the support of government, business, educational, social, cultural, philanthropic, and environmental organizations.’

The plan goes on to explain that the term “passive recreation’ is about the relationship of the activity to the environment. In addition to walking and hiking, some examples include bicycling (but not extreme competitive bicycling events), horseback riding (but not horse racing) and family picnicking (but not large-scale social events). Active recreational pursuits involving significant modifications to the land, such as field/court sports, motor sports, and golf, are not consistent with the vision. The plan makes it clear that the preservation of the land and the natural environment should drive all decisions about activity at the preserve.

Recommendations address three main topics: trails, facilities, and conservation policies:

## Trail system

- Build Trail A to handicapped accessible specifications
- Build segments D5, D6, and D7 to connect the zoo parking lot to the existing pedestrian bridge area.
- Build trail segments D2 and D3 to connect the zoo parking to the Game Preserve Road/covered bridge area.
- Build Trail C, the Loop Trail.
- Build Trail Segments D1 and D4.
- Four pedestrian bridges are proposed, one each on Trails A and B and two on Trail C.

## Support Facilities

### Entrances

North Range—Open an entrance to the proposed North Range parking area from Mill Creek Road.

North Range—Add a trail entrance and a four-car gravel parking area off Game Preserve Road where the Civilian Conservation Corps pathway begins.

Central Range—Upgrade the main entrance from Game Preserve Road to meet PennDOT standards.

Central Range—Add a trail crossing (Trail C) north of the main entrance from the Central Range to the North Range.

Central Range — Rebuild the entrance at Schlicher’s Covered Bridge.

Central Range—Upgrade the exit at the north end of the site to PennDOT standards.

Central Range — Provide a gate at the property boundary with Lehigh-Carbon Community College to control access.

Central Range — Add a four-car gravel parking lot on Packhouse Road at the east side of the covered bridge. Add a trail entrance on each side of the covered bridge to trail A.

Central Range — Provide a trail entrance on Jordan Road west of Geiger’s Covered Bridge.

Central Range — Add a gravel horse trailer parking area and trail entrance on the county-owned land off of Orchard Road.

South Range — Add a maintenance/emergency/trail entrance and four gravel parking spaces off of Jordan Road south of the bridge crossing Jordan Creek.

South Range — Add a maintenance/emergency/trail entrance off of Jordan Road on the north side of the bridge crossing Jordan Creek.

Build a trail crossing of Jordan Road west of Geiger’s Covered Bridge.

Build a trail crossing of Old Packhouse Road east of Geiger’s Covered Bridge.

Build a trail crossing of Old Packhouse Road west of Orchard Road.

### Roads and Parking

Provide a gravel entrance road to the North Range from Mill Creek Road.

Provide a gravel parking area on the North Range off of Mill Creek Road.

Provide gravel parking area for horse trailers.

Keep the parking area east of the ford.





Restrooms

Build restrooms at the south end of the zoo parking lot open to the public using the existing water and sewer systems.

Provide portable toilets:

- At the North Range parking area.
- Near the pedestrian bridge to serve the picnic area and nearby trails.
- At the parking area near the ford.
- At the horse trailer parking area.

Fence

Repair and maintain boundary fencing in the area of the composting facility to keep preserve visitors from crossing into the composting facility.

Remove the existing fencing and gates at entrances and replace with new posts, 3-rail fence, and gates to control preserve entrances.

Remove fences from animal enclosures after each of the buffalo, elk, and horses have vacated the property.

Add fencing in the picnic area.

Add fencing around the North Range parking area to contain vehicles.

Add fencing around the horse trailer parking area to contain vehicles.

Policies

Jordan Creek Corridor

Permit fishing in the Jordan Creek when the water level is high enough to support fish.

Continue to allow/encourage wading in the Jordan Creek near the ford and pedestrian bridge.

Redesign the picnic area along the Jordan Creek upstream of the pedestrian bridge.

Activities

Camping — Allow only organized, responsible groups, such as Boy Scouts, Girl Scouts, and similar groups, to use the preserve for camping events.

Picnicking — Relocate the picnic area along Jordan Creek upstream of the ford.

Picnicking — Keep the picnic area east of the ford.

Picnicking — Add picnic tables at the parking area in the North Range.

Nature Watching — Relocate the trail to the existing nature watching area west of Trail A.

Indoor Space

Use/modify existing space for administrative purposes, rather than constructing a new administration building.

Work with the Lehigh-Carbon Community College to make optimum use of the preserve for college classes and site-based environmental education programs.

Wildlife - Remove the bison, elk, and horses.

Management - Provide a permanent full-time, on-site park manager or an organized group to accomplish the same result.

Name - Consider changing the name of the site to the Trexler Nature Preserve to emphasize the environmental education and outdoor experiences available at the site.

Site - Consider expanding the preserve site to include adjacent county lands in order to promote land conservation, expand the proposed trail system, and unify the identity of the preserve.

Lehigh Valley Greenways Plan



2007

This plan looks at greenways, which are best described as corridors of open space, whether narrow or wide, that can run through urban, suburban, or rural areas, and that integrate diverse natural, cultural, and scenic features. Connectivity is an important component of greenways, linking together a variety of open spaces.

The plan points out Trexler Nature Preserve and the adjacent State Game Lands as a valuable Jordan Creek Greenway “Hub”:

The collection of open space created by the Trexler Nature Preserve, State Game Lands No. 205, and adjacent Lehigh County land holdings creates over 2,800 acres of wildlife habitat and natural areas that are unmatched anywhere else in the Lehigh Valley...

Trexler Nature Preserve is cited as an important recreational resource along the Jordan Creek Greenway, and Trexler Hollow is identified as an important natural area along the Greenway.

Recommended Actions for the Jordan Creek Greenway:

Goal: The creation of a multi-use greenway along the Jordan Creek through the acquisition of unprotected land and/or conservation easements on the remaining high priority natural, recreational and cultural resource lands to connect it with existing protected areas.

Preserve, through acquisition or easement, the remaining high priority parcels not currently in public ownership or deed restricted along the Jordan Creek Greenway.

Explore the possibility of acquiring lands or conservation easements along the greenway from Covered Bridge Park to the Trexler Nature Preserve for recreational and conservation use. Encourage landowners to restore natural riparian buffers of 100 feet along the creek.

Lehigh Valley Trails Inventory - Lehigh and Northampton Counties



Lehigh Valley Planning Commission

2013

The goal of this plan was to assist local officials in planning for future trails in the Lehigh Valley. The objectives of the 2013 update were to:

- Update LVPC’s existing trail data
- Update the Lehigh Valley Trails map and associated table
- Identify priority trail gaps
- Provide information on safe road crossings
- Upload the updated trails data and trail gap information to the DCNR database

The Jordan Creek Greenway Trail is identified as a “trail gap”, which ends in the South Range of Trexler Nature Preserve and is planned to connect with the Preserve’s trails system. In the appendix, the report provides references for safe road crossing; these include documents by PennDOT and AASHTO, among others. Also provided are examples of trail crossing plans, including shared use path crossing plans for Trexler Nature Preserve.

This report informed the consultants on trail design and potential/proposed connections both within the site and in the context of the larger regional trail system.



## Lehigh Valley Return on Environment

### Return on Environment

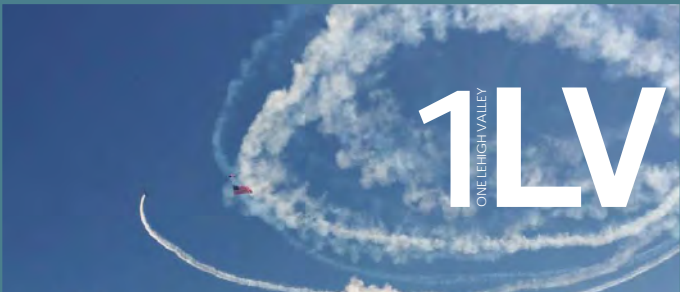


Lehigh Valley Planning Commission

2014

The Lehigh Valley Planning Commission studied the estimated values of open space by measuring impacts across natural system services, air quality, outdoor recreation, and property value. For example, natural system services can save municipalities money through better water quality and storm water management. Additionally, homeowners who live near open space will experience higher property values. The study also identifies how open space has a beneficial impact on life, including meeting basic needs for health and well-being, jobs, food, and supporting a diversity of plants and animals. This report was helpful to the consultants in displaying the benefits that Trexler Nature Preserve provides.

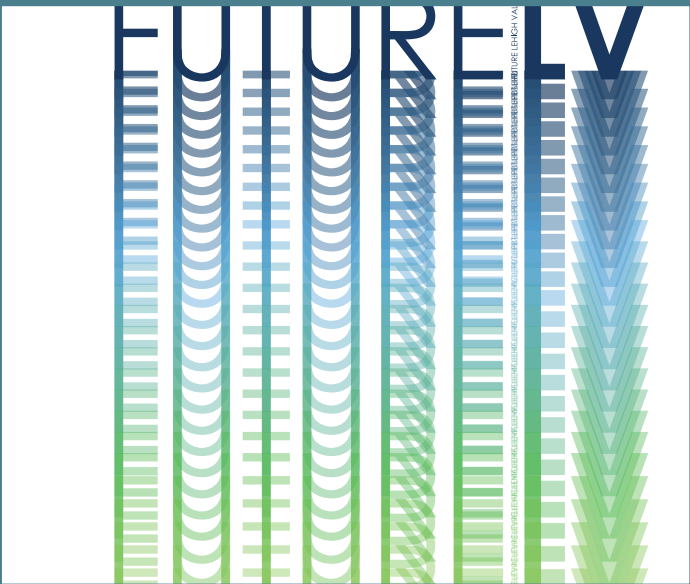
## One Lehigh Valley (1LV)



2014

The Lehigh Valley Sustainability Consortium (a fourteen-member regional alliance) organized ten plans around economy, environment, transportation, and livable communities. The Lehigh Valley Planning Commission (LVPC) assessed these different reports and developed the goals within this document to guide the Lehigh Valley through growth and development. This report provided the consultants with an understanding of land planning throughout the region.

## Future LV: The Regional Plan



2019

This report combines the land use planning from LVPC and the transportation planning of LVTS to guide future decision making within this fast-growing region. In the report, people identified protection and preservation of natural resources and having recreational opportunities to be very important. The plan stresses the importance of protecting, preserving, and connecting natural, cultural, historical, and scenic open space to promote the health, safety, and welfare of residents through inclusive and livable communities. The report provided insight into Lehigh Valley's future land planning goals and how they correspond with the role of Trexler Nature Preserve.

## Livable Landscapes - A Park, Recreation, Open Space, Agricultural and Historic Lands Plan for Lehigh County



2018

The purpose of this plan is to provide guidance for development of an open space network that will assist in conserving, restoring, and enhancing valuable natural and cultural resources within Lehigh County. The goal is to promote vibrant and healthy quality of life for residents, while maintaining the unique character of the natural resources throughout the area. The report presents the valuable benefits of open space to the community, economy, and health, referring to the findings in the *Lehigh Valley Return on Environment Study* and the Health Care Council of the Lehigh Valley study *The Road to Health*.

The benefits of open space as expressed within the report include:

- Community - Reduction of crime and delinquency, better family and social support networks, places for youth engagement, and providing lifelines to the elderly
- Economy – increased tourism, increase in land and property value, increased business retention and attraction, revenue generation, and cost mitigation for services provided by open space
- Health and Wellness – Reduced stress, increase in life expectancy, improved air quality, promotion of physical activity and socialization, improved mental and physical health, and reduced pressure on local health system

The plan gives recommendations for Lehigh County and the municipalities to achieve the six goals expressed in the plan.

- Conserve, restore and enhance natural resources;
- Provide and maintain an accessible, interconnected park, trail and recreation system;
- Conserve, restore and enhance greenway and blueway networks;
- Preserve farmland and farming to meet food production, economic and open space needs;
- Preserve historic, cultural and scenic resources and landscapes;
- Advance County natural, recreational, agricultural, and historical resources and usage through funding, promotion, education, partnerships, and other strategies.

These goals assisted in guiding the consultant team to ensure that the Master Plan update for Trexler Preserve aligned with the recommendations of the County.



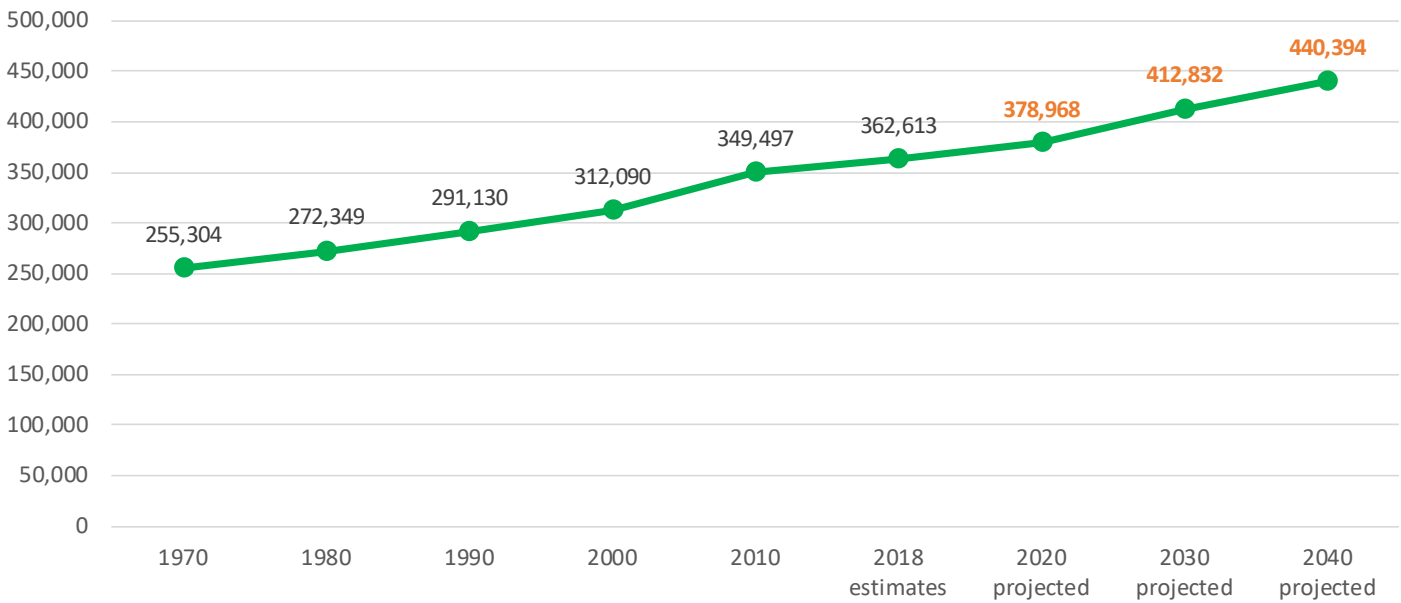
# Demographics

The Trexler Nature Preserve is located within both Lowhill and North Whitehall Townships in Lehigh County, Pennsylvania. The Preserve’s unique ecology, history, and amenities draw visitors from across the County and region.

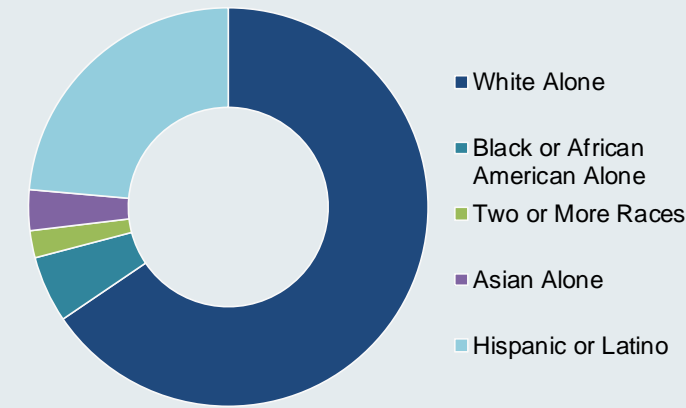
To better plan for the future of the Preserve, it is essential to understand the context and community within which the Preserve operates.

The following demographic information was obtained via the Lehigh County planning documents, the United States Census and the 2018 American Community Survey.

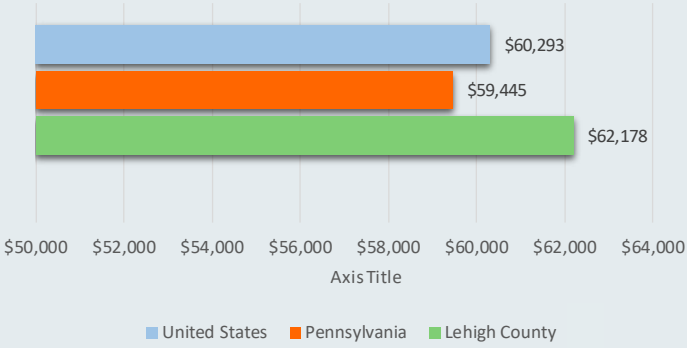
## Lehigh County Population



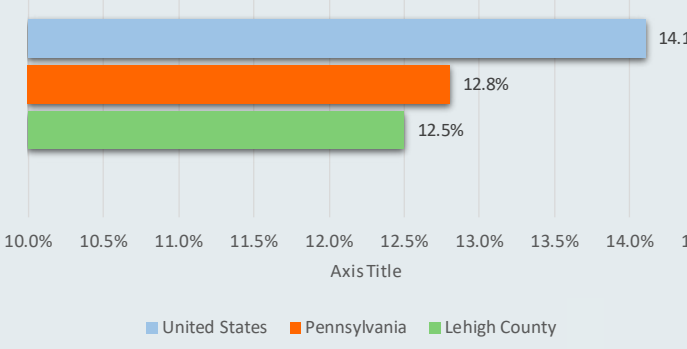
## County Race & Ethnicity



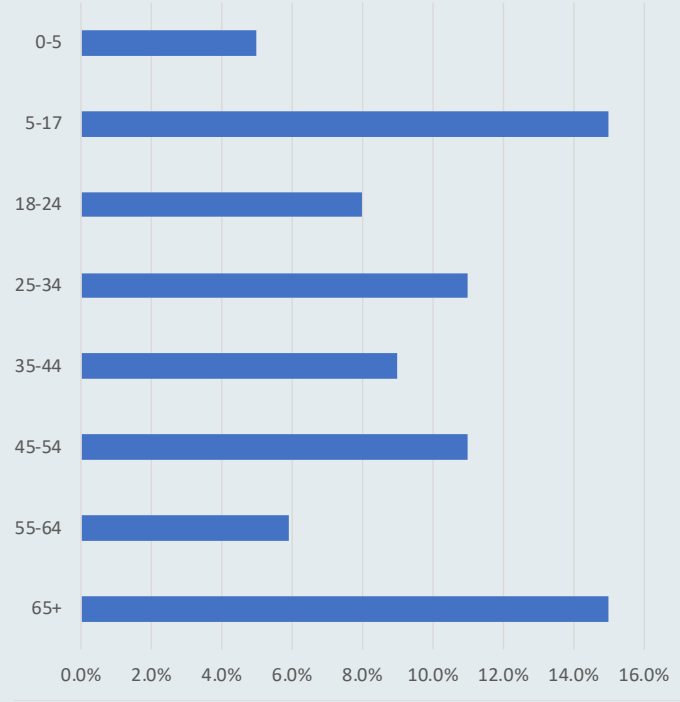
## County Median Income



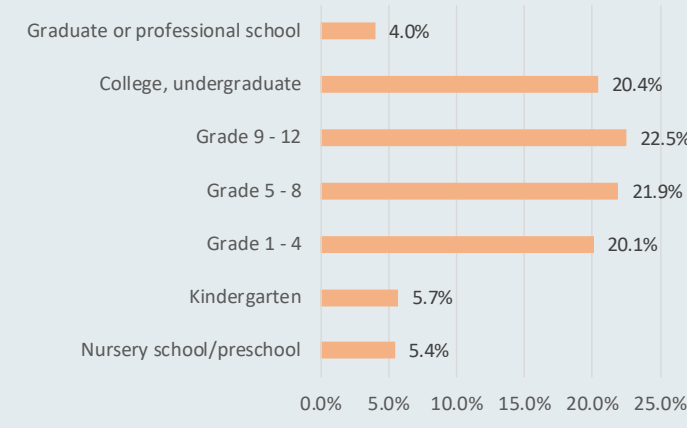
## County Poverty Rate



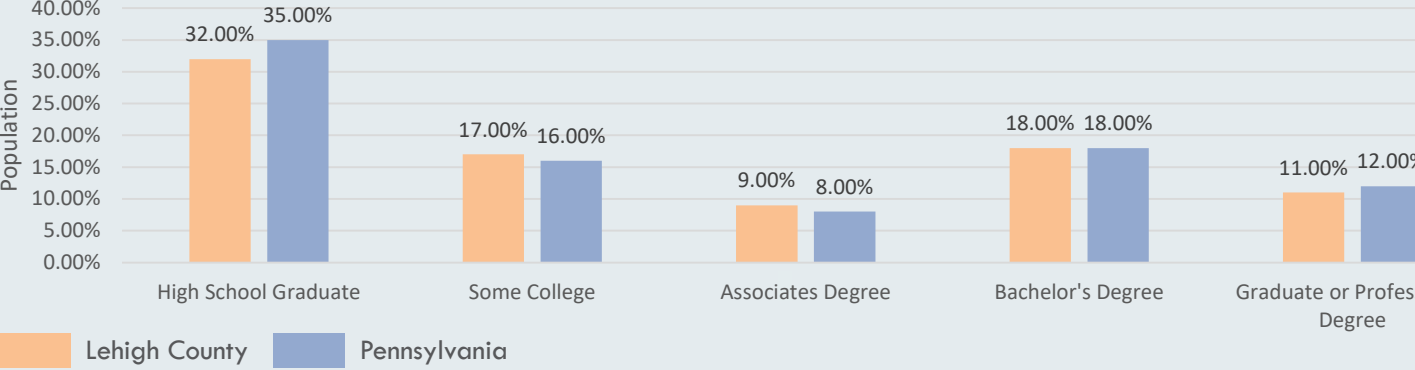
## County Age Breakdown



## County School Enrollment



## County Educational Attainment





# Site Description

Located along the Jordan Creek, the Trexler Nature Preserve contains a range of diverse ecological areas which include varied macro and micro habitats with unique flora and fauna. The Preserve contains stunning views and vistas, as well as a variety of passive recreation areas, trails, and facilities.

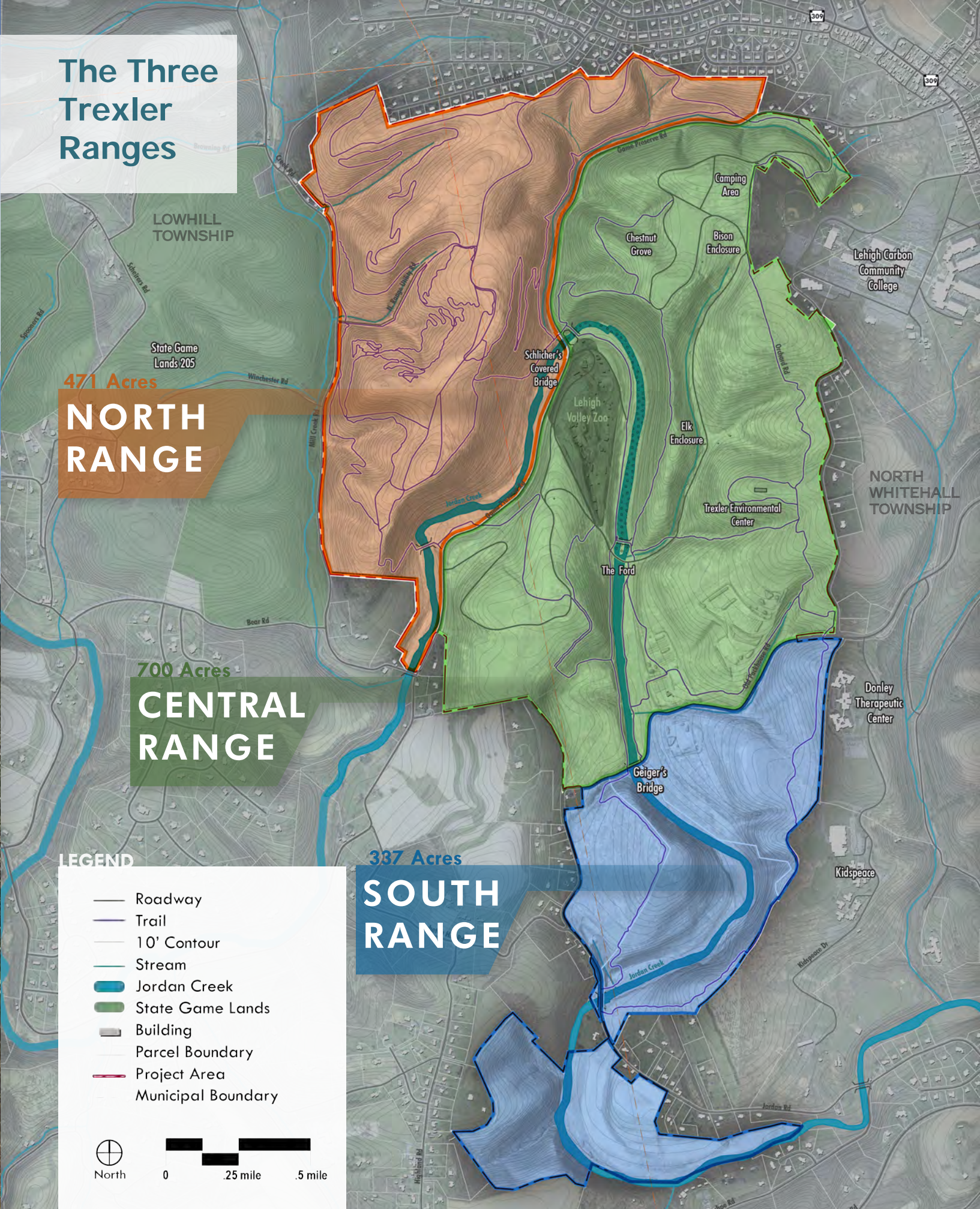
The Trexler Nature Preserve (and the adjacent County-owned lands) encompasses over 1,500 acres, and is divided into three distinct areas:

- North Range
- Central Range
- South Range.

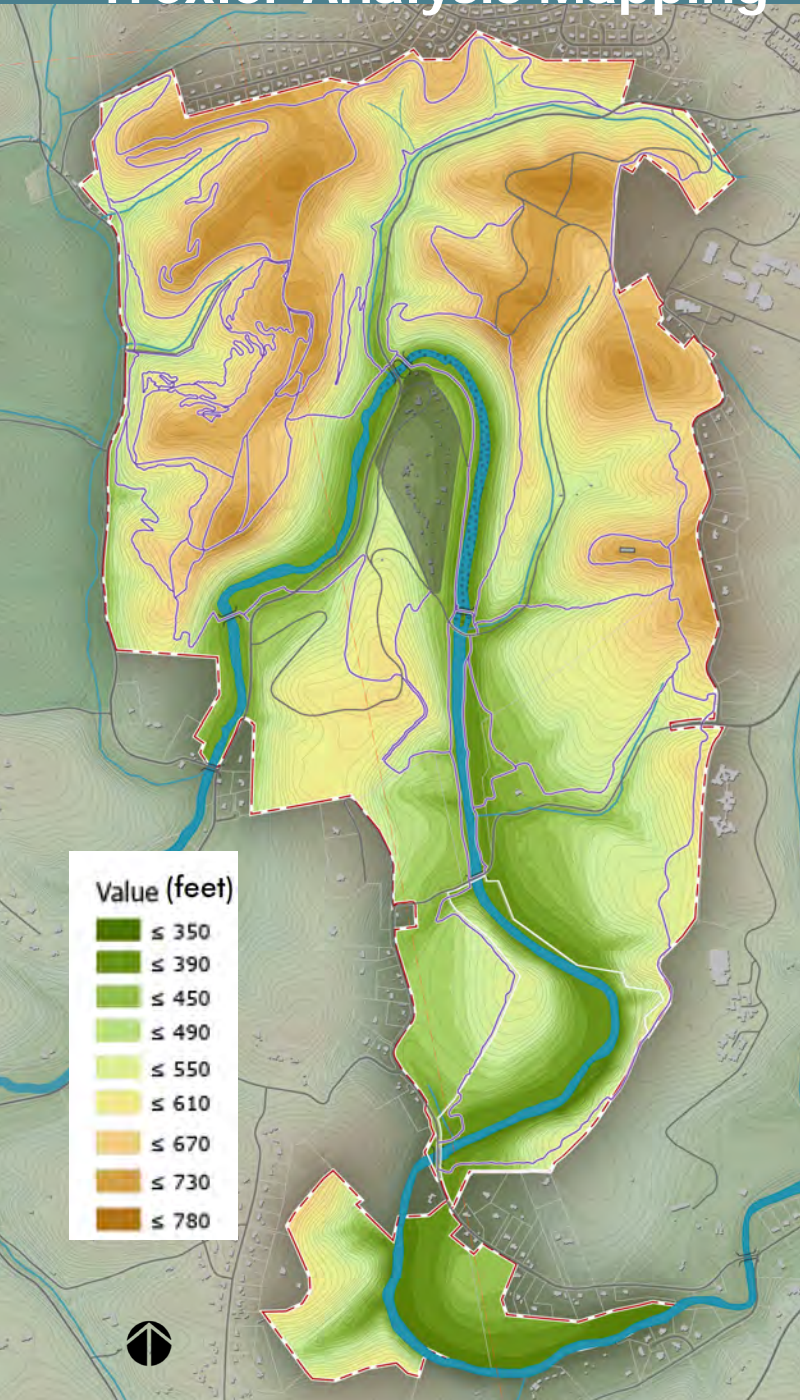
This master plan and the ecological inventory and analysis report prepared by Applied Ecological Services note the distinct character of each range.



## The Three Trexler Ranges





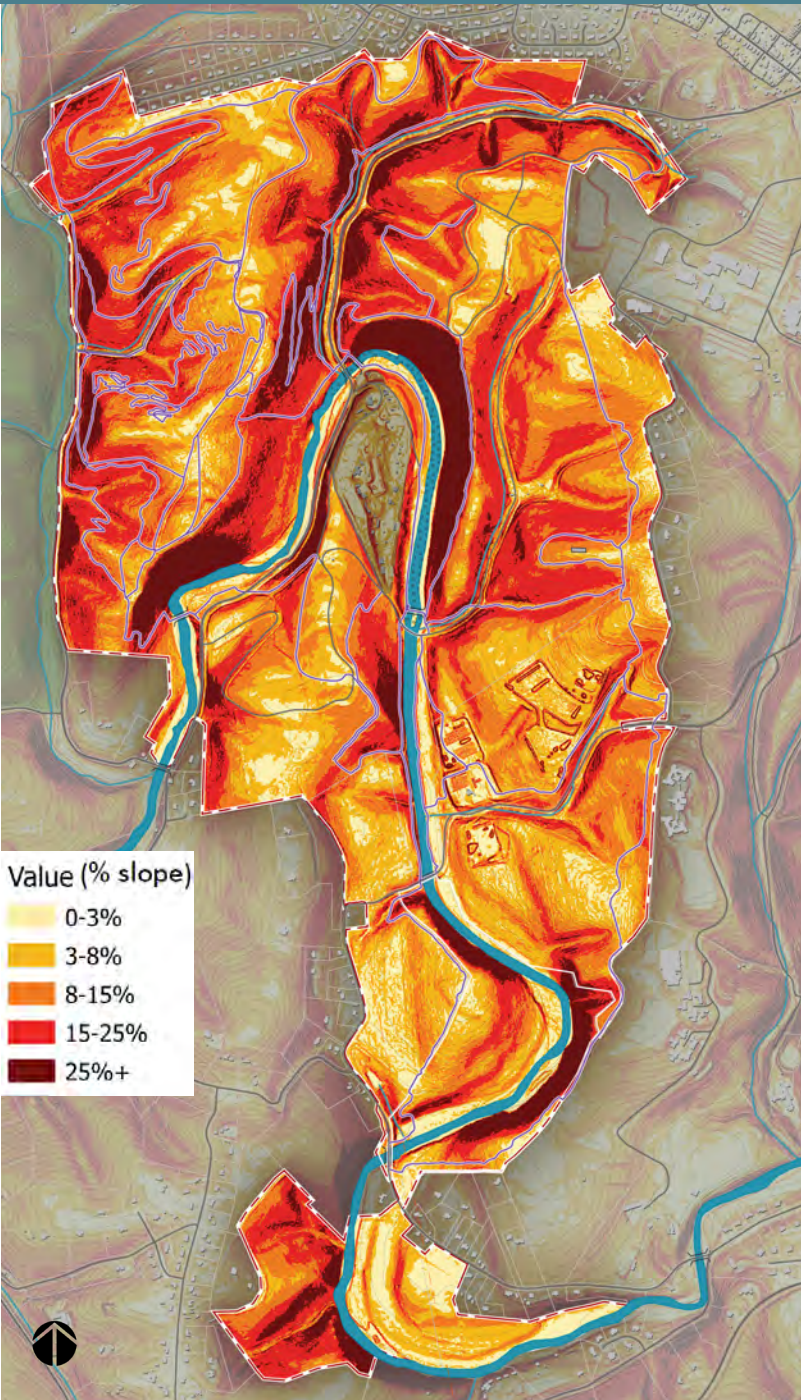


Elevation & Topography

The dramatic transitions between hills and valleys leading to the Jordan Creek define the site topography.

The site highpoint is 830 feet above mean sea level and the site low point, located along Jordan Creek, is 350 feet above mean sea level.

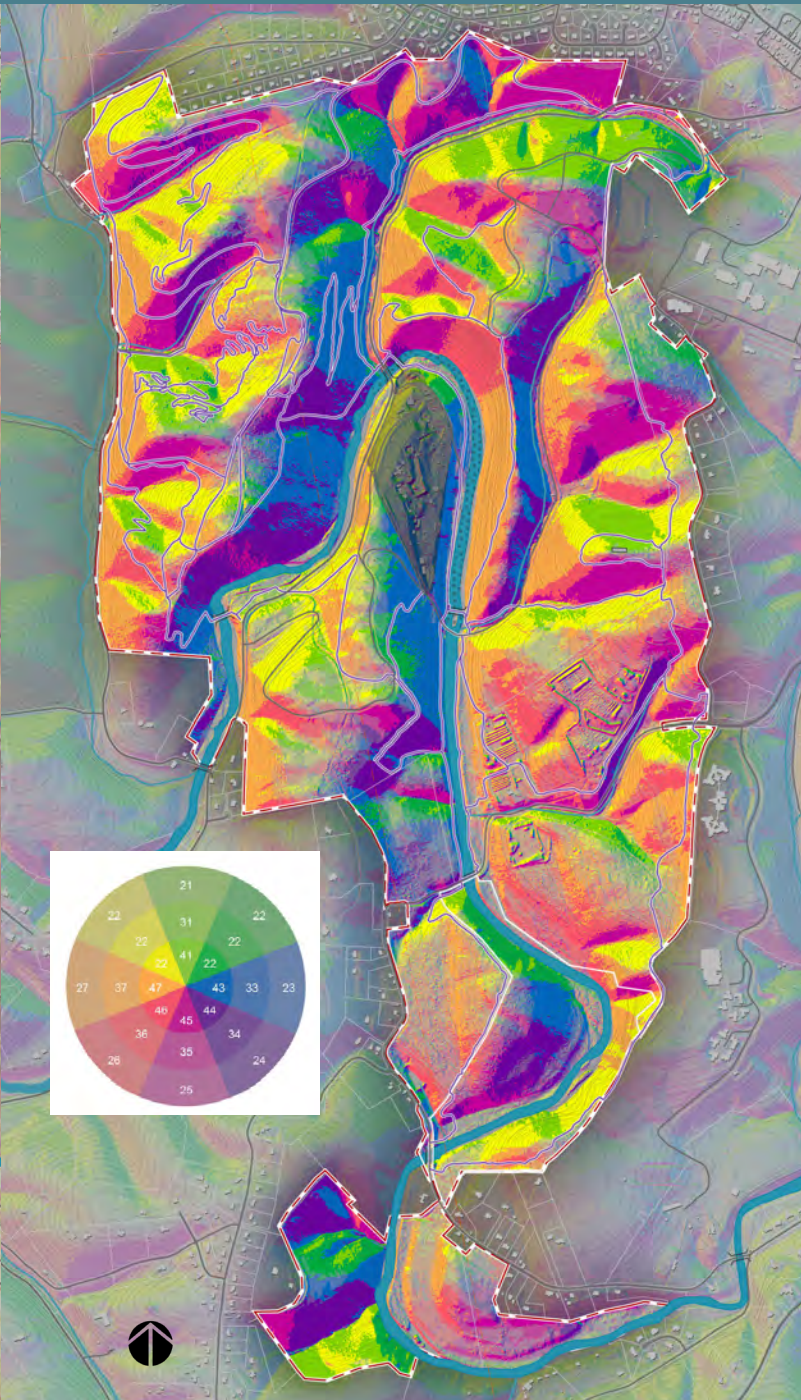
The central valley formed by the Jordan Creek is associated with areas of steep slopes. This range of topography provides unique macro and micro habitats and influences the movement of water throughout the Preserve.



Steep Slopes

Steep slopes, greater than 15%, are present along the Jordan Creek Valley.

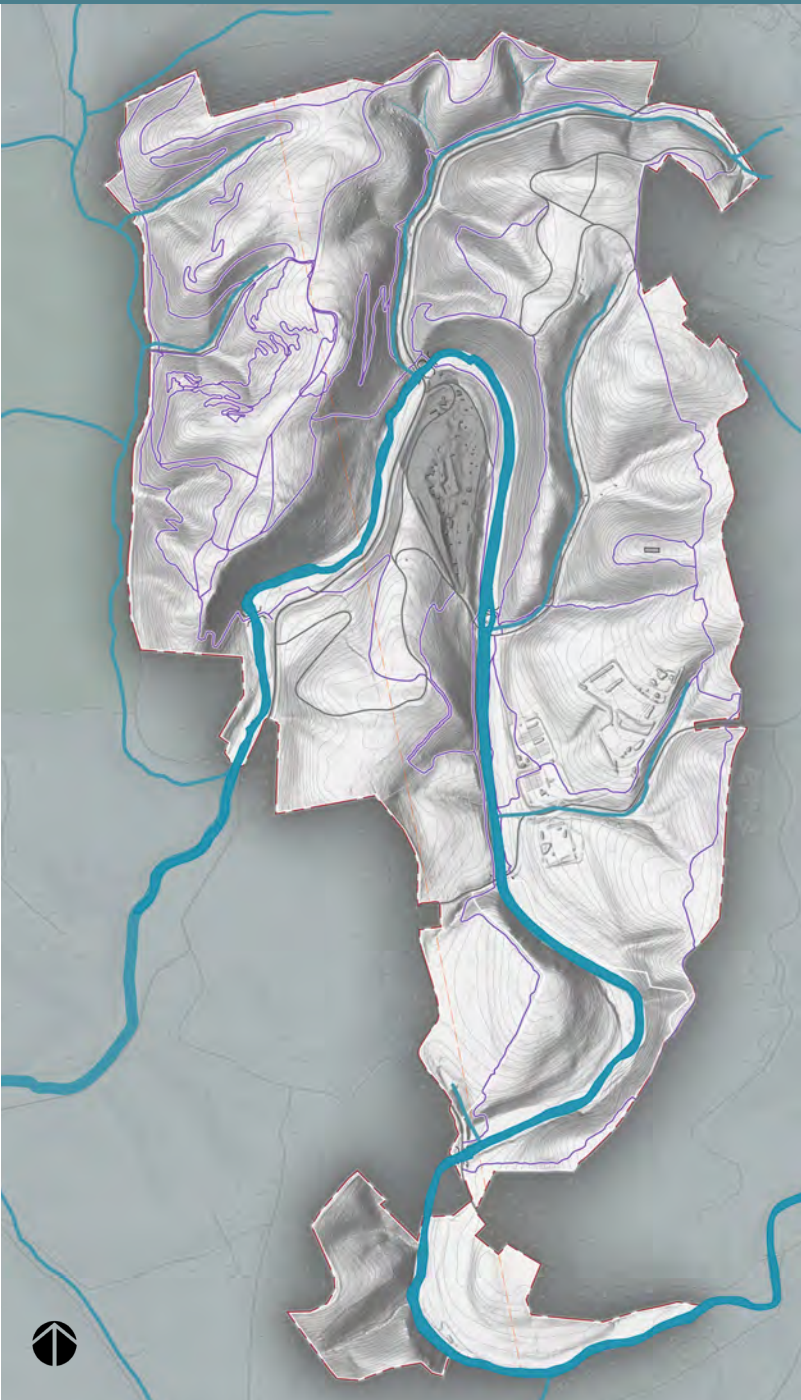
Steep slopes represent areas where soil stabilization should be prioritized and development of facilities should be avoided to limit soil erosion.



Slope Aspect

The slope aspect map above shows the aspect (direction) and degree (steepness) of slope within the Preserve.

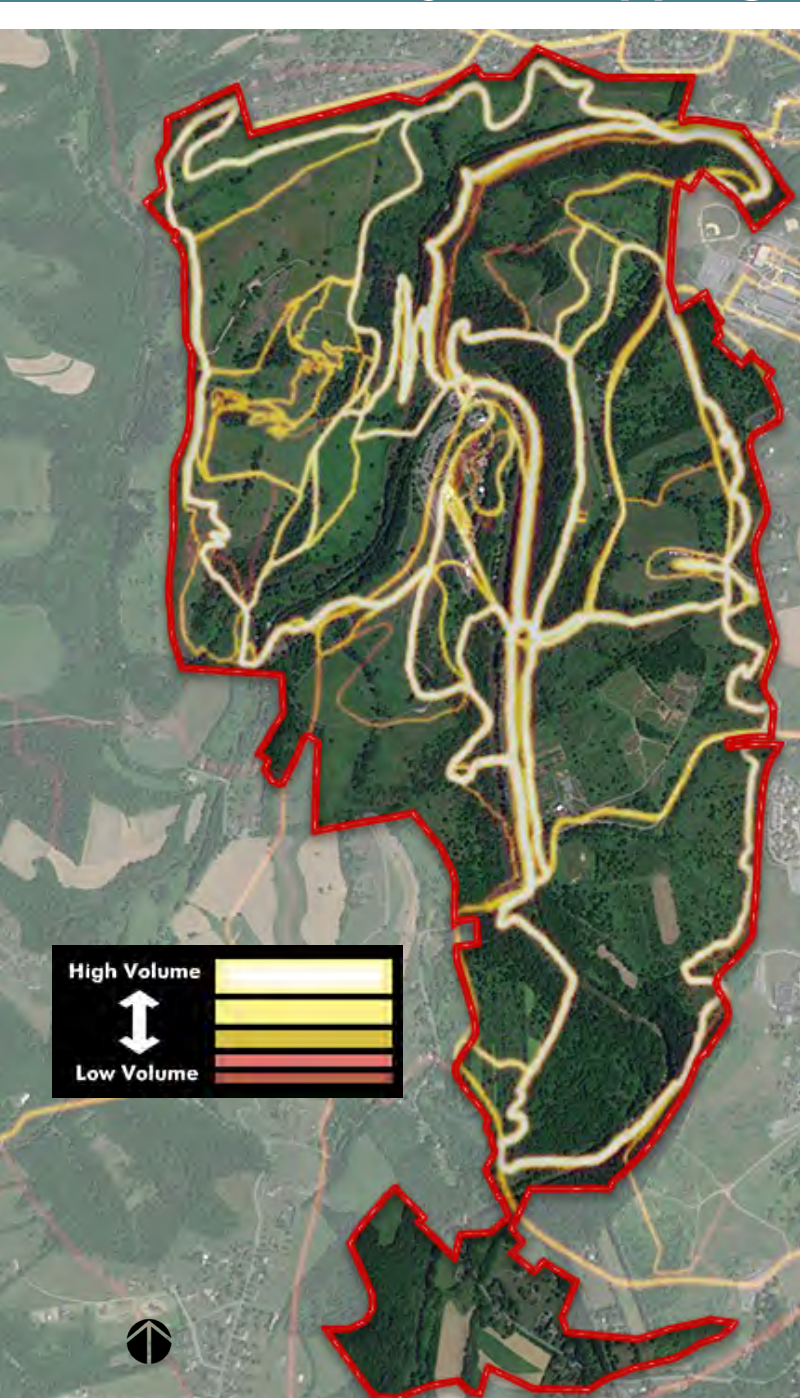
Slope aspect delineates the direction of certain slopes and indicates micro environmental factors like solar radiation, temperature, and soil moisture.



Hydrology

The Preserve's varied topography influences where and how water moves through the site. The Jordan Creek and its tributaries flow through the Preserve.

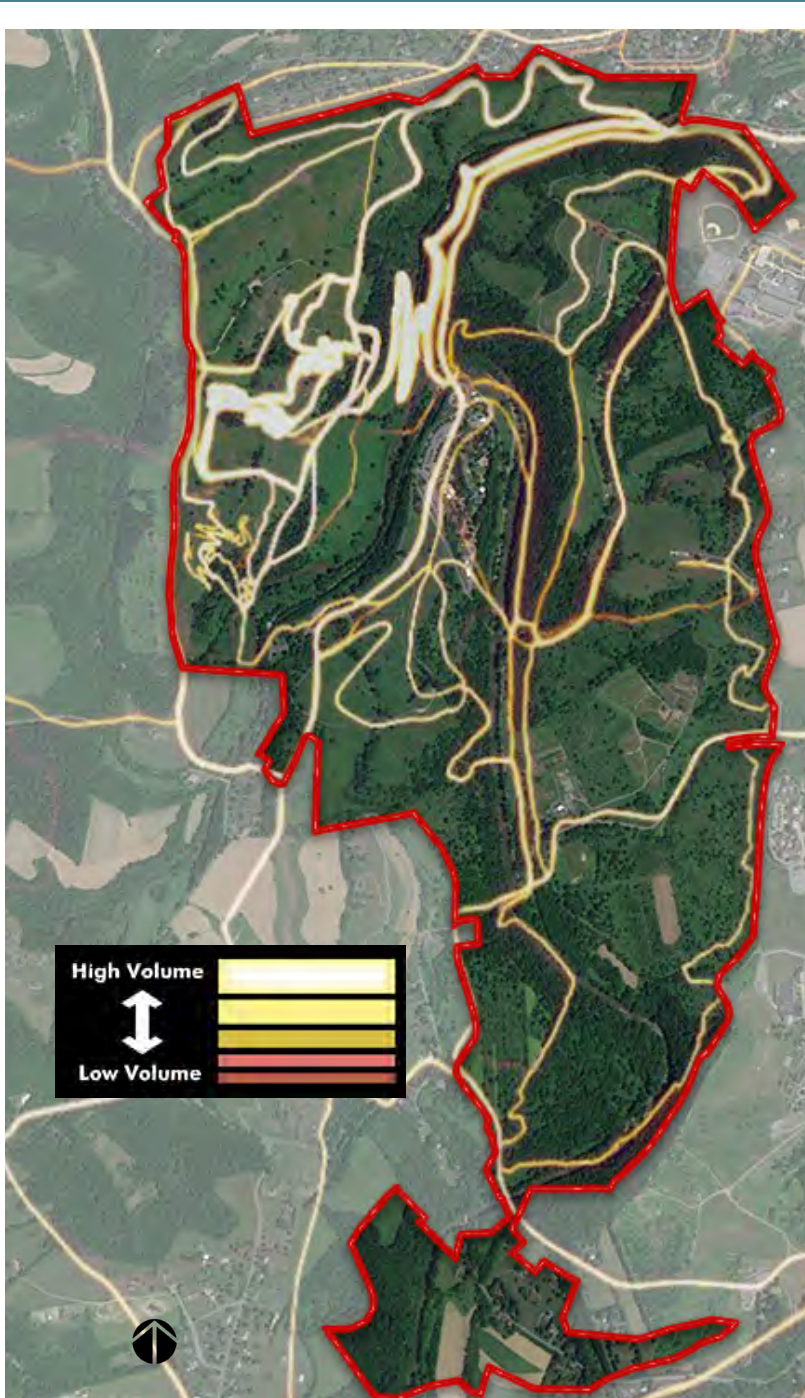




STRAVA Run

STRAVA is a mobile application with which runners, bikers, and swimmers can measure and track their movements. This open source data is compiled into ‘heat maps’, as shown above. These maps delineate which routes are generally more popular among runners and bikers.

The mapping above indicates that the border, elk ridge, broken arrow, and covered bridge trails are among the most popular running routes.



STRAVA Bike

Due to the quantity of mountain bike trails, the north range is the most popular among cyclists.

The half pipe, broken arrow, teardrop, and Brian’s trail are the most popular with this user group.





# Preserve Ranges & Management Units

This report breaks down each Preserve range into various management units. These smaller units are delineated by geographical location and shared characteristics & features. Ecological, trail, facility, and signage recommendations in Chapter 3 correspond and are organized by the following management units.



## NORTH RANGE (471 acres)

The North Range is characterized by steep slopes and ridge tops that offer breathtaking views of the Preserve. This range contains mountain bike trails, and is open to archery hunting.

- MUN01 – The North Flats
- MUN02 – Jordan Creek and Floodplain (North Range)
- MUN03 – The North Slopes

## CENTRAL RANGE (700 acres)

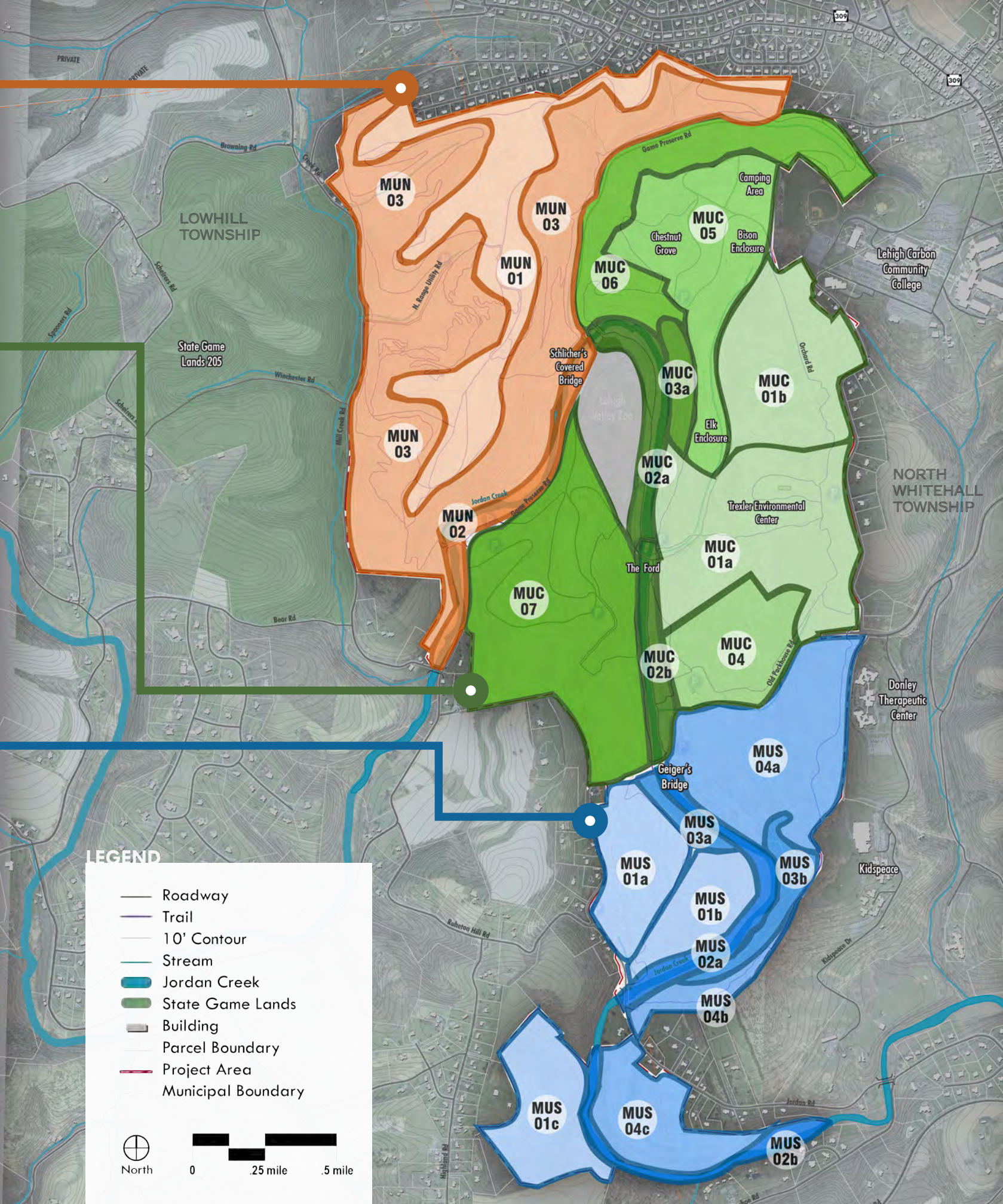
The Central Range contains the largest variety of uses and passive recreation facilities. This range is characterized by steep topography which lead to the Jordan Creek and offer panoramic views of the Preserve at several locations.

- MUC01a – Nature Center (Central East)
- MUC01b – Nature Center (North East)
- MUC02a – Jordan Creek and Floodplain (Central North)
- MUC02b – Jordan Creek and Floodplain (Central South)
- MUC03a – Hemlock Ravine (Central North)
- MUC04 – Maintenance Yard
- MUC05 – Working Lands
- MUC06 – North Woods
- MUC07 – The West Meadows

## SOUTH RANGE (337 Acres)

The south range contains unique ecological areas and (only) minimal trails and facilities. This range contains steep slopes, unique hemlock forests, and contains the fewest trails / facilities.

- MUS01a – South Range West (Agricultural)
- MUS01b – South Range West (Forest)
- MUS01c – South Range West (Forest Outlier)
- MUS02a – Jordan Creek and Floodplain
- MUS02b – Jordan Creek and Floodplain (Outlier Parcel)
- MUS03a – Hemlock Ravine (South West)
- MUS03b – Hemlock Ravine (South East)
- MUS04a – South Range East (Agriculture)
- MUS04b – South Range East (Forest)
- MUS04c – South Range East (Agricultural Outlier)





## Ecological Introduction

The Preserve contains tracts of grassland which are unique for Pennsylvania and present creative management opportunities. As with many natural areas, the Preserve has many invasive species, in particular Autumn Olive (*Elaeagnus umbellata*). In order to adequately manage the site in a manner which protects existing natural heritage, restores degraded areas, and provides safe access for the public, a rapid assessment of the existing ecological conditions has been compiled.

Using a variety of peer-reviewed and standardized methods, consultant Applied Ecological Services (AES) in coordination with other project team members and key project stakeholders, developed a custom study of the Preserve to establish a baseline data set for wildlife, plants, water and wetland resources, upland habitat types, and more. The following sections details AES's selected methods, results, and a set of ecological recommendations for thoughtful management of wildlife populations, botanical diversity, and the creation, stewardship, and protection of a mosaic of habitat types to support these biotic elements at Trexler Nature Preserve.

### Materials & Methods

The site has been the focus of a variety of interested parties over the past few years which has resulted in the collection of multiple data sets that can support this ecological assessment. Various natural history data have been collected prior to this 2020 assessment that can aid in understanding and save time when analyzing the site.

These data sets are referred to as secondary data (pre-existing information). Collected data in support of this project is referred to as primary data. Secondary data sets include e-Bird records, plant lists, and other previously collected data sets.



### Rapid Ecological Assessment

A team of AES ecologists visited the site in the summer and fall months of 2020 to walk the site in its entirety in search of indication of various ecological stressors and examples of intact habitat types. ArcCollector was the program used to spatially align observations throughout the site for aid in mapping and location-specific recommendations. Some of the primary goals of this rapid assessment included:

- Searching for combinations of abiotic and biotic features that might serve as critical habitat for rare, threatened and/or endangered species known to the region
- Locating any intact habitat locations that are free of invasive plant and/or animal pressure
- Locating any representation of forest ecosystems that have all strata present (canopy, understory, and groundstory) and evidence of forest regeneration
- Finding locations that show physical evidence of erosion within the drainage systems on site
- Finding locations of any impediments to drainage/flow or faunal migration within the stream systems
- Identifying sections of forested landscape with need for thinning, clearing, or other timber management needs/opportunities for ecological enhancement
- Documenting invasive plant species populations for development of an invasive species management plan

For succinct alignment of various data sets and recommendations, the site has been separated into distinct Management Units (MUs). All forested MUs are aligned with the forestry report for ease of comparison.

### Plants

Timed meanders were the primary method used for botanical data collection within each of the identified MUs on site. This involved setting a fixed time and walking through each polygon collecting notes of species presence and relative abundance per species.

Primary goals for plant surveys were to characterize vegetation communities, locate any rare plants/rare plant habitats, and to document invasive species throughout the Preserve.



**Birds**

AES conducted point counts at 16 locations on site to systematically collect avifaunal data using Unlimited Distance, Single-Observer Point Counts at Trexler Nature Preserve. Point count locations are were selected to represent particular habitat types. Bird diversity, abundance, and activity are invaluable to track ecosystem function in the various onsite habitat types.

**Herpetofauna**

A robust survey for documenting reptiles and amphibians (collectively, herpetofauna) often requires multiple survey methods and significant effort through spring, summer, and fall months. These faunal assemblages have very low detection probabilities and, as ectotherms, are heavily reliant on external variables for metabolic function and life history activities. For this reason, a variety of systematic trapping is often required to confirm presence/absence. While this level of detail is not required for supporting this master plan, understanding the herpetofaunal community at Trexler Nature Preserve as best possible allows us to minimize impacts to existing populations and maximize the integration of critical habitats and safe mobility between these critical habitats by frogs, toads, salamanders, snakes, turtles, and lizards on site. AES has enacted two survey methods on site that do not require scientific collection permits, labor-intensive survey methods, or trapping and tracking infrastructure (ex. pitfall traps, hoop nets, radiotelemetry, etc.). The combination of these survey methods has proven to result in a near-comprehensive (~75% of all species detected) inventory of herpetofaunal assemblage in the region. These methods are described below.

*Time (and Area) Constrained Searches (TCS)*

TCS involves visiting the site at the proper times of day in spring, summer, and fall months when weather conditions are suitable for reptiles and amphibians to be surface active or concealed on the surface (rather than being underwater, buried in soil, or in burrows). Areas are delineated by the Management Units (and sub-units). Optimal conditions usually involve temperatures between 60 and 85 degrees Fahrenheit with some cloud cover and low to no wind. Precipitation (or recent rain) can be a valuable factor for certain species, with recent rain being ideal. These searches include using binoculars and spotting telescopes to search for basking turtles and snakes in water bodies, carefully

searching under cover objects (logs, stones, and debris piles) for concealed snakes, salamanders, and anurans, and carefully searching for active/moving reptiles and amphibians in various habitats. Strict conservation etiquette is enacted when searching, making sure to replace logs and stones as found and carefully removing any found animals prior to replacing these objects to prevent injury of the animals. All found animals are released unharmed at the location where found.

*Random Opportunistic Sampling*

While on site conducting other data gathering exercises, our lead field biologist would pause to search locations for herpetofauna when conditions (weather, time of day, season, etc.) were appropriate. This involves similar search methods to the TCS methodology but in an opportunistic nature.

**Mammals**

With a diverse mosaic of habitat types, geology, soils, and other environmental factors, the site has potential to support a wide array of mammal species. Similar to the herpetofaunal approach, a low cost, efficient method was used to develop an understanding of the mammal communities on site without completing a comprehensive assessment using random opportunistic sampling and scat and track analysis.

*Scat and Track Analysis*

AES biologists and ecologists targeted stream margins, wet soil on trails, and other suitable locations on site to review tracks left by mammals traversing the site. Additionally, any encountered scat, hair, bones, or evidence in the landscape (buck rub, burrows, nests, cavities, etc.) were documented as evidence of mammal presence and, whenever possible, identified to the species level.



Results

Plants and Animals

An ongoing species list is being compiled for the site for vascular plants, reptiles, amphibians, mammals, and birds. Please refer to the appendices for these lists. These lists are the result of site visits in the summer and fall of 2020.

Plants

A total of 197 plant species have been identified representing 9 different natural communities and 3 man-made communities. Invasive species are represented by 23 species (4 vines, 6 shrubs, 5 grasses, and 8 forbs) but many of these are dominants (most dense within communities as well as most widely distributed in some instances). A few lithophilic plant communities (within intact sloping mesic hardwood forests and hemlock ravines) are supporting regionally rare fern allies. Please see management unit descriptions for more on plant communities. A full species list will be provided in the appendix.

Birds

The site was visited during the breeding and fall migration seasons in 2020. A total of 84 species were observed. Of these, 52 were confirmed or probable breeders per the PA Breeding Bird Survey behavior codes. The most common species on site are associated with small woodlots and field edges, such as American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), and American goldfinch (*Spinus tristis*). Interior breeding birds such as wood thrush (*Hylocichla mustelina*) and ovenbird (*Seiurus aurocapillus*) were found in three forested sections during the breeding season. Alder flycatcher (*Empidonax virescens*) and willow flycatcher (*Empidonax traillii*) were defending territories in suitable habitat along Jordan Creek floodplain in the forest and shrubby wetland area, respectively. Some of the regionally rare species that are breeding on site include savanna sparrow (*Passerculus sandwichensis*) in the North Range meadows and one territorial hooded warbler (*Setophaga citrina*) on a forested slope near the elk enclosure.

Fall migration is protracted and difficult to fully capture in one season. That said, AES documented a great diversity of fall passerine (songbirds) and raptors at TNP. Highlights include 18 warbler species, Lincoln’s sparrows (*Melospiza lincolnii*), vesper sparrow (*Pooecetes gramineus*), and white-crowned sparrow (*Zonotrichia albicollis*). An adult bald eagle (*Haliaeetus leucocephalus*) was observed carrying nesting material over the western portion of the Central Range (flying west) in late fall (early nesting season). A full species list will be provided as an appendix.

Herpetofauna

Aquatic resources are critical for the life history of most reptiles and all amphibians in our region. Therefore, targeted search efforts for herpetofauna we centered around wetlands and Jordan Creek. Upland searches were conducted (primarily for snakes) as well. A total of 9 amphibian species were documented on site during the study (Table 1).

It is likely that at least 5 other species are present on site based on biogeography and habitat types present.

A total of 4 reptiles have been observed on the site (Table 2). AES anticipated up to 10 additional species may occur within the Preserve. Due to the secretive nature of reptiles, more intensive survey methods are typically needed to approach a comprehensive inventory. Since that is not required for master planning, AES recognized the likelihood of occurrence for certain species and document which were encountered. Species that likely occur onsite but weren’t observed include eastern milk snake (*Lampropeltis t. triangulum*), northern brown snake (*Storeria dekayi*), eastern ratsnake (*Pantherophis alleghaniensis*), and wood turtle (*Glyptemys insculpta*).

Mammals

Mammals were assessed on site using time and area constrained search methods, searched for tracks and scat, and other signs of mammals. Small mammals were located while flipping cover objects. A total of 13 species were observed (Table 3).

At least 9 other mammal species likely occur on site, including 3-5 additional bat species.

Table 1. Observed Amphibians at Trexler Nature Preserve

Common Name	Scientific Name	Notes
American toad	<i>Anaxyrus americanus</i>	Most common anuran on site
spring peeper	<i>Pseudacris c. crucifer</i>	In wetlands and woods
pickerel frog	<i>Lithobates palustris</i>	Found in Jordan Creek
wood frog	<i>Lithobates sylvatica</i>	Found in woods
northern green frog	<i>Lithobates clamitans melanota</i>	Common/ found throughout
bullfrog	<i>Lithobates catesbeiana</i>	In Jordan Creek
northern gray treefrog	<i>Hyla versicolor</i>	Calling from woods
eastern redback salamander	<i>Plethodon cinereus</i>	Found in healthy forests and seepage wetlands
northern two-lined salamander	<i>Eurycea bislineata</i>	Within the tributary streams and Jordan Creek

Table 2. Observed Reptiles at Trexler Nature Preserve

Common Name	Scientific Name	Notes
common snapping turtle	<i>Chelydra serpentina</i>	In Jordan creek
eastern garter snake	<i>Thamnophis s. sirtalis</i>	Common
northern ringneck snake	<i>Diadophis punctatus edwardsii</i>	Upland slopes under rocks
northern water snake	<i>Nerodia s. sipedon</i>	Common in and around Jordan Creek

Table 3. Observed Mammals at Trexler Nature Preserve

Common Name	Scientific Name	Notes
white-footed mouse	<i>Peromyscus leucopus</i>	Under cover in woods
short-tailed shrew	<i>Blarina brevicauda</i>	In trash pile
Eastern red bat	<i>Lasiurus borealis</i>	Observed three times in breeding season
eastern chipmunk	<i>Tamias striatus</i>	Common
eastern gray squirrel	<i>Sciurus carolinensis</i>	Common
eastern cottontail	<i>Sylvilagus floridanus</i>	Common
groundhog	<i>Marmota monax</i>	Common
Virginia opossum	<i>Didelphis virginiana</i>	Central range
striped skunk	<i>Mephitis mephitis</i>	South range
raccoon	<i>Procyon lotor</i>	Common
red fox	<i>Vulpes vulpes</i>	Multiple dens, tracks, scat, adults
eastern coyote	<i>Canis latrans</i>	Scat and tracks
white-tailed deer	<i>Odocoileus virginianus</i>	Overpopulations





# Trails & Facilities Assessment

The following pages include inventory and analysis mapping of existing range-specific Preserve features, which include:

- Trails, crosswalks, and pedestrian bridges
- Trail analysis
- Range-specific and adjacent land uses
- Parking and circulation inventory





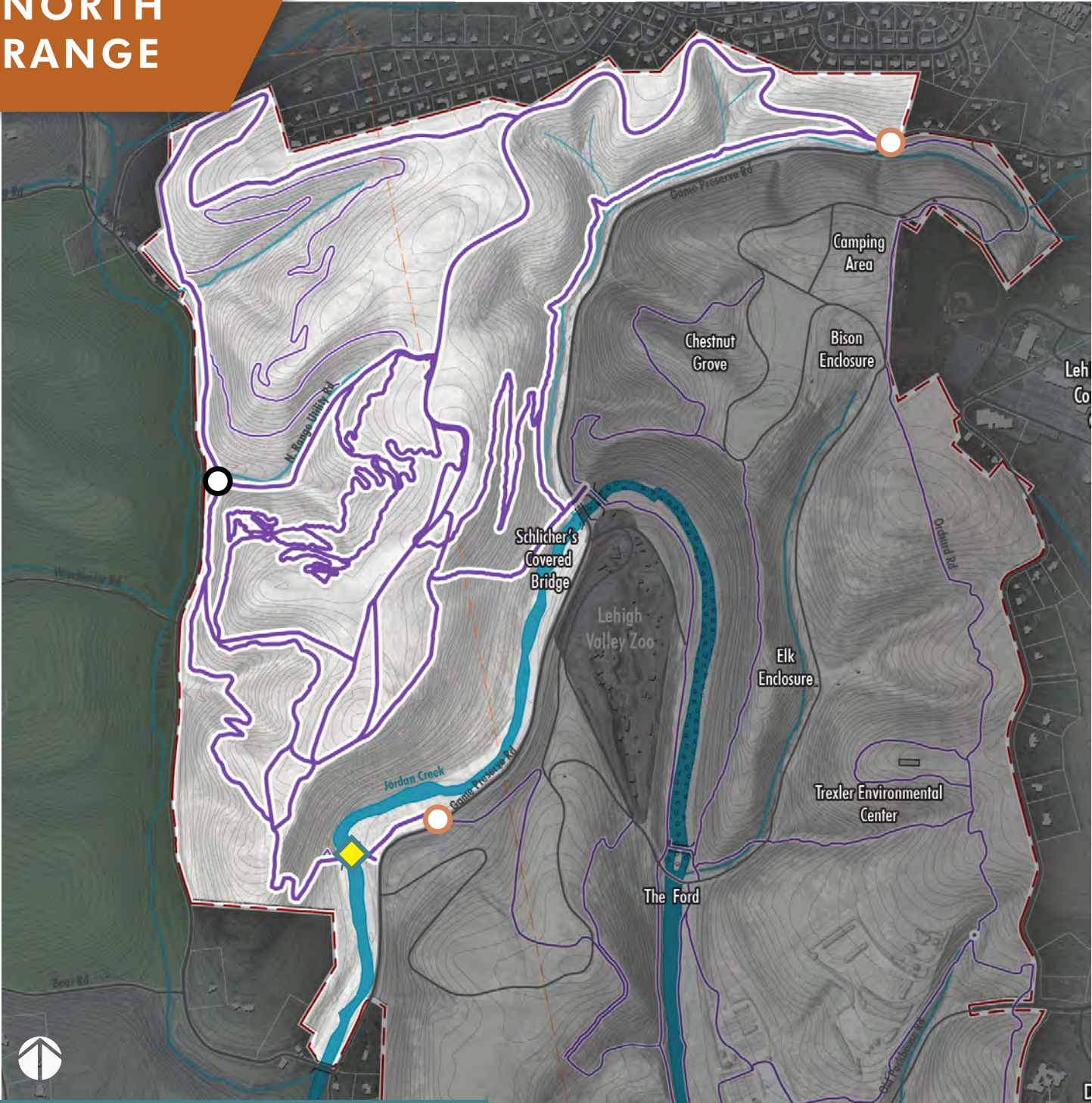
NORTH  
RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE



Trails & Trail Crossings

11.2 Miles of Trails

Trail Breakdown by Existing Difficulty

3.6 Miles Easy

4.1 Miles Moderate

3.5 Miles Challenging (Border Trail)

3 Locations Where Trails Cross Roadways

- 1 Unsigned / Unmarked Crossing
- 2 Crossings That Do Not Meet Best Design Standards
- 1 Pedestrian Bridge



Trexler Trail Condition Analysis

- Existing Trail
- Steep Running Slope
- Steep Cross Slope
- Rutting
- Large Ballast
- Erosion
- Seasonally Wet

- Shared Road
- Single Track
- Poor Trail Transition
- Poor ADA Access
- Informal Trail
- Proposed Trail Realignment / Addition



NORTH RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE

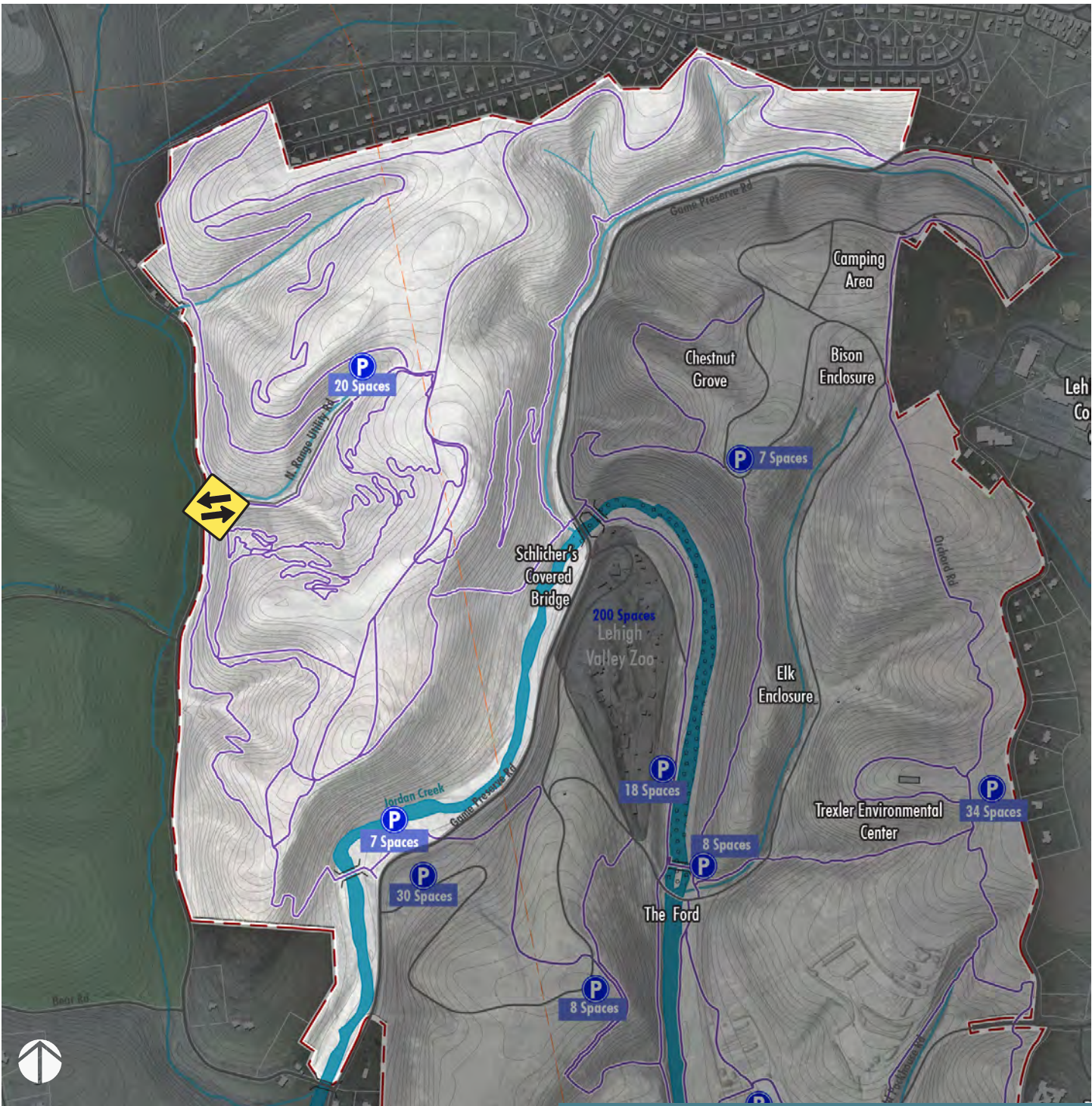


North Range Permitted Uses / Use Areas

- Archery Hunting
- Mountain Biking
- Hiking

Adjacent Off Site Uses

- A. Northern Residential Neighborhood
- B. Western State Game Lands



Preserve Entrances

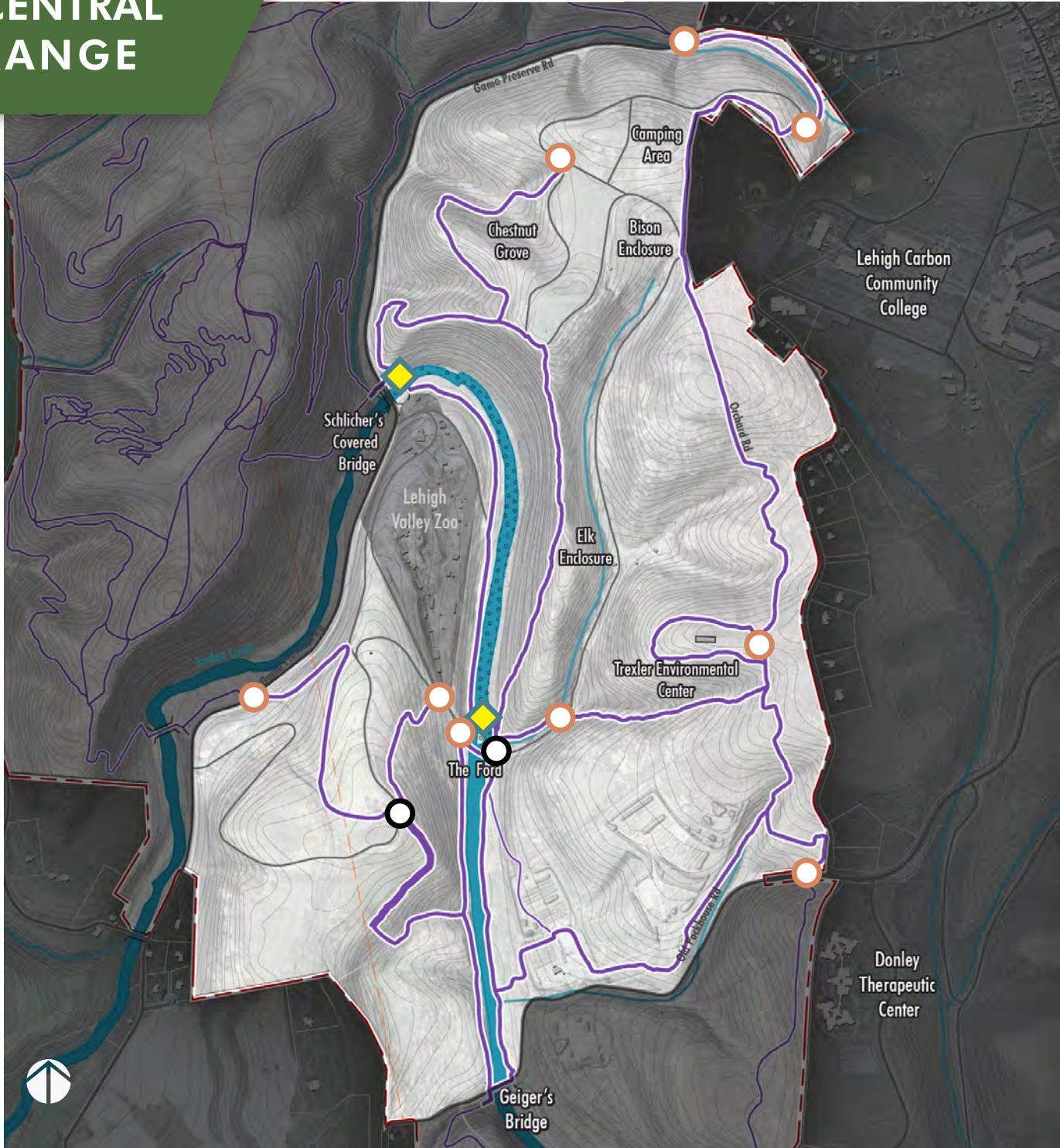
- (1) Two-Way Entrance



Parking

- 2 Parking Areas
- North Range Accommodates Approximately 27 cars





Trails & Trail Crossings

8.5 Miles of Trails

Trail Breakdown by Existing Difficulty

2.8 Miles Easy

2.7 Miles Moderate

3 Miles Challenging (Border Trail)

11 Locations Where Trails Cross Roadways

- 3 Unsigned / Unmarked Crossing
- 8 Crossings That Do Not Meet Best Design Standards
- 2 Pedestrian Bridge



Trexler Trail Condition Analysis

- Existing Trail
- Steep Running Slope
- Steep Cross Slope
- Rutting
- Large Ballast
- Erosion
- Seasonally Wet

- Shared Road
- Single Track
- Poor Trail Transition
- Poor ADA Access
- Informal Trail
- Proposed Trail Realignment / Addition



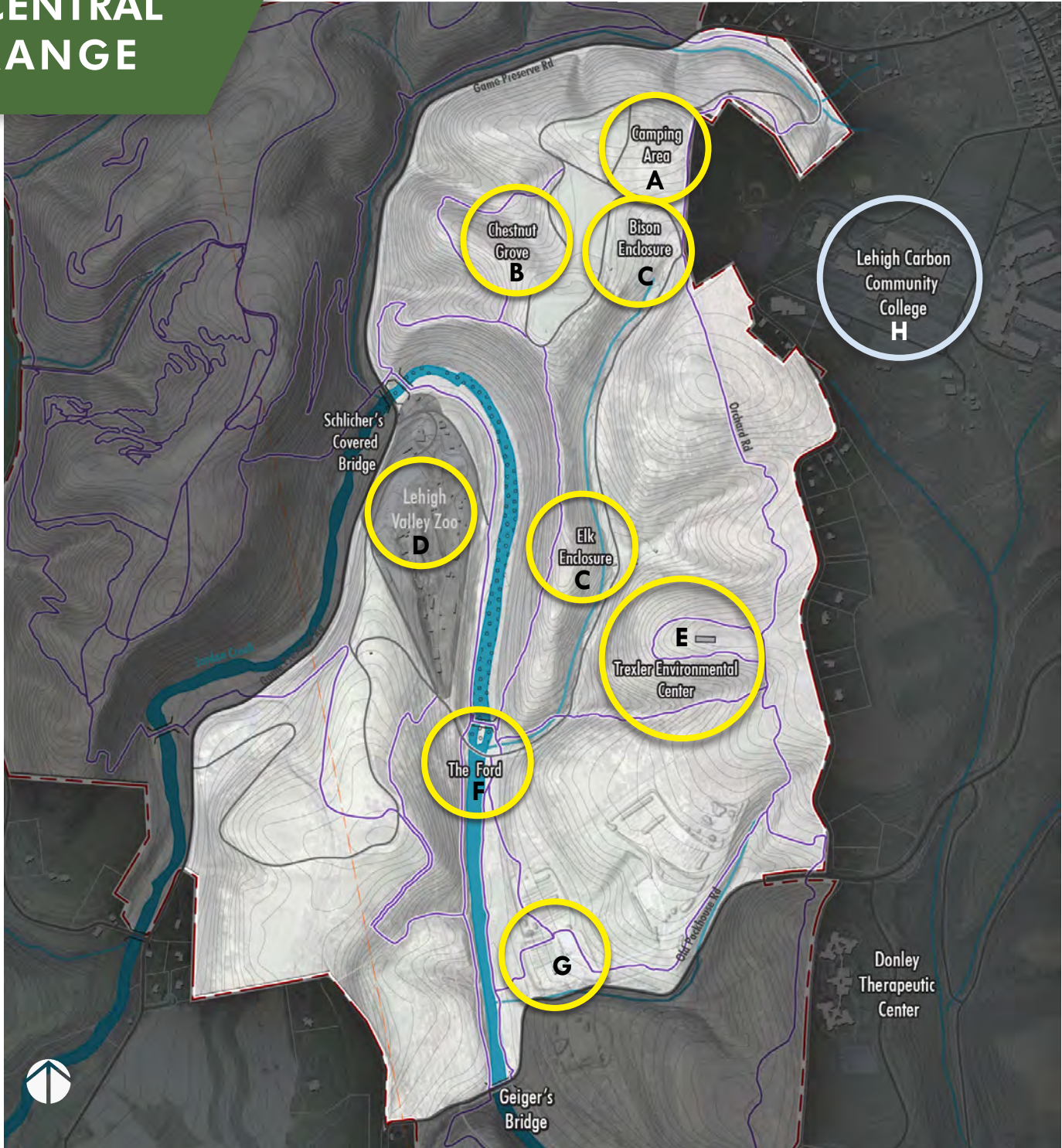
CENTRAL RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE

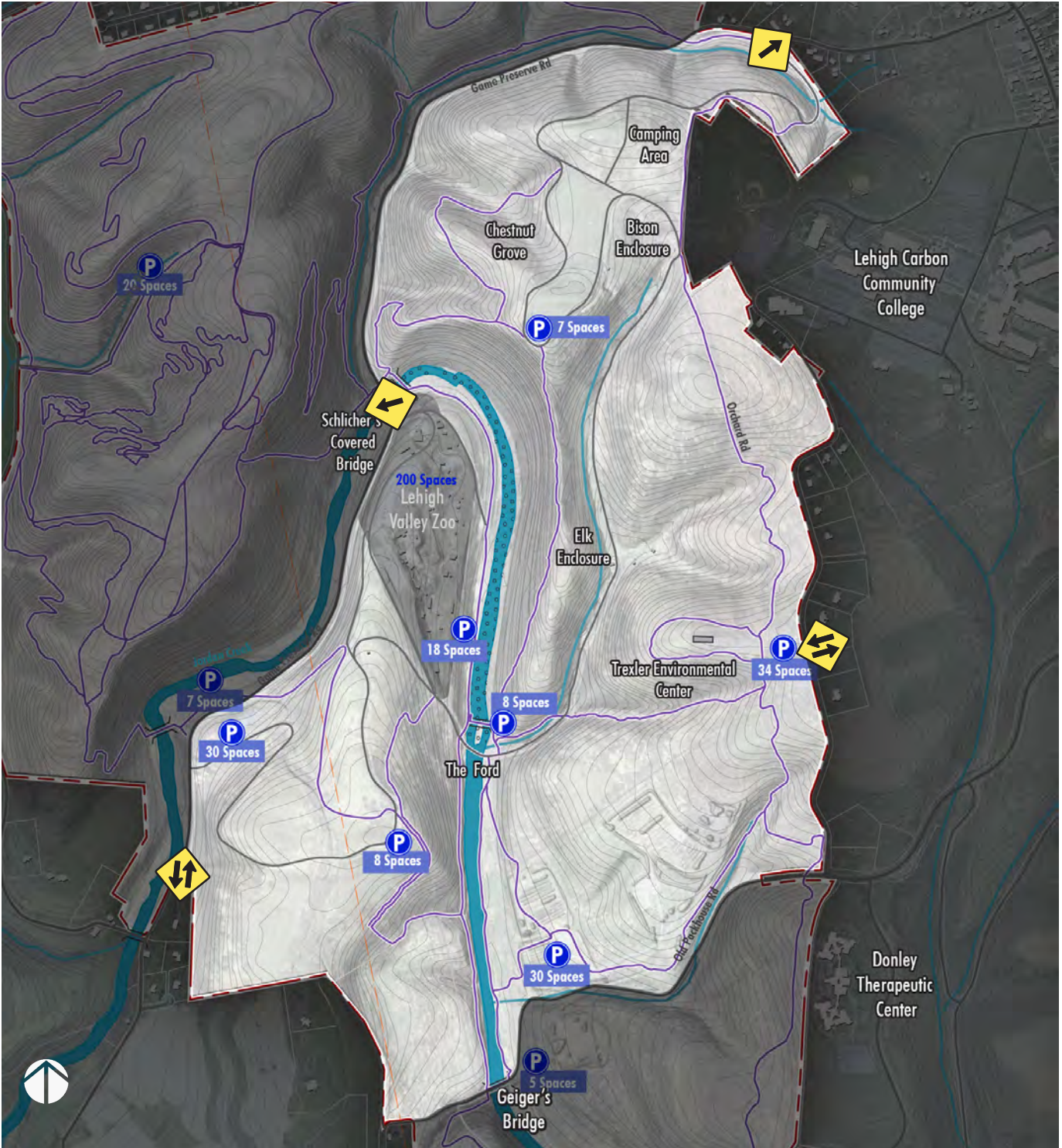


Central Range Use Areas

- A. Camping Area
- B. Chestnut Grove
- C. Bison & Elk Enclosures
- D. Lehigh Valley Zoo
- E. Trexler Environmental Center
- F. The Ford
- G. Former County Compost Facility

Adjacent Off Site Uses

- H. Lehigh Carbon Community College



Preserve Entrances

- (2) Two-Way Entrance
- (2) One-Way Exits

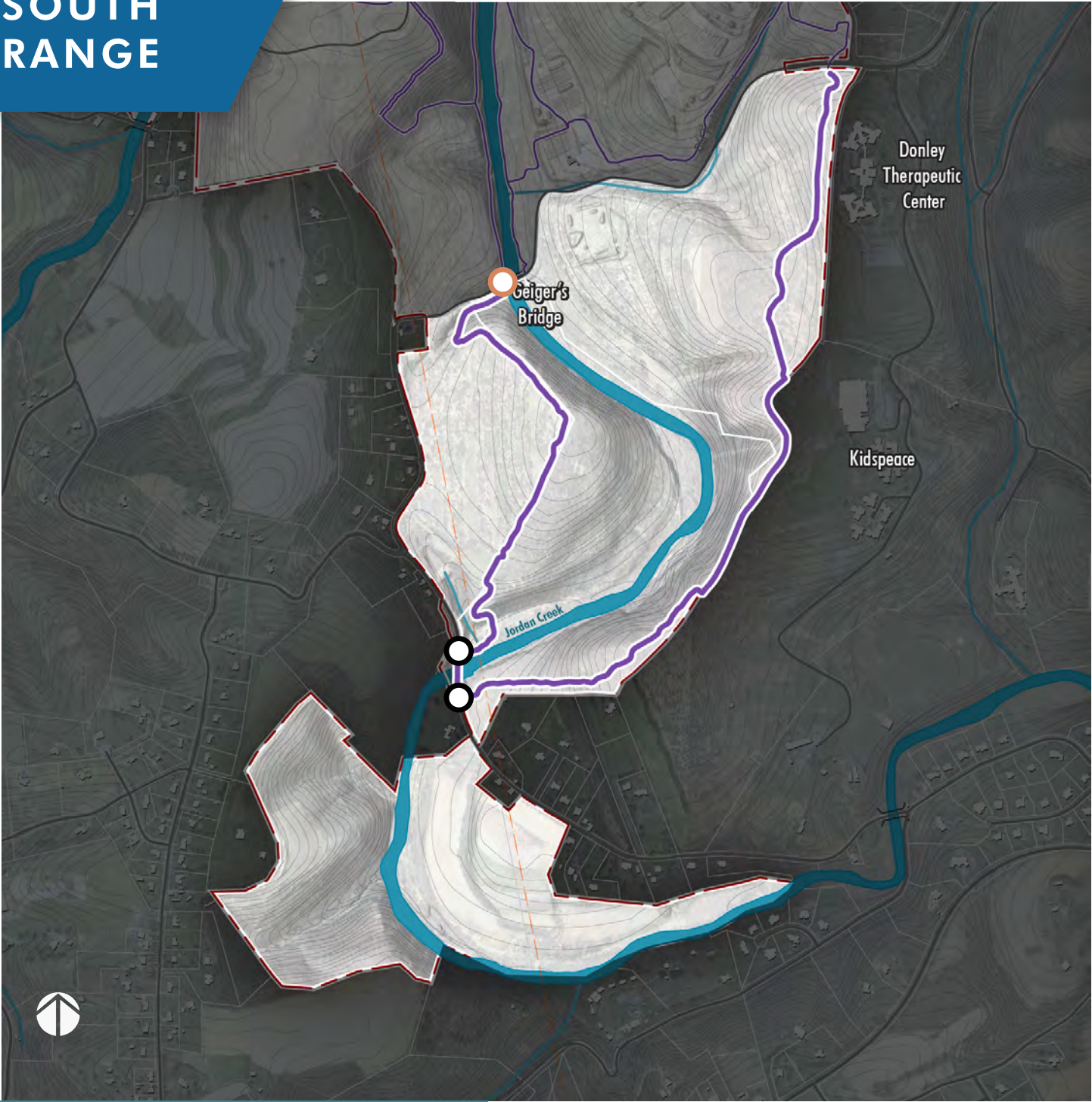
Parking

7 Parking Areas

Central Range Accommodates Approximately 135 cars

\*Lehigh Valley Zoo accommodates an additional 200 cars (approximate)





**Trails & Trail Crossings**

2 Miles of Trails

Trail Breakdown by Existing Difficulty

0 Miles Easy

0 Miles Moderate

2 Miles Challenging (Border Trail)

3 Locations Where Trails Cross Roadways

- 2 Unsigned / Unmarked Crossing
- 1 Crossing That Does Not Meet Best Design Standards

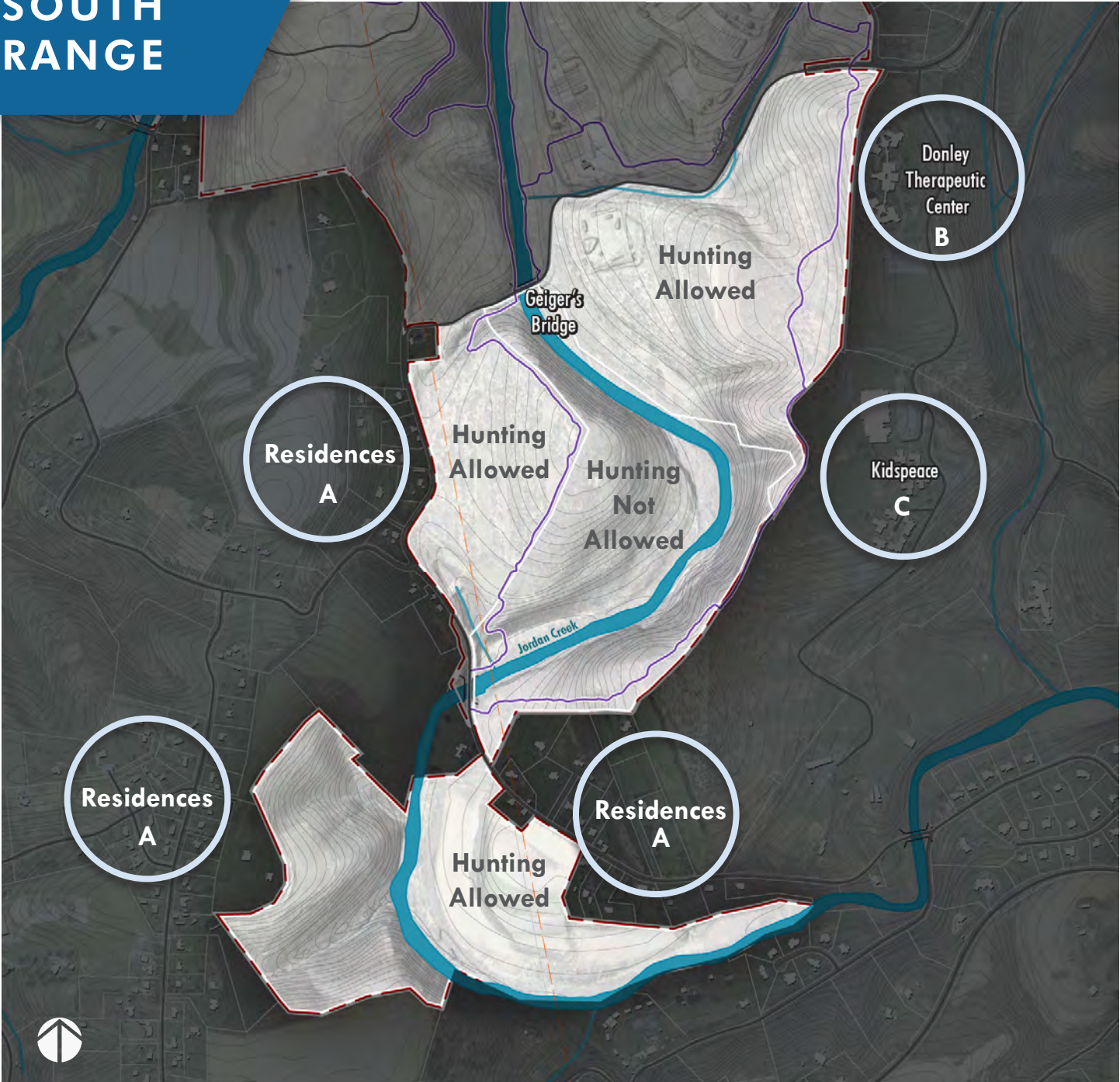


**Trexler Trail Condition Analysis**

- Existing Trail
- Steep Running Slope
- Steep Cross Slope
- Rutting
- Large Ballast
- Erosion
- Seasonally Wet

- Shared Road
- Single Track
- Poor Trail Transition
- Poor ADA Access
- Informal Trail
- Proposed Trail Realignment / Addition





South Range Permitted  
Uses / Use Areas

Archery Hunting

Adjacent Off Site Uses

- A. Residences
- B. Donley Therapeutic Center
- C. Kidspace



Preserve Entrances

- (1) Two-Way Entrance 

Parking

2 Parking Areas

South Range Accommodates Approximately 20 cars







A landscape photograph showing a grassy hill covered in yellow wildflowers. A line of green trees stands on the crest of the hill. The sky is blue with scattered white clouds. A dark green semi-transparent banner is at the bottom, containing the text 'Recommendations' and a large number '3'.

**Recommendations**

**3**





# Design Standards

## Trail Standards

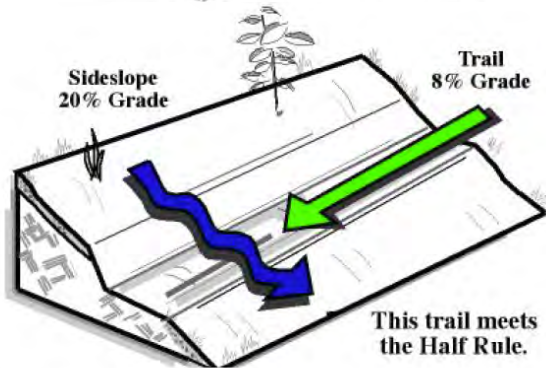
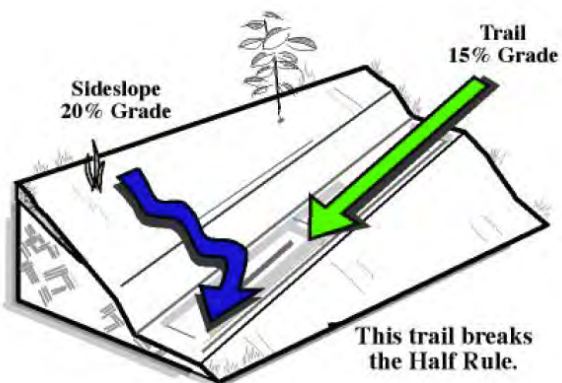
Site-specific trail recommendations are included later in this chapter. The following trail standards and best design practices should be observed throughout the Preserve. The following best practices were gathered from the United States Department of Agriculture & the International Mountain Biking Association.

## Essential Trail Elements

### The Half Rule

A trail's grade should not exceed half the grade of the side slope the trail is traversing. If the trail's grade exceeds half the slope's grade, it's considered a fall-line trail. Water will be focused to travel the fall line, the path of least resistance, rather than flowing across it.

For a trail with a side slope of 20%, the trail's tread should not exceed 10%. The half rule is important in areas of gentle slopes, where erosion can still occur. For example, a trail traveling through an area with side slopes of 6%, should have a grade of less than 3% to avoid the fall-line. Flat areas should be avoided, as trails built in these areas are more likely to collect and hold water.



Water will sheet across trail.

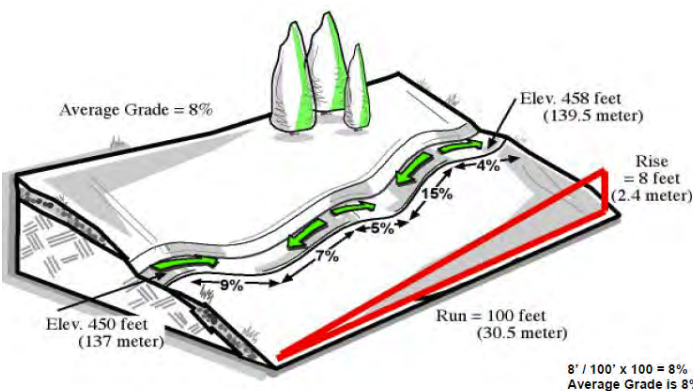
Diagrams Courtesy of the International Mountain Biking Association

### Ten Percent Average Guideline

A 10% average grade is the most sustainable. Trails may, at points, be above and below 10%; however, the trail's average grade should be maintained at a sustainable grade of 10% or less. Short sections can exceed 10% as long as the half rule is still used (15% trail grades can be used for short sections as long as the side slope is greater than 30%).

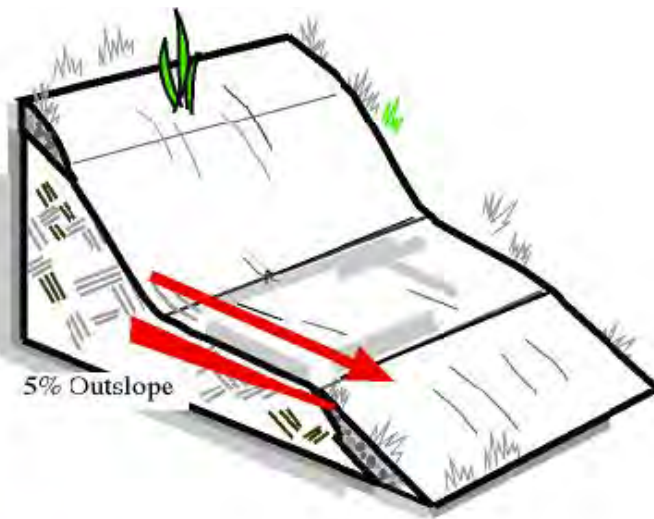
### Maximum Sustainable Trail Grades

Maximum grade, usually around 15% to 20%, is the steepest allowable grade based on several site-specific factors, which include: Half Rule (the trail's grade is less than half the side slope grade); Soil Types (some soils support steeper grades than others); Rock (solid rock or rock embedded slopes can be steeper); Annual Rainfall (heavy rainfall leads to water-caused erosion, low rain leads to dry, loose soils); Grade Reversals (a short dip followed by a rise forces the water to drain off the trail); Types of Users (low impact users, hiking and biking, can sustain a steep grade. Higher impact users, horses and motorized, should have lower maximum grades); Number of Users (higher anticipated use requires lower grades); Difficulty Level (trails with a higher degree of technical challenge tend to have steeper grades; grade reversals and armoring are necessary to ensure sustainability).



### Outslope

As the trail contours across a hillside, the downhill, or outer edge of the trail's tread should be slightly lower than hillside, or inside edge, by 5 percent. Outslopes encourage water to sheet across the trail rather than travel down the trail's center. Outslopes can be difficult to maintain in loose soils. Constant impact from users tends to compact the center of the trail and push soils to the sides. Frequent grade reversals are essential in order to drain water from the trail in this situation.



Diagrams Courtesy of the International Mountain Biking Association





Surface Water Control

Running water erodes tread and can degrade trails over time. It is important to divert surface water and reduce instances of standing water, which often results in soft, boggy tread.

Building trails into the side slope, maintaining sustainable grades, frequent grade reversals, and outsloped tread—these design elements allow water to sheet across the trail rather than pool on its surface.

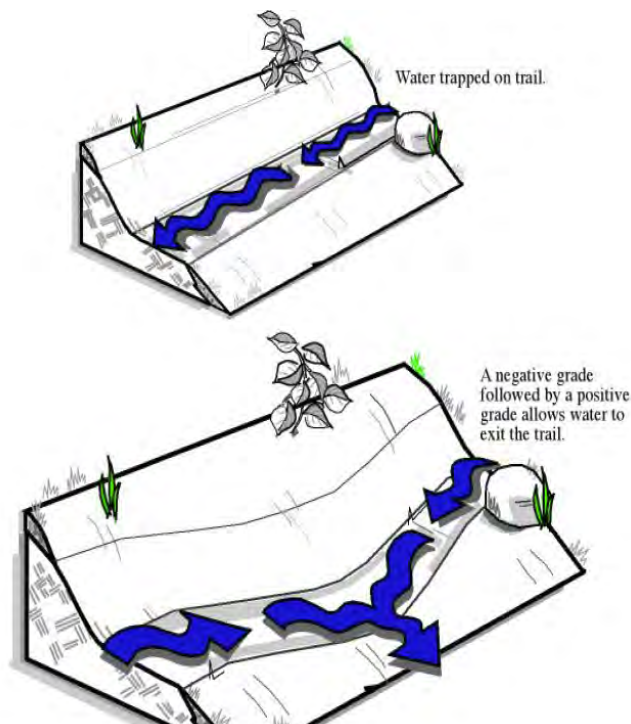
Optimal drainage design can be achieved in new trail construction - as new trails are added and trail modifications are made throughout the Preserve.

Grade Reversals

Grade reversals (also known as grade dips, terrain dips, Coweeta dips, or swales) are designed to keep water moving across the trail.

Trails that implement grade reversals and outsloped tread will encourage water to continue sheeting across the trail—not down it. These trail design features require minimal maintenance and are unobtrusive if constructed with smooth grade transitions.

Grade reversals utilize natural contours of topography in the terrain - The grade of the trail is reversed for 10 to 15 feet, then “rolled” back over to resume the descent. This change in grade allows water to exit the trail tread at the low point of the grade reversal. Grade reversals should be placed frequently, roughly every 20 to 50 feet. A trail that lies lightly on the land will take advantage of natural dips and draws for grade reversals.

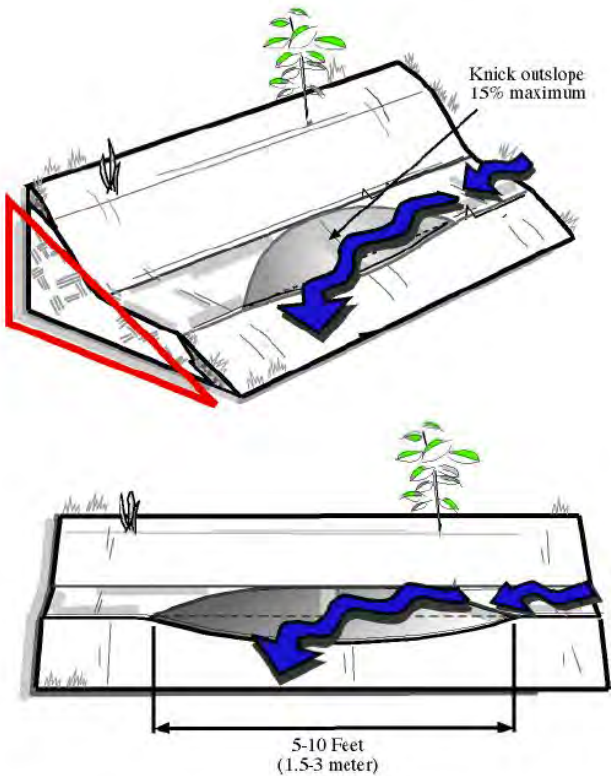


Tools for Draining Water off of Existing Trails

Knicks

Standing water in flat areas on existing trails cause several kinds of tread damage. Users avoiding puddles will widen the trail and the puddle. Standing water can weaken trail backslopes.

The knick is an effective outsloped drain. To be effective, the trail tread must have lower ground next to it so the water has a place to drain. A knick is a shaved down semicircle 10 feet long that is outsloped about 15 percent in the center. Knicks are smooth and subtle and should be unnoticeable to users.



Diagrams Courtesy of the International Mountain Biking Association

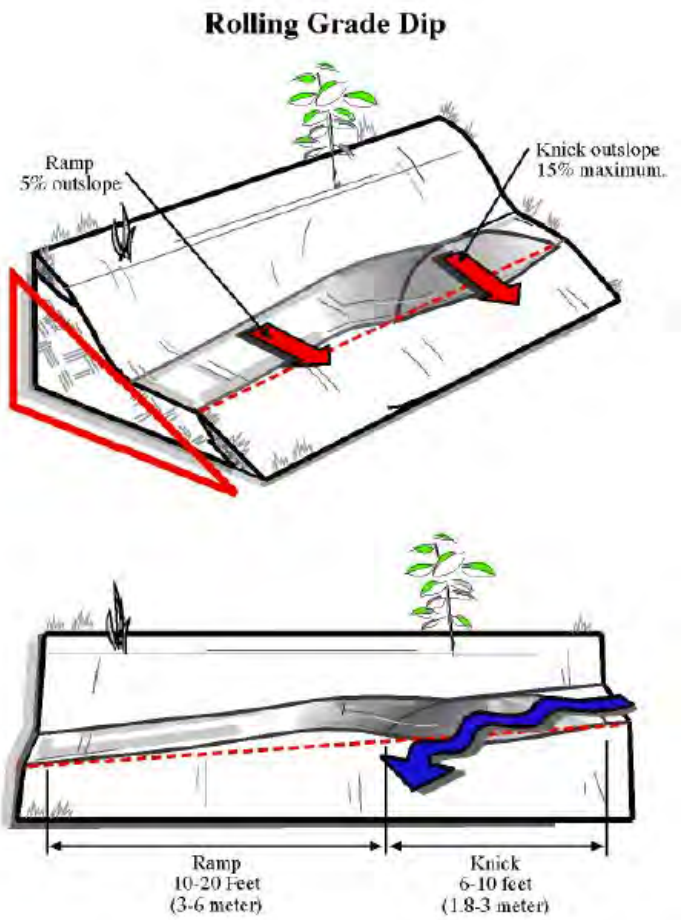
Rolling Grade Dips

A rolling grade dip is used on steeper sections of trail. It works well to drain water off the lower edge of contour trails. A rolling grade dip is a knick with a long ramp of about 15 feet.

Water running down the trail cannot climb over the short rise and will run off the outsloped tread at the bottom of the knick. This structure is low maintenance.

Rolling grade dips should not be placed at the top of a grade, and should be considered at frequent intervals to reduce stormwater volume / velocity. Mid-slope is the ideal rolling grade dip location. More rolling grade dips will be needed on steeper trails.

Use caution when constructing near water sources, where diverted sediment may reach them.



Diagrams Courtesy of the International Mountain Biking Association

Waterbars

While knicks and rolling grade dips are preferred trail alternatives, waterbars can be an acceptable trail stormwater control measure.

Water moving down a trail turns when it reaches a waterbar and, ideally is diverted from there off the lower edge of the trail.

Waterbars slow water down, and that water deposits sediment - which can fill the drain and eventually nullify the intentions of the feature. Waterbars are more successful on grades of less than 5%. On steeper grades (15 to 20 %), waterbars are prone to clogging if they are at less than a 45-degree angle to the trail. Waterbars are mostly useless for grades steeper than 20 percent.

Wood and rock waterbars can present potential tripping hazards and should be placed with caution.

Relocating Problem Sections of Trail

Important Elements:

- Locate the new section of trail on a sideslope
- Keep the trail grade less than half of the grade of the hillside
- Build with a full bench cut to create a solid, durable tread
- Construct plenty of grade reversals
- Outslope the tread
- Compact the entire trail tread
- Make sure the new section that connects to the old trail has nice, smooth transitions—no abrupt turns.



# Marketing, Branding & Public Communication

## Preserve Application & Website

Web based communication platforms are important tools for connecting Preserve visitors to:

- Trail & facility maps
- Preserve event information
- Important safety announcements
- Social media elements, and more.

Within current funding and staff parameters, it is not feasible to develop, launch, and maintain a dedicated Trexler Nature Preserve mobile phone application.

The most cost-effective method to communicate with the public would be for Lehigh County to build and host a standalone website for the Trexler Nature Preserve. Costs to host a dedicated website domain can range from \$80-\$400 a month depending of the service provider.

The County can use a website creation & domain hosting platform such as:

- Wix
- Squarespace
- Network Solutions
- Site123
- WordPress
- Web.com

A professional should be hired to build the dedicated Trexler website. The website should be optimized for both mobile and desktop use, so that Preserve visitors may use and view mapping and info while on site. QR codes at trail markers and updated kiosks can direct Preserve visitors to embedded Trexler mapping.

Examples of high quality online mapping software are:

- MapBox
- ArcGIS StoryMaps
- Google My Map

## Signage, Logo, and Branding

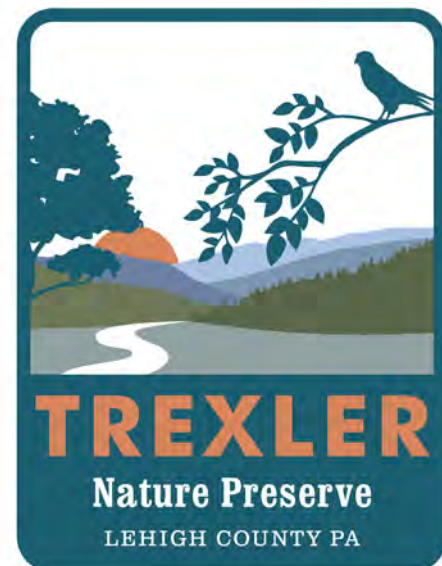
The consultant team reviewed all existing signage and branding within the Trexler Nature Preserve. This included:

- Kiosk signage
- Trail markers
- Preserve entrance / range indicators
- Preserve logo

While keeping true to the original intention, themes, and elements of the current logo, the consultant developed a conceptual logo update (below)



Existing Preserve Logo



Conceptual Logo Update

Using a color palette refined to depict the individuality of each range, a color and signage template was used to draft conceptual signage 'families'.

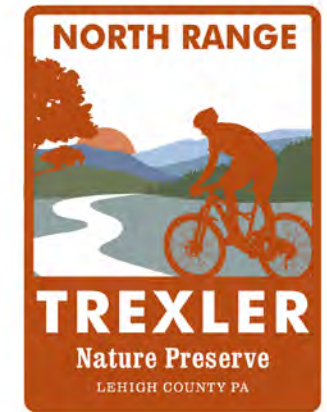
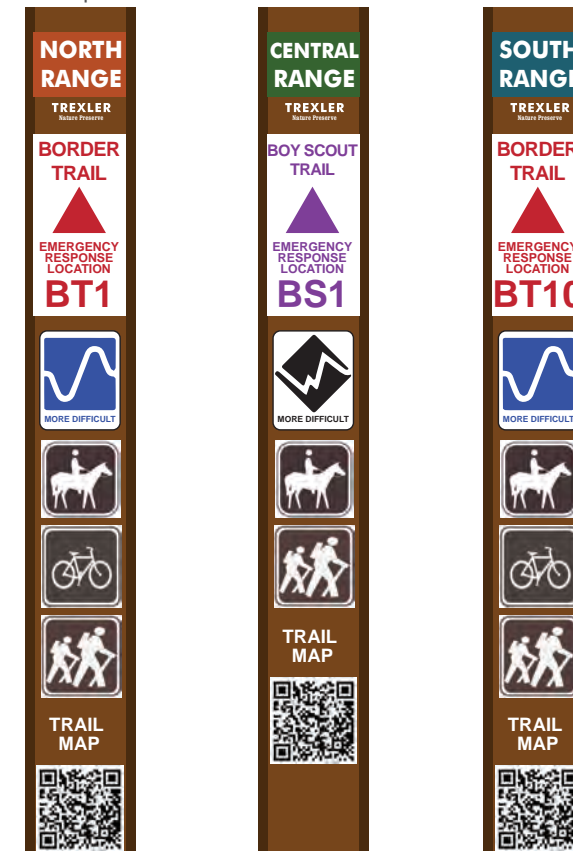
Defining characteristics and colors found in each range were used for inspiration and guidance. Updated signage reflects the unique qualities and character-defining uses for each range:

- Mountain biking for the north range
- Bison for the central range
- Hiking for the south range

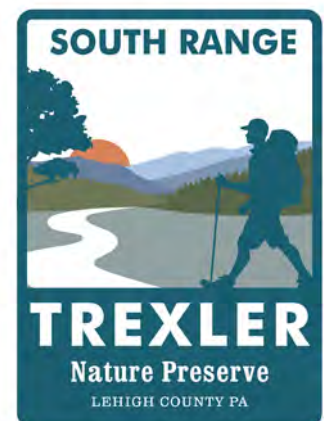
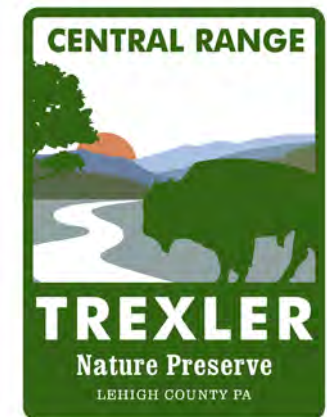
Updated / rebranded signage can be used throughout the Preserve to clearly and quickly inform users of where they are and when they are transitioning from one range to another.

A unified, range-specific color palette can be used in all levels of signage and public communication (trail markers, kiosks, entrance signage, etc.)

Conceptual Trail Markers



Conceptual Range Signage





# Preserve Security

This master plan update recommends that a minimum of three public safety personnel be assigned to the Trexler Nature Preserve. Responsibilities for such personnel may include:

- Maximize public safety
- Protect Preserve resources
- Provide service to visitors.
- Preserve resource protection/management
- Patrol/law enforcement

Lehigh County should consider hiring a minimum of three full time rangers to monitor the parks and open space in Lehigh County, and specifically the Trexler Nature Preserve. A ranger can patrol the Preserve by foot, bicycle and vehicle, and assist local law enforcement (State Troopers, Barracks M) and EMS & fire departments in the event of an emergency or hazardous situation. Rangers are typically trained in public contact techniques, CPR, first-aid and rescue techniques.

More specific roles and responsibilities of a Trexler Nature Preserve ranger may be:

- Patrol Preserve grounds for unwanted activity.
- Inspect Preserve parking areas in each range and close gates after hours to vehicles.
- Enforce park regulations, issue citations.
- Perform medical emergency assistance.
- Observe user group conflicts and provide education (i.e. advise North Range users to wear reflective hunting ribbons during hunting season).
- Communicate with the public on special recreation permit policy requirements and review permit applications.
- Distribute / collect permits and fees at established fee sites.
- Monitor the Jordan Creek and conduct patrols to monitor adjacent areas

The typical annual salary for a dedicated Trexler Nature Preserve ranger will vary depending on applicant experience and County funding availability. Nationwide such salaries range as low as \$20,500 and has high as \$61,000. The national average according to ZipRecruiter is \$38,496 at an average of \$19 per hour.





RECOMMENDATIONS

# NORTH RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE

471 acres in size, the North Range is characterized by steep slopes and ridge tops that offer breathtaking views of surrounding land. At a point in the North Range, one can see both Blue Mountain, to the north, and South Mountain, to the south, encompassing the entire width of the Lehigh Valley.

Through cooperation with the State Game Commission, the Preserve has used various treatment methods, including limited burns, to control and manage the prolific invasives in this range in an effort to establish a native meadow landscape.

The following pages follow the structure pictured below. Each range is reviewed individually, and the left page will contain matrix recommendations (ecological, trail, facility, signage) specific to each management unit. The right page will contain corresponding maps which identify proposed recommendation locations.

How to use this chapter:

Left Side: Matrix Recommendations

NORTH RANGE		
Area	Goal	Recommendation
MUN 01	10.1.1	Preserve natural resources and provide for future generations by maintaining the ecological integrity of the Preserve.
	10.1.2	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
	10.1.3	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
	10.1.4	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
	10.1.5	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
MUN 02	10.2.1	Preserve natural resources and provide for future generations by maintaining the ecological integrity of the Preserve.
	10.2.2	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
	10.2.3	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
	10.2.4	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.
	10.2.5	Protect and enhance the natural resources of the Preserve by preventing and controlling invasive species.

Right Side: Recommendation Mapping

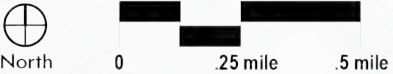


471 Acres

# NORTH RANGE

## LEGEND

- Roadway
- Trail
- 10' Contour
- Stream
- Jordan Creek
- State Game Lands
- Building
- Parcel Boundary
- Project Area
- Municipal Boundary





The North Flats: 122 Acres

Key	Goal	Recommendation
N1-E1	Maintain Upland Meadow Habitat	Prescribed burns, develop burn plan with sub-units to cascade burns over site on alternating years.
N1-E2	Maintain Upland Meadow Habitat	Winter brush non-native woody plants, follow up with stump treatment. Keep open meadow structure (can consider salvage volunteer native trees and shrubs for use elsewhere on site.
N1-E3	Maintain Upland Meadow Habitat	Spot spray invasive herbaceous and graminoid plant species with a back-pack applicator (diluted glyphosate with surfactant)
N1-E4	Maintain Upland Meadow Habitat	Hand-distribute native seed mix (spring or fall) in bare areas, especially locations where monocultures of invasive species have been removed/killed.
N1-E5	American Kestrel Foraging Habitat	Ensure seed mixes/plant establishment provided wildflowers and grasses that support a robust native insect community.

Jordan Creek & Floodplain: 24 Acres

Key	Goal	Recommendation
N2-E1	Control Invasive Plants	Cut Japanese knotweed; revisit and spray with herbicide post breeding bird season; plant native riparian plants, especially live stakes and hand-distribute native, shade-tolerant wet-mesic seed mix.
N2-E2	Control Invasive Plants	Cut non-native shrubs in winter months. Apply herbicide with a bark penetrating oil via saturated sponge on backpack spray applicator, plant native riparian plants.
N2-E3	Establish Stormwater BMPs	Tributaries and stormwater runoff feeds should have surface capture wetlands to slow & filter stormwater before entering Jordan Creek.
N2-E4	Increase Riparian Buffer Habitat	Convert toe of slope in MUN03 and transition to this MU to native woodland habitat by eradicating autumn olive, other invasive shrubs, stilt grass, and invasive vines following methods described above.





The North Slopes: 302 Acres

Key	Goal	Recommendation
N3-E1	Maintain Upland Meadow Habitat	Conduct prescribed burns in years 1,3,5,7,and 10. Develop burn plan with sub-units to cascade burns over site on alternating years.
N3-E2	Maintain Upland Meadow Habitat	Winter brush non-native woody plants, follow up with stump treatment. Keep open meadow structure (can consider salvage volunteer native trees and shrubs for use elsewhere on site.
N3-E3	Maintain Upland Meadow Habitat	Spot spray invasive herbaceous and graminoid plant species with a back-pack applicator (diluted glyphosate with surfactant).
N3-E4	Maintain Upland Meadow Habitat	Hand-distribute native seed mix (spring and fall) in bare areas, especially locations where monocultures of invasive species have been removed/killed. Throw straw mulch in larger areas that have been reseeded.
N3-E5	Establish Early to Mid Succession Habitat	Locate 25'-50' diameter sections of sloped habitat to plant native shrubs. Protect with fencing and control invasives following methods described above.
N3-E6	Protect Drainage Ways & Associated Wetlands	Include the above (early-to-mid succession habitat establishment) in transitions and toes of slopes to combine with wetland buffering. Follow same management recommendations to ensure proper establishment and combat invasives.
N3-E7	Protect Drainage Ways & Associated Wetlands	Control invasive reed canary grass in all drainage ways. Treat with a combination of mowing, herbicide, and (if possible) fire. Seed and plug native plants into the killed areas. Visit to spot spray resprouts at least twice per year for first five years.
N3-E8	Protect Jordan Creek	Invest heavily in the above actions for establishing a mosaic of native meadow and patches of shrubland/teenage forest along the southernmost slopes in this MU.
N3-E9	Protect Drainage Ways & Associated Wetlands	Allow dead-standing ash trees to fall on their own over time. Should any trails approach these (or other dead trees) limb them but leave at least 10' of standing primary stem as wildlife habitat.

MUN  
03





RECOMMENDATIONS

# NORTH RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE

Update to Trail Difficulty & Suggested Users

Trails of the North Range are heavily used by all user groups: walkers, hikers, runners, cyclists, and equine. The well-maintained mountain bike trails in this range receive a high volume of users. The consultant team critically

examined each trail within the range to determine existing conditions, challenges for users, as well as proposed / target trail ratings. Widening or tightening of accepted user groups are recommended on a trail by trail basis.

North Range Trails

Name	Blaze	Description	Existing Condition	DCNR Trail Rating	Target DCNR Trail Rating	Existing Suggested Use	Proposed Suggested Use	Distance (Miles)
Teardrop	▲	Inner Loop; Hilltop Views; Meadows	Large Ballast Material at Surface	Easy / More Difficult	Easy - Address Surface	Hike	Hike, Bike, Horse	1.56
North Range Entrance Trail	▲ △	Entrance Road	Road Ballast; Access Drive	More Difficult	More Difficult- No Change	Hike, Bike	Hike, Bike	0.15
Fireman's	△	Inner Loop; Streamside; Wooded	Streamside; Extreme Slope 33%	More Difficult/ Most Difficult	More Difficult- Max Slope 25% Provide Landings	Hike, Bike	Hike	1.27
Buck Run	▲	Trail Connector; Hillside	Steep Runs	More Difficult	Easy - Provide Resting Landings	Hike	Hike, Bike	0.31
Turkey Ridge	▲	Connector Trail; Hillside; Creek Views	Cross slope; Moderate Grades	More Difficult	More Difficult - No Change	Hike	Hike, Bike	0.40
Broken Arrow	▲ ▲	Single Track Mt. Bike Trail;	Drops / Banked Turns	Technical Bike Trail	Make One Way - Close to Pedestrians	Bike	Bike Only	1.13
Half Pipe	△ △	Single Track Mt. Bike Trail	One way / Banks	Technical Bike Trail	No Change	Bike	Bike Only	1.84
Brian's Trail	▲ ▲	Single Track Mt. Bike Trail	Good Condition	More Difficult	More Difficult - No Change	Bike	Bike	1.19

Easy Trail Difficulty

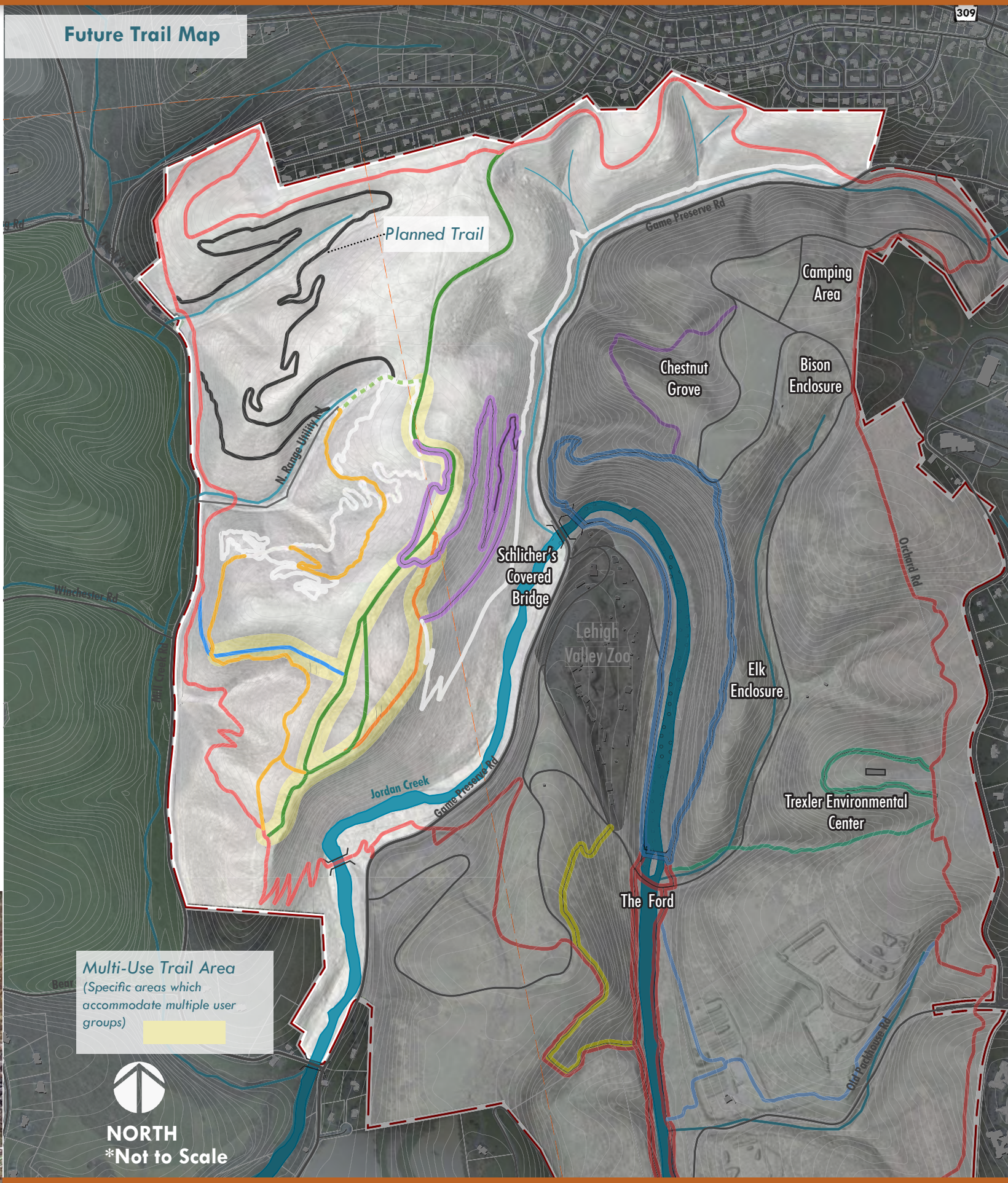
Medium Trail Difficulty

Difficult Trail Difficulty

Trails where suggested users are modified



Future Trail Map





The North Flats: 122 Acres

Key	Recommendation	Priority
N1-T1	Border Trail - Surface improvement	Low
N1-T2	Border Trail & Tear Drop Trail - Intersection improvement	Med
N1-T3	Boarder Trail near Teardrop trail - Improve trail approach	Low
N1-T4	Border Trail - Widen trail address crosslope	Med
N1-T3	Teardrop Trail - Surface improvement	Low

MUN  
01

Jordan Creek & Floodplain: 24 Acres

Key	Recommendation	Priority
N2-T1	Border Trail - Improve and stabilize Jordan Creek ford	High
N2-T2	Border Trail - Create boardwalk approach to Jordan Creek bridge	High
	Border Trail - ADA Trail connection to Game Preserve Road Parking	High

MUN  
02





RECOMMENDATIONS

# NORTH RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE

The North Slopes: 302 Acres

Key	Recommendation	Priority
N3-T1	Border Trail - Improve Game Preserve Road crossing and trail approaches	Med
N3-T2a	Border Trail - Realign trail at Hunsicker Valley and improve stream crossing	High
N3-T2b	Border Trail - stabilize former trail bed	High
N3-T3a	Border Trail - Realign trail at North Range access drive and improve stream crossing	High
N3-T3b	Border Trail - Crosswalk improvements at North Range access drive	High
N3-T3c	Border Trail - Boardwalk approach over Stream Valley at North Range access drive	High
N3-T3d	Border Trail - Stabilize former trail bed	High
N3-T4	Buck Run Border Trail - Improve trail transition at Border Trail	High
N3-T5	Buck Run Trail - Add restoration plantings in old trail bed	High
N3-T6	Buck Run Trail - Add barrier at trail cut through	High
N3-T7	Border Trail - Widen trail bed and shoulder from North Range overlook to Buck Run Trail	Low
N3-T8a	Border Trail - Realign trail approach to Jordan Creek	High
N3-T8b	Border Trail - Stabilize former trail bed	High
N3-T9a	Fireman's Trail - Realign trail approach to Jordan Creek	Med
N3-T9b	Fireman's Trail - Stabilize former trail bed	Med
N3-T10	Broken Arrow Trail - Add restoration plantings in old trail bed;	High
N3-T11	Fireman's Trail - Add rolling grade dips to improve drainage and address trail rutting	Med
N3-T12	Fireman's Trail - Improve approaches to at grade stream crossing	High
N3-T13	Install crosswalk at Fireman's Trail and Game Preserve Road	High
N3-T14	Fireman's Trail - Add railings to footbridge	High

MUN 03



NORTH  
\*Not to Scale



RECOMMENDATIONS

# NORTH RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE

The North Flats: 122 Acres

Key	Recommendation	Priority
N1-F1	Boarder Trail at Teardrop trail - Retrofit shelter and improve approach	Low
N1-F2a	Tear Drop Trail - Provide meadow overlook platform	High
N1-F2b	TearDrop Trail - Meadow overlook access trail - 5' Wide stonedust and boardwalk approach	High
N1-F3	Teardrop Trail - Replace picnic area with boulder shade grove	High
N1-F4	Tear Drop Trail - Provide meadow overlook on grade	Med
N1-F5	Border Trail - Retrofit shelter	Low
N1-F6	Teardrop and Buck Run Trail - Provide bolder seating at	High

MUN 01

Jordan Creek & Floodplain: 24 Acres

Key	Recommendation	Priority
N2-F1	Border Trail - Small picnic grove - 3 tables	Med
N2-F1	Border Trail - Provide ADA floodplain overlook platform	High
N2-F1	Game Preserve Road Pull off - Convert to ADA parking	Med

MUN 02

The North Slopes: 302 Acres

Key	Recommendation	Priority
N3-F1a	Game Preserve Road Trailhead - Provide asphalt driveway 18' width	Med
N3-F1b	Game Preserve Road Trailhead - Relocate vehicular gate	Med
N3-F1c	Game Preserve Road Trailhead - Provide gravel trailhead parking (16 Spaces)	Med
N3-F2	Game Preserve Trailhead - Provide single occupancy composting toilet	Med
N3-F3	Mill Creek Road Trailhead - Define parking rustic wheel stops	High
N3-F4	Mill Creek Road Trailhead - Provide boulder shade grove	High
N3-F5	Mill Creek Road Trailhead - Provide single occupancy composting toilet	High
N3-F6	Game Preserve Road at Schlicher's Bridge - Install guide rail and vehicular gate to deter	High

MUN 03



NORTH  
\*Not to Scale



### North Range Parking Area - MUN03

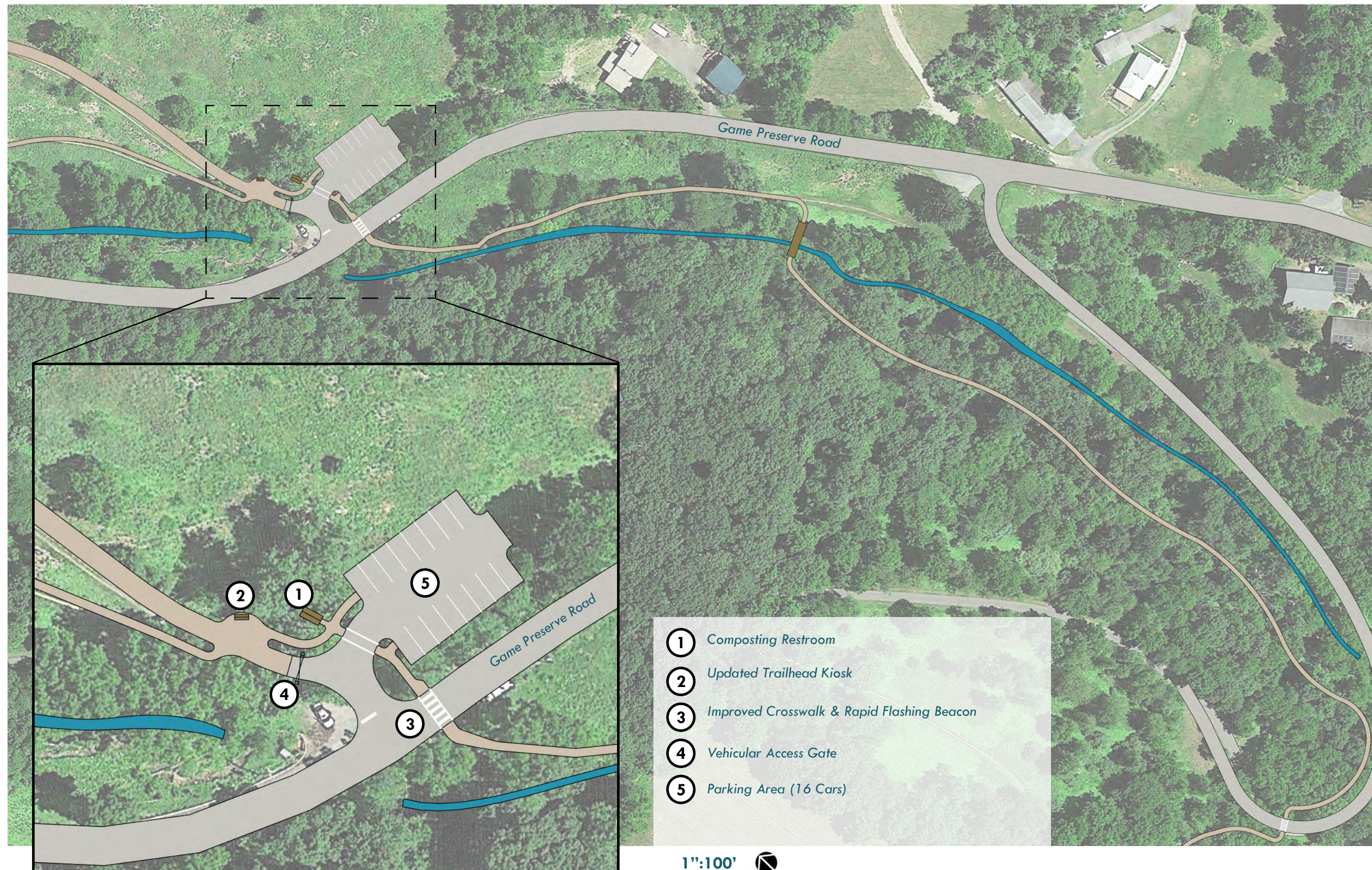
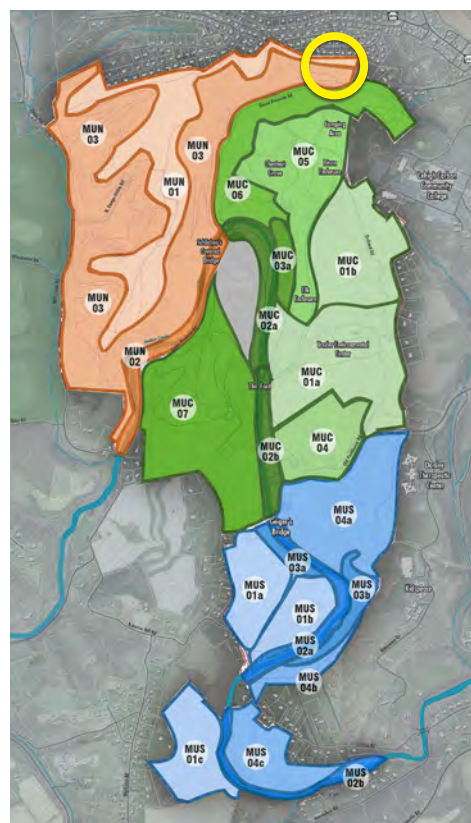
As Preserve use increases during the Covid-19 pandemic and beyond, additional vehicular parking facilities should be considered to sustainably meet this demand.

The conceptual parking area on the following page is location off Game Preserve Road in the northeast corner of the Trexler Nature Preserve.

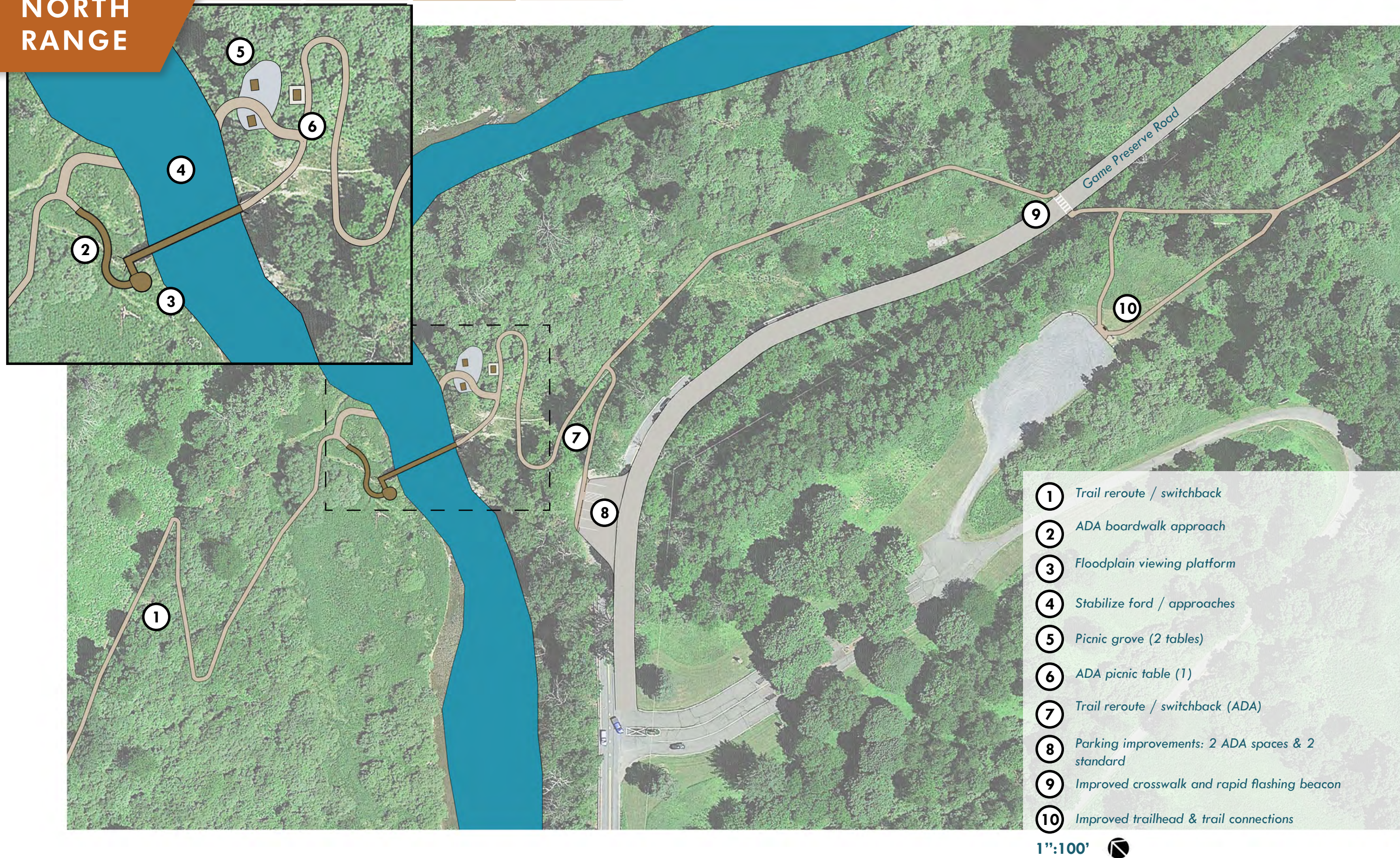
North Range parking improvements include:

1. Composting restroom
2. Updated trailhead kiosk (details given in signage section)
3. Improved crosswalk (repainted, include parallel bars) and rapid flashing beacon
4. Vehicular access gate
5. Parking area which can accommodate 16 vehicles

The map on the following page also delineates conceptual border trail improvements which lead to the parking area. The goal of the trail improvements is to create a separate and safer facility for pedestrians, cyclists, and equine users. Under current conditions, users walk on-road and must be wary of passing motorists.







- 1 Trail reroute / switchback
- 2 ADA boardwalk approach
- 3 Floodplain viewing platform
- 4 Stabilize ford / approaches
- 5 Picnic grove (2 tables)
- 6 ADA picnic table (1)
- 7 Trail reroute / switchback (ADA)
- 8 Parking improvements: 2 ADA spaces & 2 standard
- 9 Improved crosswalk and rapid flashing beacon
- 10 Improved trailhead & trail connections

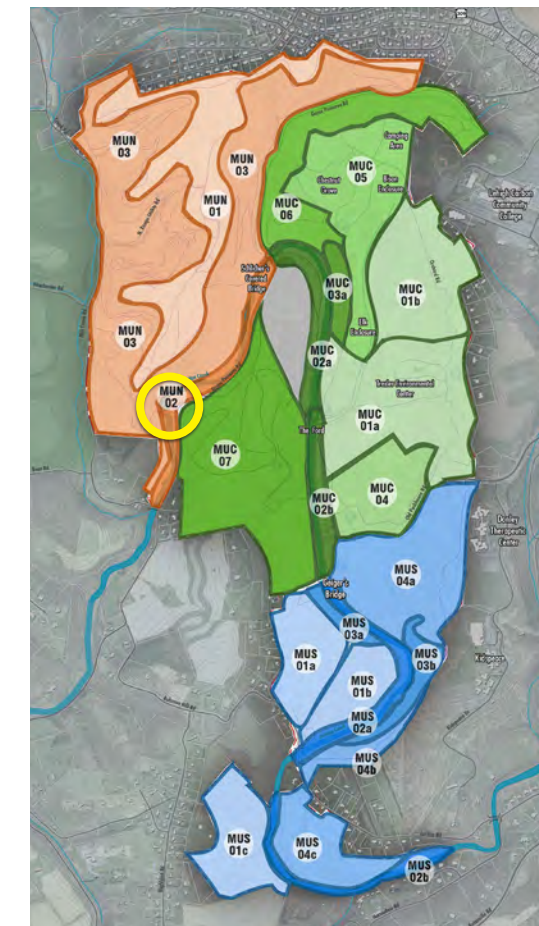
1"=100'



## Jordan Creek Crossing - MUN02

The following conceptual improvements along the Jordan Creek can potentially improve safety and user experiences in this location:

1. Trail reroute / switchback
2. ADA boardwalk bridge approach
3. Floodplain viewing platform
4. Stabilize ford / approaches
5. Picnic grove (2 tables)
6. ADA picnic table (1)
7. Trail reroute / switchback (ADA)
8. Parking improvements: 2 ADA spaces & 2 standard
9. Improved crosswalk and rapid flashing beacon
10. Improved trailhead and trail connections







Conceptual North Range kiosk update

The consultant team critically reviewed all existing signage in the North Range to determine the signage and wayfinding recommendations indicated on the following page. These recommendations can be organized by the following potential improvements:

- Remove Kiosk
- Update Kiosk
- New Kiosk
- Interpretive Signage
- Trail Markers
- Range Signage





RECOMMENDATIONS

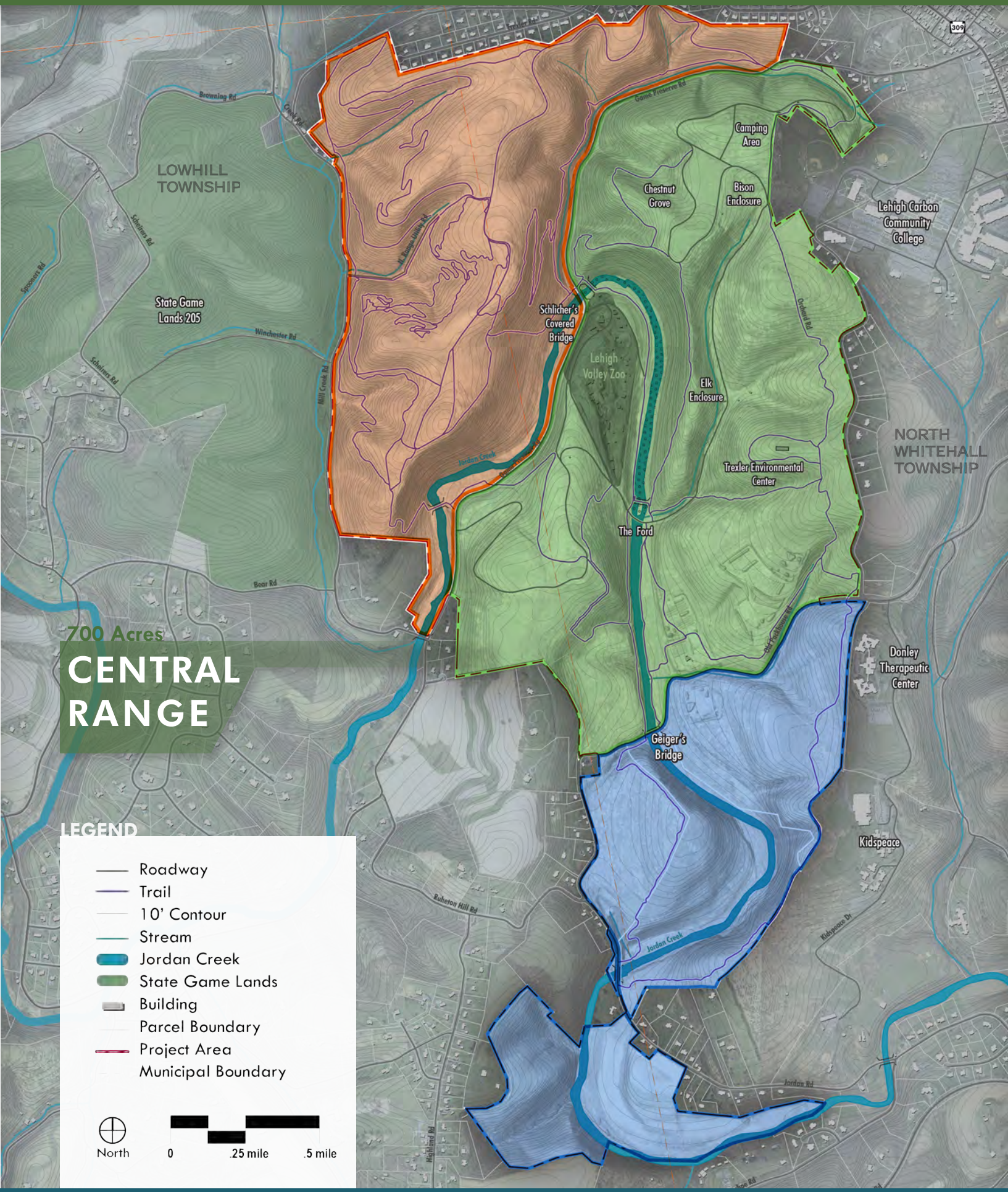
# CENTRAL RANGE

- ECOLOGY
- TRAILS
- FACILITIES
- SIGNAGE

The Central Range (700 acres) includes the Environmental Education Center, pastures for bison and elk, and a variety of trails and other passive recreation areas. The Central Range surrounds the Lehigh Valley Zoo. The Zoo, while located on County-owned land, is operated by a separate entity as is not part of the Trexler Nature Preserve.

The Central Range has been the center of activity since Lehigh County began involvement in 1935, and its dramatic views, unique access to the Jordan Creek, and the wildlife enclosures represent the Preserve’s strongest identity for many Lehigh County residents.

Accessibility (ADA and otherwise) should remain a focus for this range, in an effort to bring its ecological and educational aspects to the largest group possible in a way that protects the precious ecology of the Preserve.





Environmental Ed. Center (Central East): 122 Acres

MUC  
01a

Key	Goal	Recommendation
C1a-E1	Enhance Meadows	Plug "hot spots" into the meadows to increase value for wildlife and improve aesthetics. Hot spots should be clusters of native wildflower and warm season grass plugs (100-250) planted 12-18" on center.
C1a-E2	Enhance Meadows	Continue to eradicate Eleagnus and any other non-native wood plants from establishing in this polygon.
C1a-E3	Enhance Meadows	Remove all of the olive and stabilize. Plant live stakes and/or containerized native shrubs into this swale and margin to increase breeding bird habitat diversity, provide ecosystems services related to water conveyance and water cleansing.
C1a-E4	Repair the Native Garden	Consider hand-pulling all invasives (to reduce damage to extant native plants) then hand-seeding and plugging more native plants to produce a robust and functional display.

Environmental Ed. Center (North East): 81 Acres

MUC  
01b

Key	Goal	Recommendation
C1b-E1	Enhance Meadows	Plug "hot spots" into the meadows to increase value for wildlife and improve aesthetics. Hot spots should be clusters of native wildflower and warm season grass plugs.
C1b-E2	Restore Spring-Fed Wetland	Design, permit, and build a wetland restoration here that is part of the proposed stream and wetland restoration found in MUC05.
C1b-E3	Enhance Forest	Winter brush (cut and stump treat) all invasive shrubs. Return to spray resprouts then plant trees, shrubs, and seed in areas of bare soil.

Jordan Creek and Floodplain (Central North): 16 Acres

MUC  
02a

Key	Goal	Recommendation
C2a-E1	Ensure Passage Through the Stream	Remove (at least in part) some sections of the ford to enable safe fish and other mobile aquatic fauna to navigate above and below this feature.

Jordan Creek and Floodplain (Central South): 19 Acres

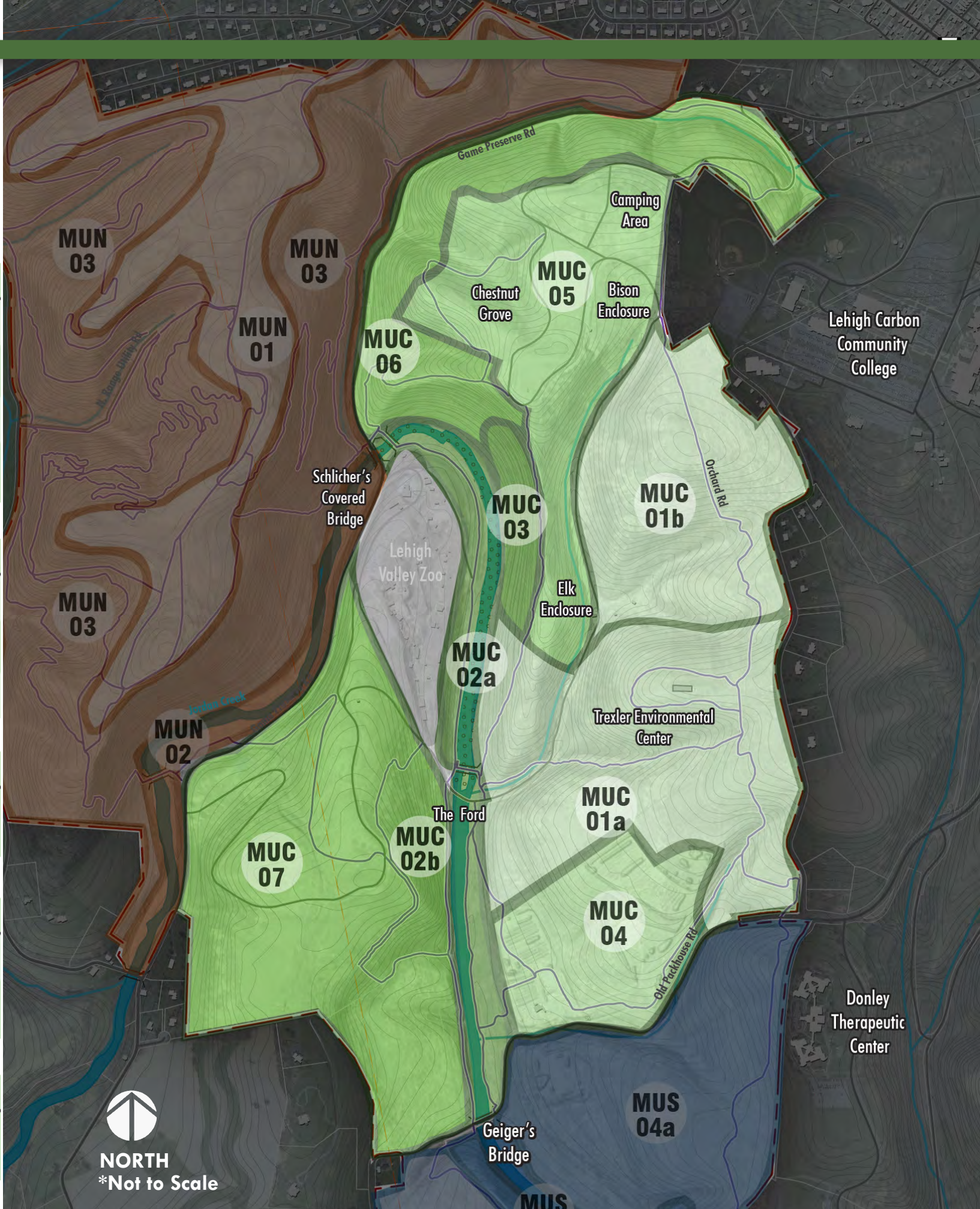
MUC  
02b

Key	Goal	Recommendation
C2b-E1	Enhance Wetlands in Floodplain	Toe of slope and floodplain wetlands occur in the riparian zone of Jordan Creek. Eradicate invasive forbs and shrubs from these wetlands.
C2b-21	Control/Eradicate Invasives	Similar to above but on the natural levees and creek banks.

Hemlock Ravine (Central North): 13 Acres

MUC  
03a

Key	Goal	Recommendation
C3a-E1	Maintain and Protect Hemlock Trees	Treat the largest and healthiest hemlocks to prevent death by hemlock woolly adelgid. Consider cutting any dead/dying trees whose collapse would result in human safety risks (near trails) and/or would result in uprooting the steep slope upon falling.





Hemlock Ravine (Central South)

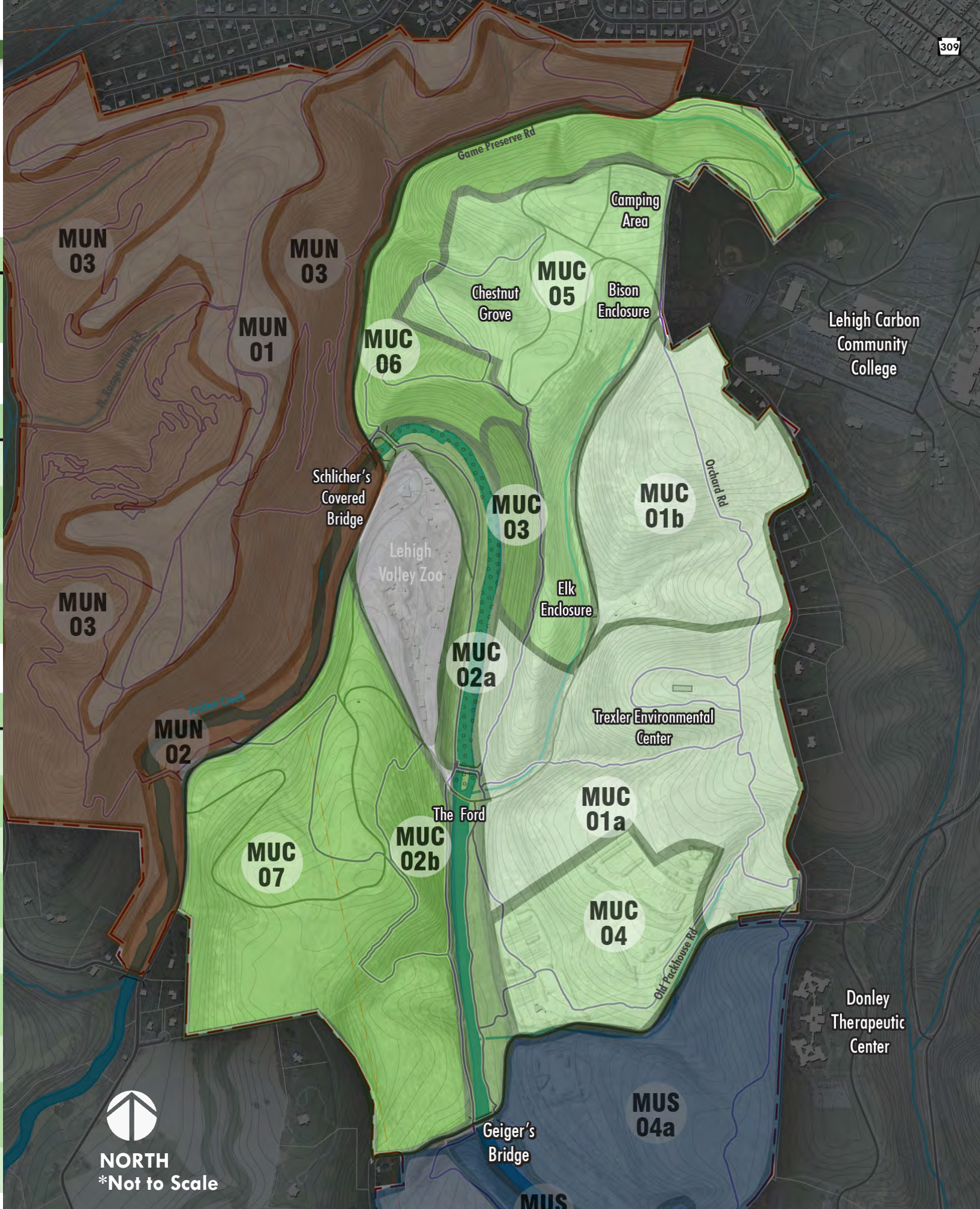
MUC 03b	Key	Goal	Recommendation
	C3b-E1	Maintain and Protect Hemlock Trees	Treat the largest and healthiest hemlocks to prevent death by hemlock woolly adelgid. Consider cutting any dead/dying trees whose collapse would result in human safety risks (near trails) and/or would result in uprooting the steep slope upon falling.

Maintenance Yard: 51 Acres

MUC 04	Key	Goal	Recommendation
	C4-E1	Eradicate Invasives	Eradicate invasive forbs and shrubs from this area.
	C4-E2	Re-Grade to Create Natural Topography	Re-grade soil and earthen piles which are remnants of County composting facility.
	C4-E3	Demonstration Gardens & Reflection Areas	This is a very good location to teach and interpret nature. Create yard-sized demonstrations of landscaping with native plants to encourage visitors to do the same at home.
	C4-E4	Native Plant Restoration	Mimic early succession habitats know to the region regarding plant selection and structure.

Working Lands: 94 Acres

MUC 05	Key	Goal	Recommendation
	C5-E1	Eradicate Olive	Remove all of the olive and stabilize.
	C5-E2	Control Invasives	Remove all invasives as part of above.
	C5-E3	Improve Herd Health & Pasture Resources	Set up smaller paddocks in existing pastures - use temporary lines to restrict and control movement of bison in smaller paddocks on site.
	C5-E4	Improve Herd Health & Pasture Resources	Enhance pastures with mix of native and non-native seeds to promote healthier buffalo and ecosystem.
	C5-E5	Improve Herd Health & Pasture Resources	Enhance pastures with mix of native and non-native seeds to promote healthier buffalo and ecosystem.
	C5-E6	Protect and Enhance Water Resources	Enact stream restoration as soon as possible between buffalo and elk. Incorporate associated wetlands (including from MUC02).
	C5-E7	Protect and Enhance Water Resources	Exclude bottomland wetland from elk enclosure. Move elk during construction, exclude them from actual wetland and stream when returned.
	C5-E8	Improve Herd Health and Pasture Resources	Allow elk to age out - do not add new individuals.
	C5-E9	Enhance Bird Habitat	Install bird boxes on fence posts.





RECOMMENDATIONS

# CENTRAL RANGE

ECOLOGY

TRAILS

FACILITIES

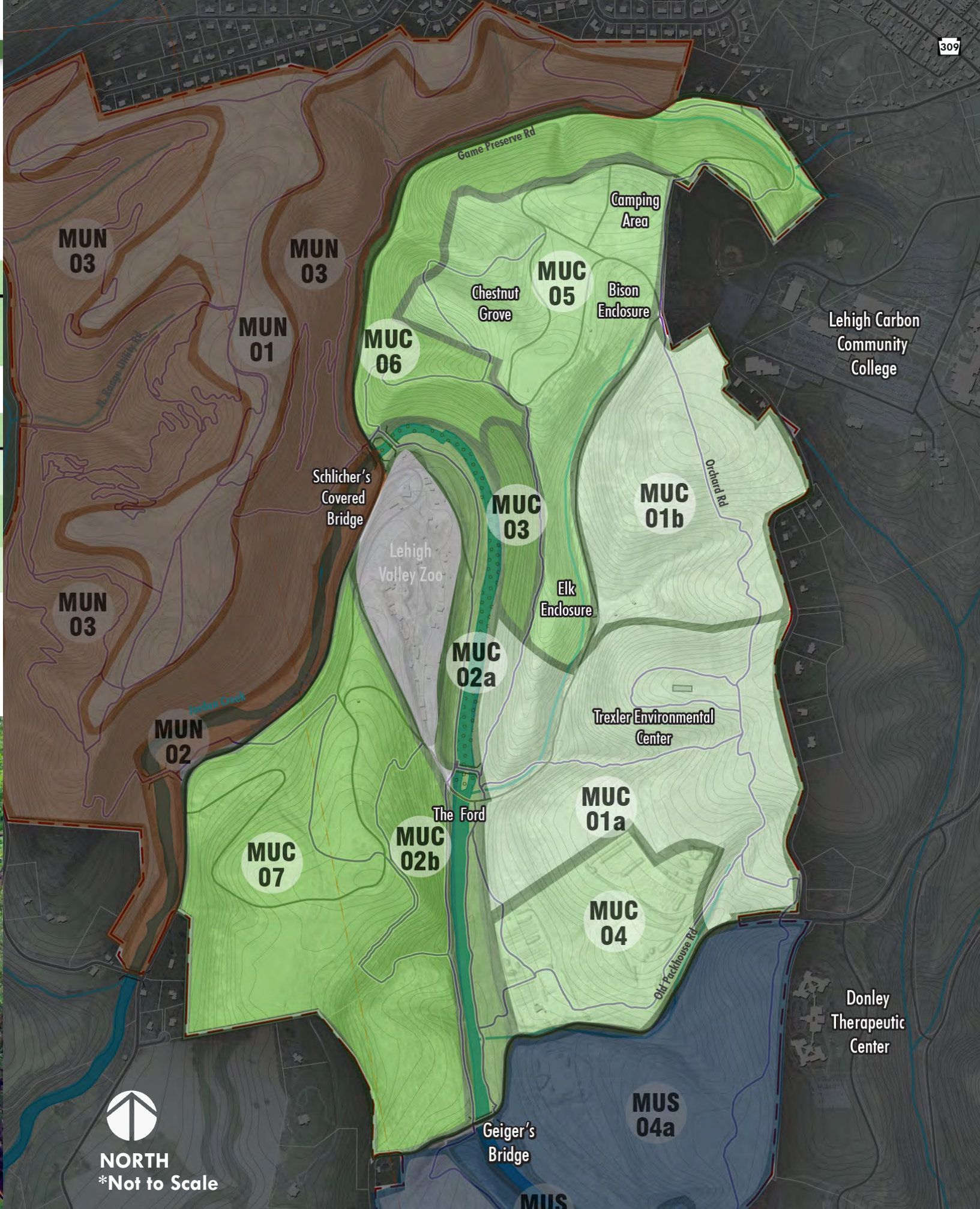
SIGNAGE

North Woods: 80 Acres

MUC 06	Key	Goal	Recommendation
	N01-E1	Eradicate Invasives And Enhance Natural Community	Eradicate invasive forbs and shrubs from this area.

The West Meadows: 158 Acres

MUC 07	Key	Goal	Recommendation
	N01-E1	Enhance Meadows	Immediately enhance with native seed: spot spray for any large colonies of invasives, direct drill in native seed mix, plant wildflower and grass plugs in high visibility areas.
	N01-E2	Create Savanna Habitat	Open windrows by removing invasives and clearing certain areas to promote a savanna condition; all tree removal should be done after USFWS consultation for bats.
	N01-E3	Create Shrub Habitat	Plant shrub clusters in selected areas - plant 25-50 woody plants in clusters and protect with perimeter fence. Control invasives in these corrals over next 5 years as they mature.





RECOMMENDATIONS

# CENTRAL RANGE

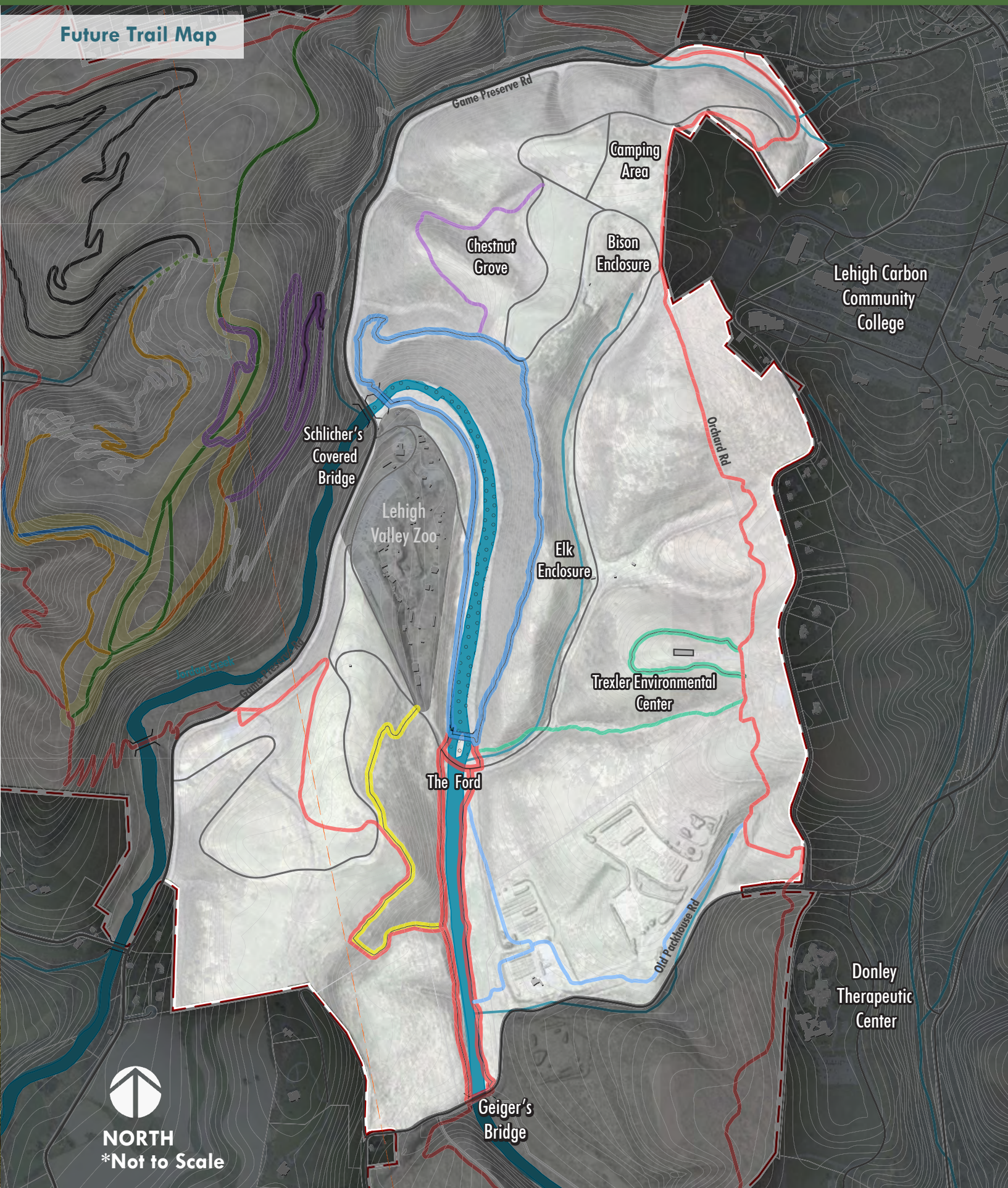
### Update to Trail Difficulty & Suggested Users

Trails of the Central Range are heavily used by all user groups: walkers, hikers, runners, cyclists, and equine. The ADA accessible trails near the Jordan Creek are successful and are popular among different users. The consultant

team critically examined each trail within the range to determine existing conditions, challenges for users, as well as proposed / target trail ratings. Widening or tightening of accepted user groups are recommended on a trail by trail basis.

### Central Range Trails

<div>Easy Trail Difficulty   Medium Trail Difficulty   Difficult Trail Difficulty   Trails where suggested users are modified</div>								
Name	Blaze	Description	Existing Condition	DCNR Trail Rating	Target DCNR Trail Rating	Existing Suggested Use	Proposed Suggested Use	Distance (Miles)
Elk Viewing	▲▲	Loop Trail; Ridge; Wooded	Steep Slopes; Single Track; Steps	Most Difficult	More Difficult Provide Resting Landings	Hike	Hike	1.74
Bird Watching	▲▲	Hillside; Bord Watching	Steep Slopes	More Difficult	Easy - Provide Resting Landings	Hike	Hike	0.64
Trexler Nature Trail	▲	Connector Trail; Woodland	Excellent Birding Area	More Difficult	More Difficult- Provide Resting Landings	Hike	Hike	0.44
Covered Bridge	▲▲	Loop Trail - ADA; Trail Streamside	ADA Surface	Easy	ADA - Address Crosswalk Areas	Hike	Hike	1.25
Observation Trail	▲▲	Loop Trail; Meadow Views	Cross slope 4-8%	Most Difficult	ADA - Address Crosslope & ADA Material	Hike	Hike	.39
Boy Scout Trail	▲	Connector Trail; Chestnut Nursery	Cross slope 4-8% Steep slopes	Most Difficult	Most Difficult - Address extreme Slopes	Hike	Hike, Horse	0.46
Spur Trail	▲▲	Trail Connector; Covered Bridge To Border Trail	Steep Cross slope; Steep Slopes	Most Difficult/ More Difficult	More Difficult- Address Crosslope	Hike	Hike, Horse, Bike	1.25





RECOMMENDATIONS

# CENTRAL RANGE

ECOLOGY   TRAILS   FACILITIES   SIGNAGE

Environmental Ed. Center (Central East): 122 Acres

MUC 01a

Key	Recommendation	Priority
C1a-T1	Border Trail - Define trail separate from parking area and driveways	High
C1a-T2	Observation Trail - Improve cross slope, 5' wide stone dust	High
C1a-T3	Border Trail - Add rolling grade dips to address trail erosion	Low
C1a-T4	Border Trail - Widen trail bed and shoulder to 7'; Add rolling grade dips to address rutting	Med
C1a-T5	Trexler Nature Trail - Improve road crossing approach cross slope and erosion	High
C1a-T6	Elk Viewing Trail - Realign trail head	Med

Environmental Ed. Center (North East): 81 Acres

MUC 01b

Key	Recommendation	Priority
C1b-T1	Border Trail - Add rolling grade dips to address trail erosion	Low
C1b-T2	Border Trail - Create off-road connection for border trail at LCCC trail entry	High

Jordan Creek and Floodplain (Central North): 16 Acres

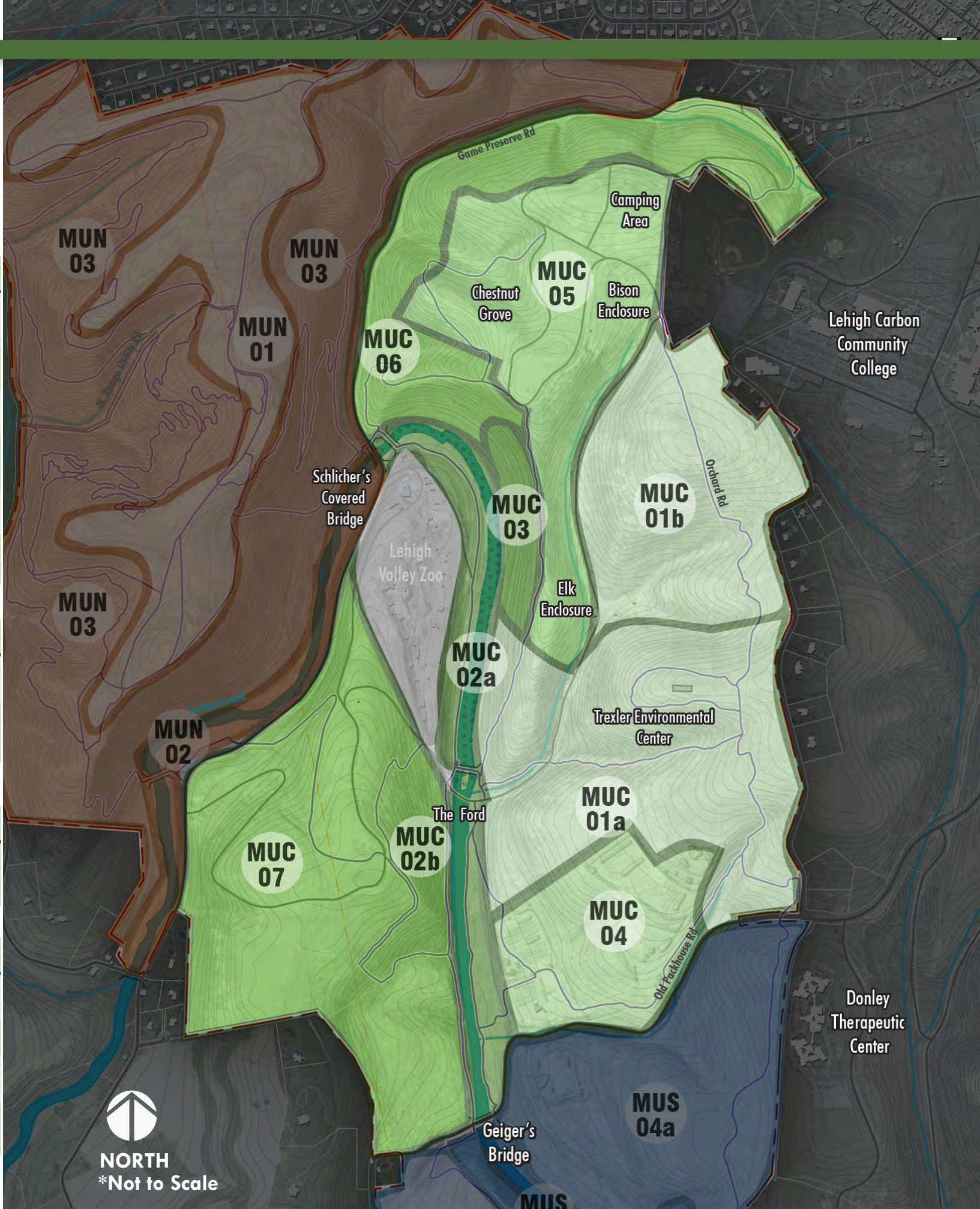
MUC 02a

Key	Recommendation	Priority
C2a-T1	Elk Viewing Trail - Separate trail from exit drive, 5' wide ADA stone dust	High

Jordan Creek and Floodplain (Central South): 19 Acres

MUC 02b

Key	Recommendation	Priority
C2b-T1	Bird Watching Trail - Extend from preserve exit drive to proposed Ford boardwalk	High
C2b-T2a	Covered Bridge Trail -Remove onroad Parking Realign trail at ADA grades	Med
C2b-T2b	Covered Bridge Trail -Regrade trail at ADA grades to cover bridge Asphalt 8' wide	Med
C2b-T2c	Covered Bridge Trail - Improve trail approach slope and crosswalk to ADA standards at exit drive crossing	Planned





RECOMMENDATIONS

# CENTRAL RANGE

ECOLOGY   TRAILS   FACILITIES   SIGNAGE

Maintenance Yard: 51 Acres

MUC 04

Key	Recommendation	Priority
C4-T1	Spur Trail - Adjust trail cross slope	High
C4-T2	Old Packhouse Trailhead - Realign unblazed trail for Ford connection, 5' wide stone dust	High
C4-T3	Old Packhouse Trailhead- Improve Access, new access trails and walkways throughout proposed trail head	High

Working Lands (94 Acres)

MUC 05

Key	Recommendation	Priority
C5-T1	Boy Scout Trail - Add rolling grade dips to address steep running / cross slopes	Low
C5-T2	Boy Scout Trail - Add rolling grade dips to address steep running / cross slopes	Low
C5-T3	Boy Scout Trail - Add reinforces grade dip to address erosion	Low
C5-T4	Elk Ridge Trail - Provide off road trail connection at Bison Enclosure overlook	High

North Woods: 80 Acres

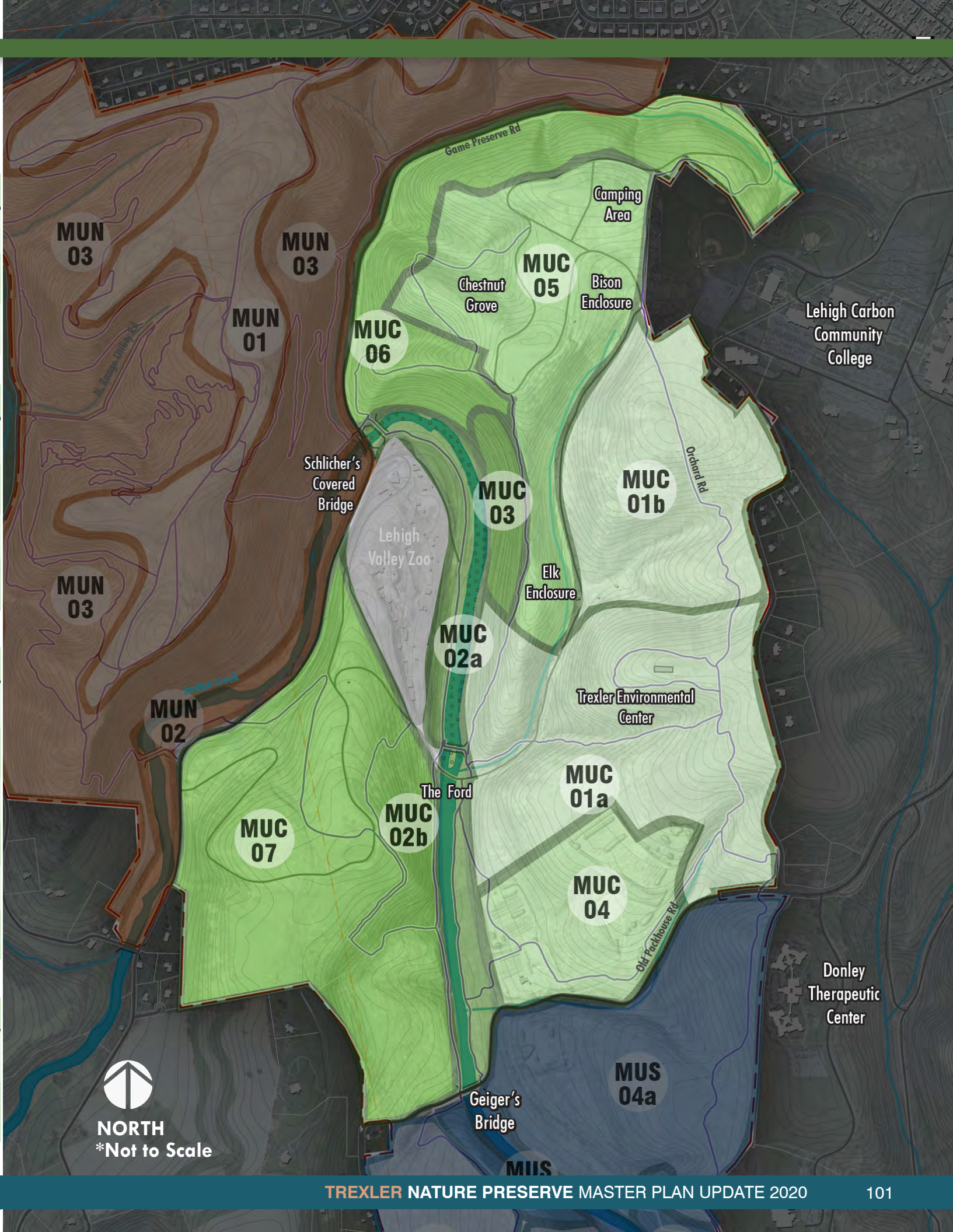
MUC 06

Key	Recommendation	Priority
C6-T1	Border Trail -Complete off road section at Preserve Exit Road and stream foot bridge	High
C6-T2	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low
C6-T3	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low
C6-T4	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low
C6-T5	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low
C6-T6	Elk Ridge Trail - Crosswalk at Game Preserve Road	High

The West Meadows: 158 Acres

MUC 07

Key	Recommendation	Priority
C7-T1	Border Trail - Add rolling grade dips to address steep running slope east of Game Preserve Road	Low
C7-T2	Bird Watching Trail - Add rolling grade dips to address steep running slope leading to Cover bridge loop	Low





RECOMMENDATIONS

# CENTRAL RANGE

ECOLOGY   TRAILS   FACILITIES   SIGNAGE

Environmental Ed. Center  
(Central East): 122 Acres

MUC 01a

Key	Recommendation	Priority
C1a-F1	Observation Trail - Provide ADA benches	High
C1a-F2	Education Center - Provide photo point at roof lookout	High
C1a-F3	Trexler Nature Trail - Remove bird blind structure	High

Environmental Ed. Center  
(North East): 81 Acres

MUC 01b

Key	Recommendation	Priority
C1b-F1	Border Trail - Create outdoor classroom forest habitat	Med

Jordan Creek and Floodplain  
(Central North): 16 Acres

MUC 02a

Key	Recommendation	Priority
C2a-F1a	Exit Drive - Provide gravel trail head parking area 10 spaces	Med
C2a-F1b	Exit Drive - Provide asphalt driveway apron to parking	Med
C2a-F2	Exit Drive - Covert existing 7 spaces to ADA parking (3 existing)	Med
C2a-F3	Exit Drive & Elk Viewing Trail - Provide trail gate	High
C2a-F4	Along Exit Road - Install post and rail fencing along exit drive	High

Jordan Creek and Floodplain  
(Central South): 19 Acres

MUC 02b

Key	Recommendation	Priority
C2b-F1	Ford Area -Remove Parking and provide seat wall riparian outdoor classroom	Med
C2b-F2	Ford Area - Provide single occupancy composting toilet	Med
C2b-F3	Ford Area - Provide shaded picnic grove 4-6 tables	Med
C2b-F4	Cover Bridge Trail at Ford Area - Improve boardwalk	High

Maintenance Yard: 51 Acres

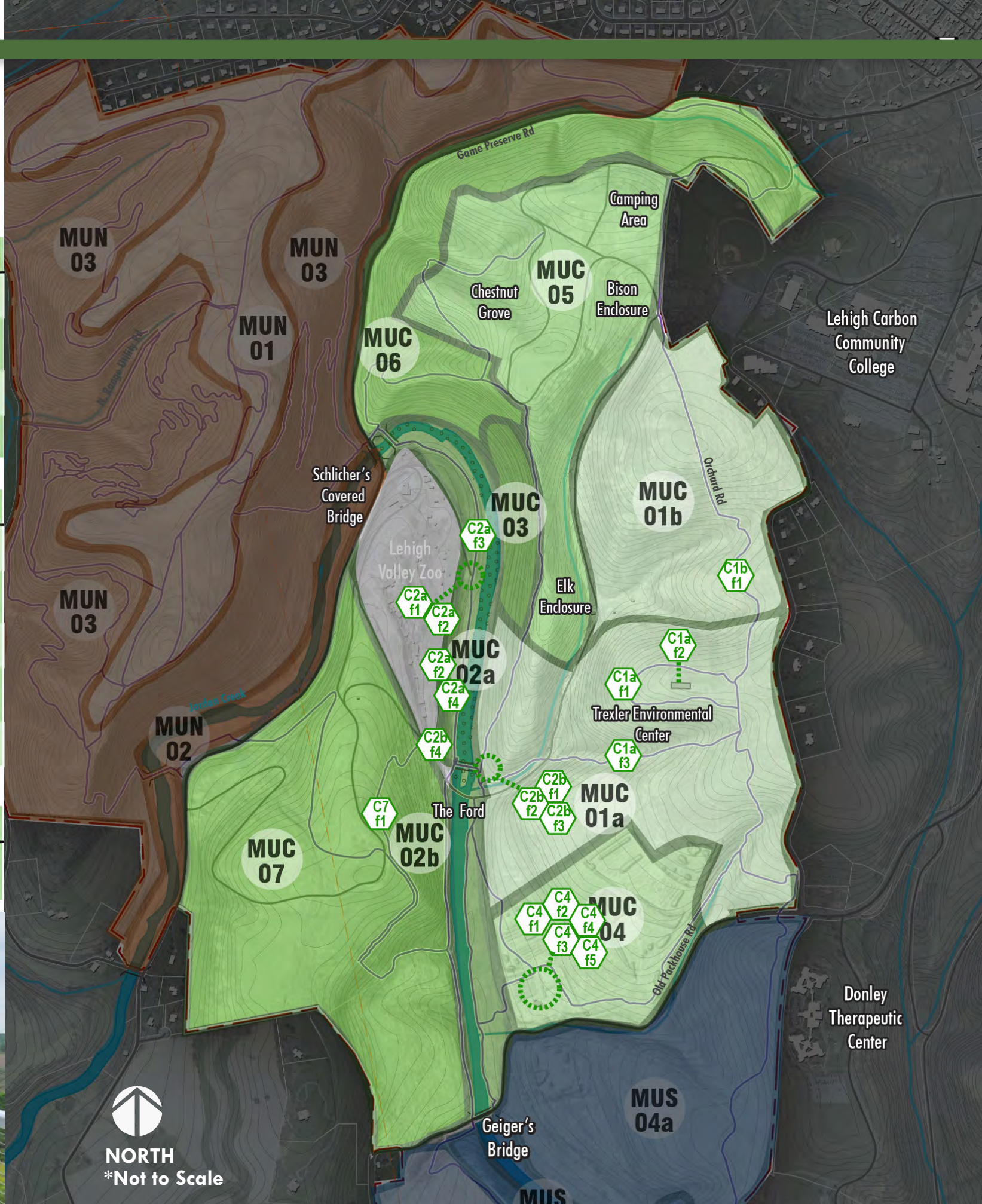
MUC 04

Key	Recommendation	Priority
C4-F1	Old Packhouse Trailhead -Formalize existing parking area - 59 spaces	Med
C4-F2	Old Packhouse Trailhead - Provide restroom pavilion- 20' x 17'	High
C4-F3	Old Packhouse Trailhead - Provide equestrian trailer parking - 13 spaces	High
C4-F4	Old Packhouse Trailhead -Provide Ford access parking - 44 spaces	High
C4-F5	Old Packhouse Trailhead -Provide picnic pavilions	High

The West Meadows: 158 Acres

MUC 07

Key	Recommendation	Priority
C07-F1	Birding Trail - Remove bird blind structure	High

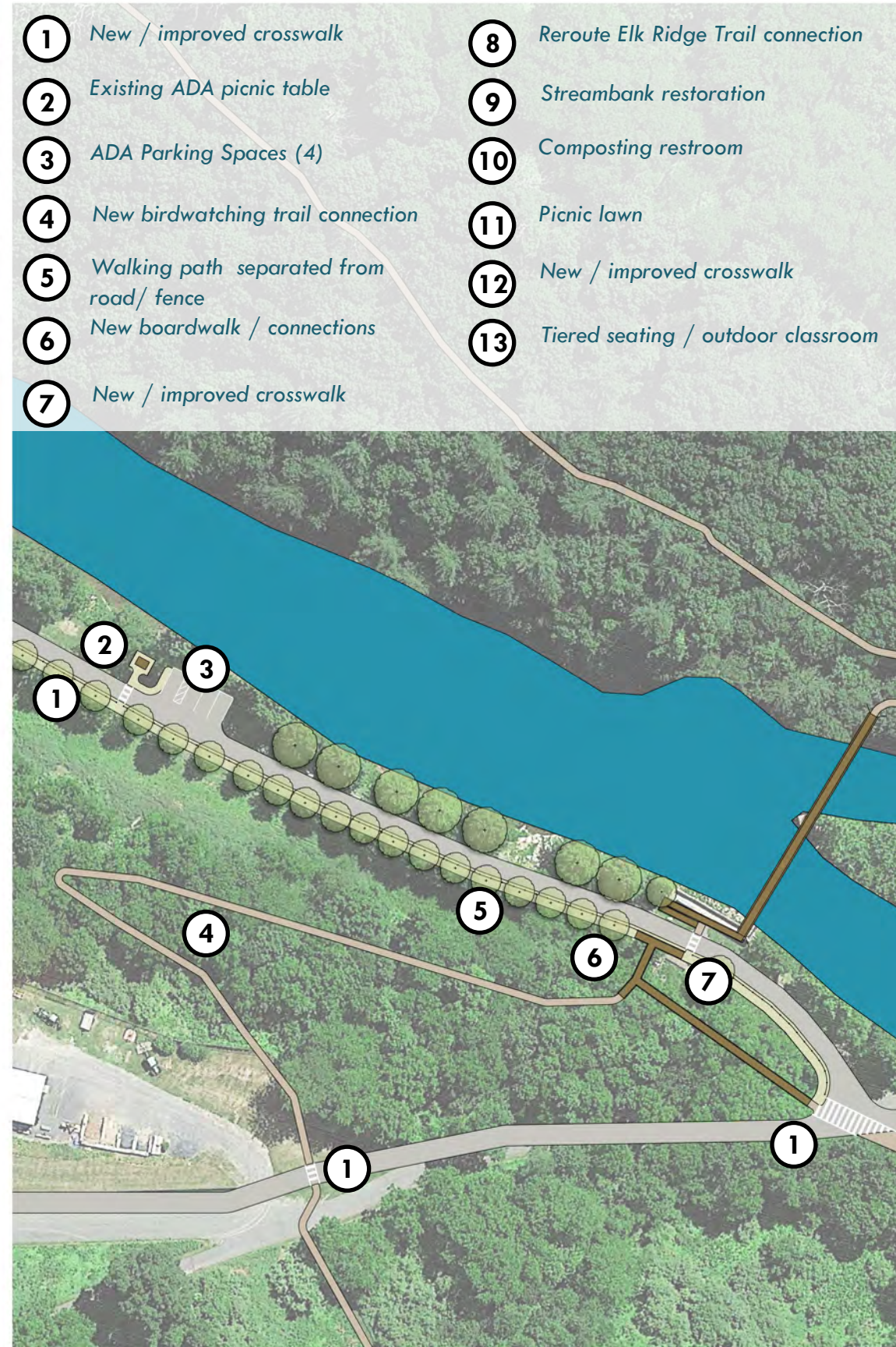
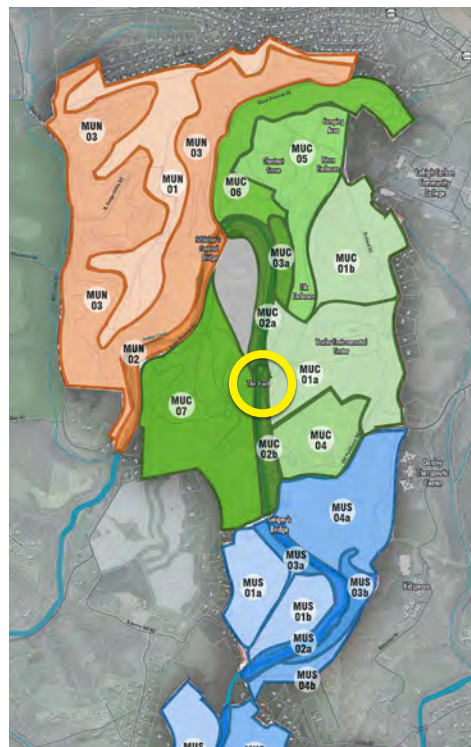




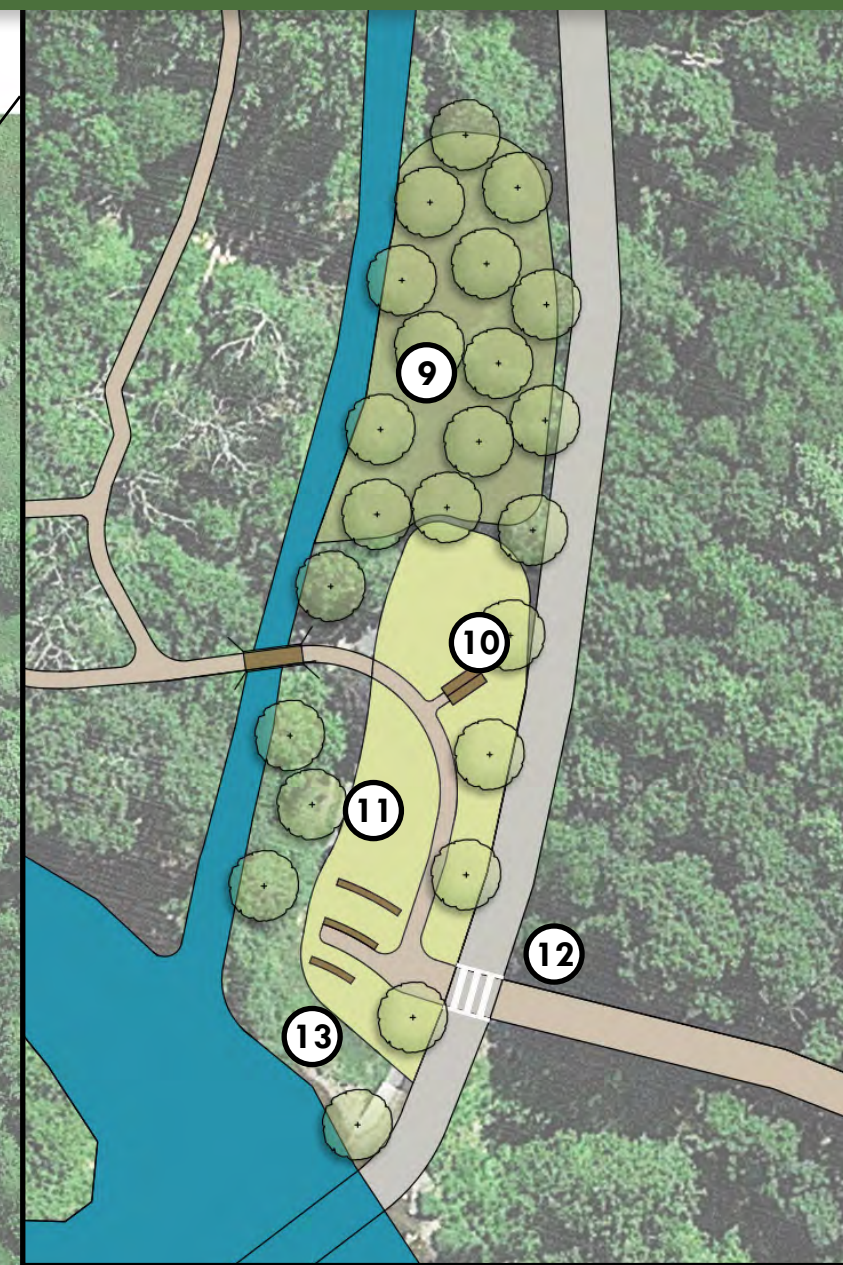
### The Ford - MUN02b

The Ford is the most visible and publicly accessible portion of the Jordan Creek. A common gathering and wayfinding location, this conceptual improvements noted on the following page aim to orient this space toward safer pedestrian uses, improved civic space, and sustainable use and management of ecological resources. Conceptual ford improvements include:

1. New / improved crosswalk
2. Existing ADA picnic table
3. ADA Parking Spaces (4)
4. New Birdwatching Trail connection
5. Walking path separated from road/ fence
6. New boardwalk / connections
7. New / improved crosswalk
8. Reroute Elk Ridge Trail connection
9. Streambank restoration
10. Composting restroom
11. Picnic lawn
12. New / improved crosswalk
13. Tiered seating / outdoor classroom



1"=100'







1"=100'



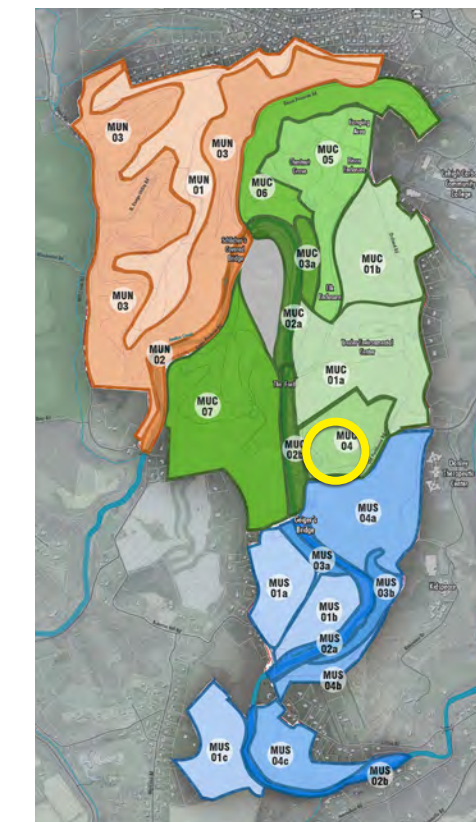
### Old Packhouse Road Parking Area (Former Compost Facility) - MUN04

Under current conditions, the former County compost facility on Old Packhouse Road is used for some parking and Preserve trail access. The conceptual improvements on the previous page envision this space as an area where parking improvements can sustainably occur, provide important access to the Jordan Creek and trails, and minimally disturb important ecological areas.

It is important to note that not all improvements will / must be completed at one time - and that a phased approach to implementation of parking areas is recommended.

Conceptual Old Packhouse Road Parking area improvements include:

1. Meadow / stormwater BMP (best management practice)
2. Parking area (44 spaces)
3. Small pavilion area
4. Equestrian parking (13 spaces)
5. Meadow / stormwater BMP
6. Drop-off
7. Restroom pavilion
8. Parking (59 spaces)
9. Meadow / stormwater BMP
10. Vehicular access gate
11. Vehicular access gate
- 12 Vehicular access gate





RECOMMENDATIONS

# CENTRAL RANGE

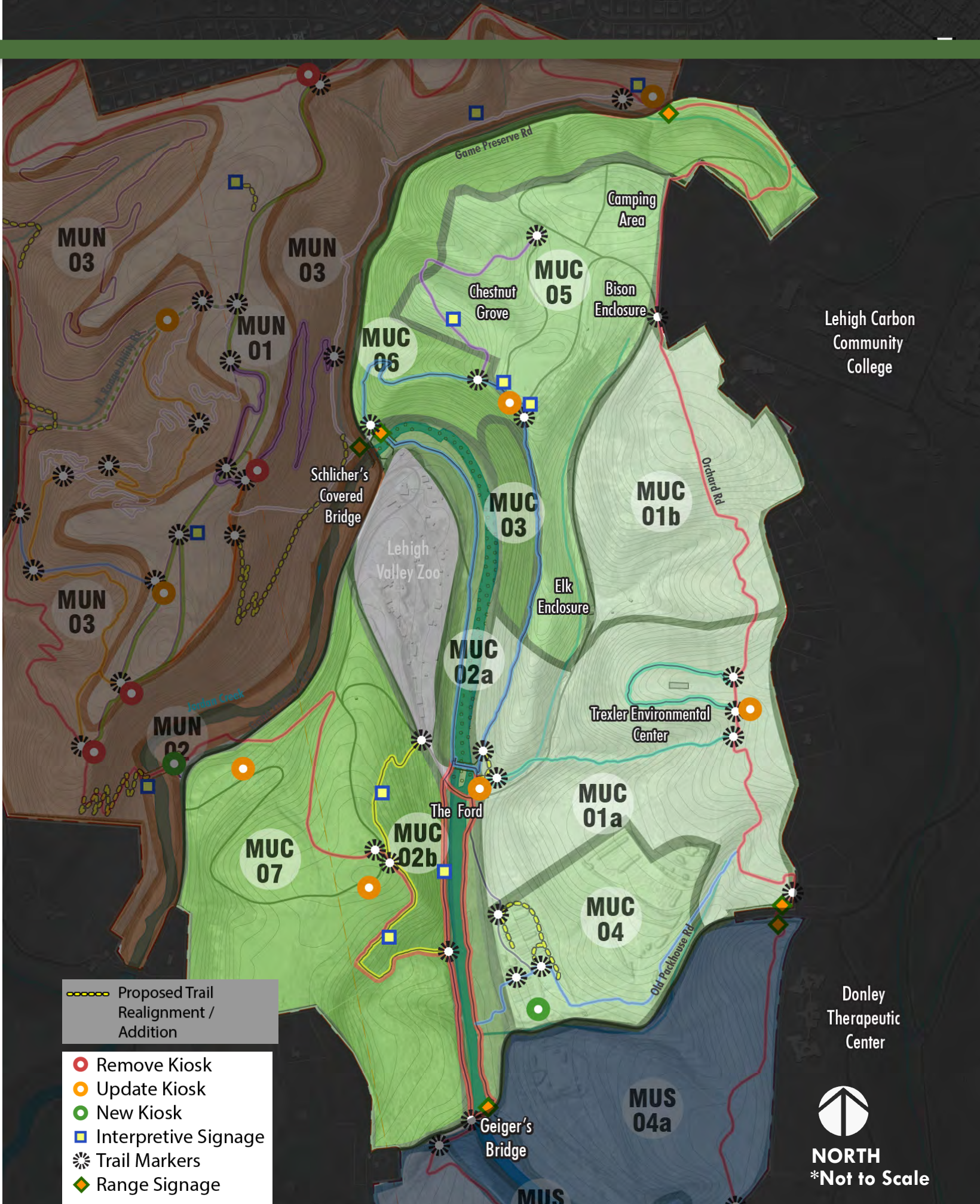
Conceptual kiosk update with trail marker



Conceptual Central Range kiosk update

The consultant team critically reviewed all existing signage in the Central Range to determine the signage and wayfinding recommendations indicated on the following page. These recommendations can be organized by the following potential improvements:

- Remove Kiosk
- Update Kiosk
- New Kiosk
- Interpretive Signage
- Trail Markers
- Range Signage





RECOMMENDATIONS

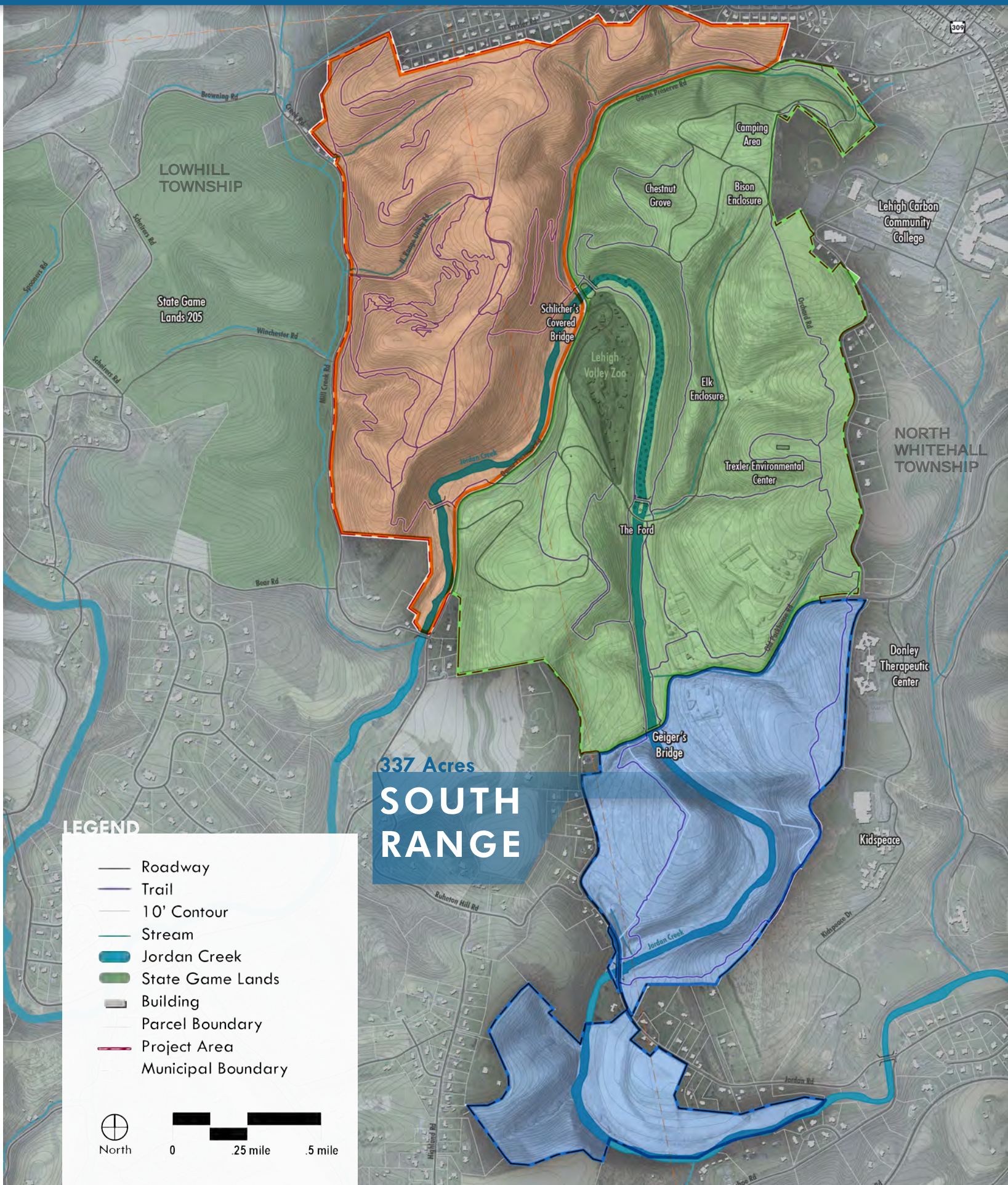
# SOUTH RANGE

ECOLOGY / TRAILS / FACILITIES / SIGNAGE

The South Range (337 acres) contains several unique ecological areas, steep topography, existing agricultural areas, and hemlock forests.

The consultant team spent extensive time documenting existing ecological conditions in this range, and minimal trail and facility improvements are suggested here.

The South Range is where the future Jordan Creek Greenway will connect into and through the Trexler Nature Preserve; a conceptual route and facilities are noted on subsequent pages.





South Range West (Agricultural): 45 Acres

Key	Goal	Recommendation
S1a-E1	Harvest Black Walnut	Enact a competitive bid for the walnut harvest. Make sure strict BMPs are in place for contractor behavior and site condition.
S1a-E2	Eradicate Olive	Continue to eradicate Eleagnus and any other non-native wood plants from establishing in this polygon.
S1a-E3	Replant with Native Communities	Promote forage for deer and turkey.
S1a-E4	Continue Hunting Here	Enhance natural areas to support hunting, keeping open sight lines and high-quality forage available.
S1a-E5	Establish Savanna & Meadow Community	Significant invasives and low-quality native plants here. Convert to open oak savannah habitat to support robust wildlife community and hunting resources.
S1a-E6	Enhance Sloping Muck Wetland Community	There exists a robust PEM on (in some areas) deep muck. This is flanked by the road and an ag field. Control invasives, especially in the adjacent slopes, and conduct invasive species management in the wetland.

MUS  
01a

South Range West (Forest): 33 Acres

Key	Goal	Recommendation
S1b-E1	Eradicate Olive	Continue to eradicate Eleagnus and any other non-native wood plants from establishing in this polygon.

MUS  
01b

South Range West (Forest Outlier): 49 Acres

Key	Goal	Recommendation
S1c-E1	Improve Forest Community	Conduct polygon-wide invasive species management, prioritizing invasive shrubs (using above described methodologies). Consider a pre-emergent herbicide for any large concentrations of stilt grass.

MUS  
01c

Jordan Creek and Floodplain: 26 Acres

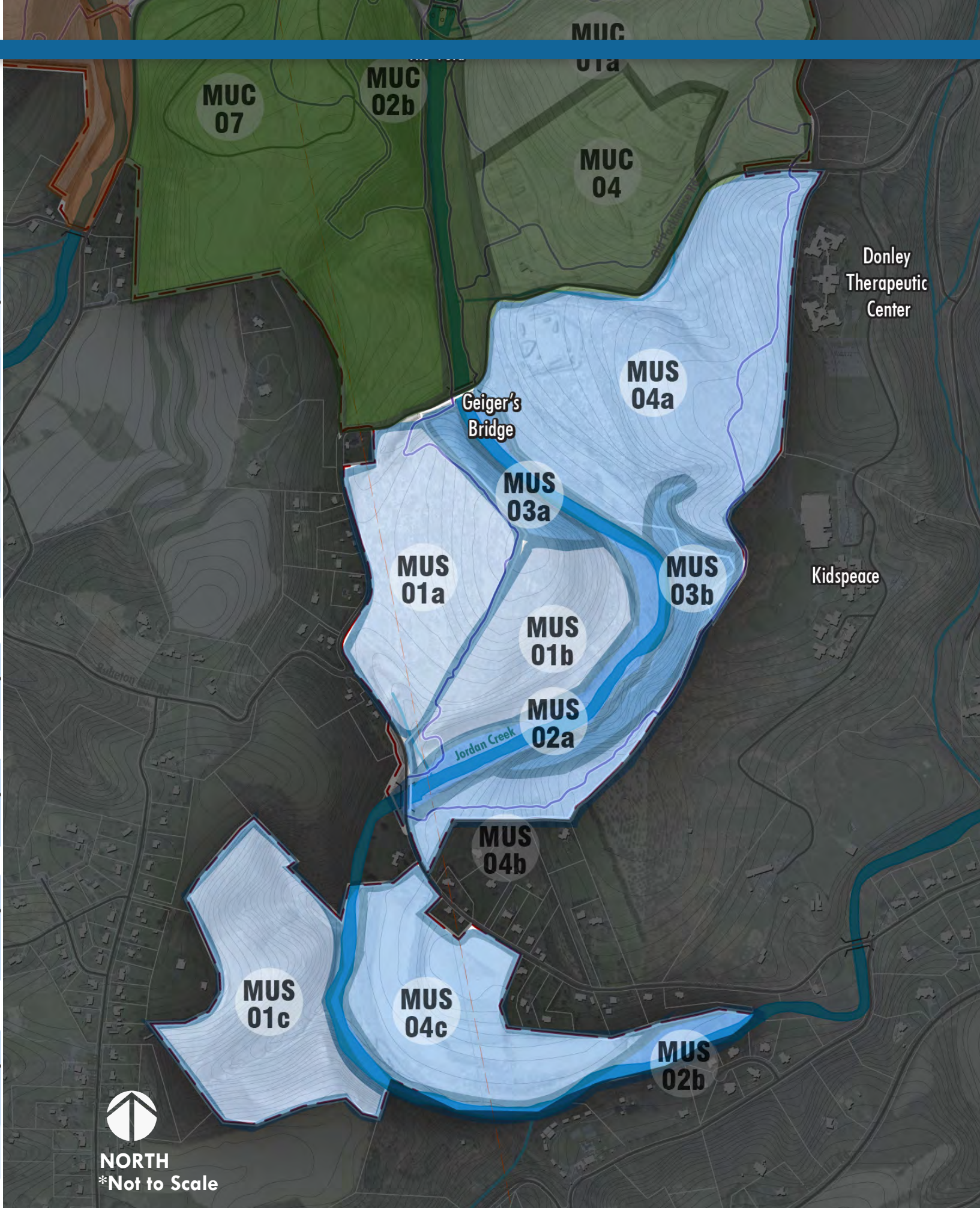
Key	Goal	Recommendation
S2a-E1	Protect Vernal Pools in Floodplain Wetland Area	Remove all invasives in a 200' buffer to these pools, ensure no trails or other promotion of access are constructed.

MUS  
02a

Jordan Creek and Floodplain (Outlier Parcel): 16 acres

Key	Goal	Recommendation
S4b-E1	Remove invasive species in buffer and floodplain	Install high quality meadow on either side of new trail; seed in and then plug hotspots along trail/viewsheds.
S4b-E2	Restrict human access to floodplain	Do not add trails in this section.

MUS  
02b





Hemlock Ravine (South West): 8 Acres

MUS  
03a

Key	Goal	Recommendation
S3a-E1	Assess hemlock grove health and treat key trees	Conduct assessment of hemlocks within this grove to locate and treat primary trees with hemlock woolly adelgid pesticides.
S3a-E2	Invasive species management	Conduct site visits to control invasive shrubs.

Hemlock Ravine (South East): 17 Acres

MUS  
03b

Key	Goal	Recommendation
S3b-E1	Assess hemlock grove health and treat key trees	Conduct assessment of hemlocks within this grove to locate and treat primary trees with hemlock woolly adelgid pesticides.
S3b-E2	Invasive species management	Conduct site visits to control invasive shrubs.

South Range East (Agriculture): 97 Acres

MUS  
04a

Key	Goal	Recommendation
S4a-E1	Establish savanna and meadow community	Significant invasives and low-quality native plants here. Convert to open oak savannah habitat to support robust wildlife community and allow for trail connections/access.

South Range East (Forest): 15 Acres

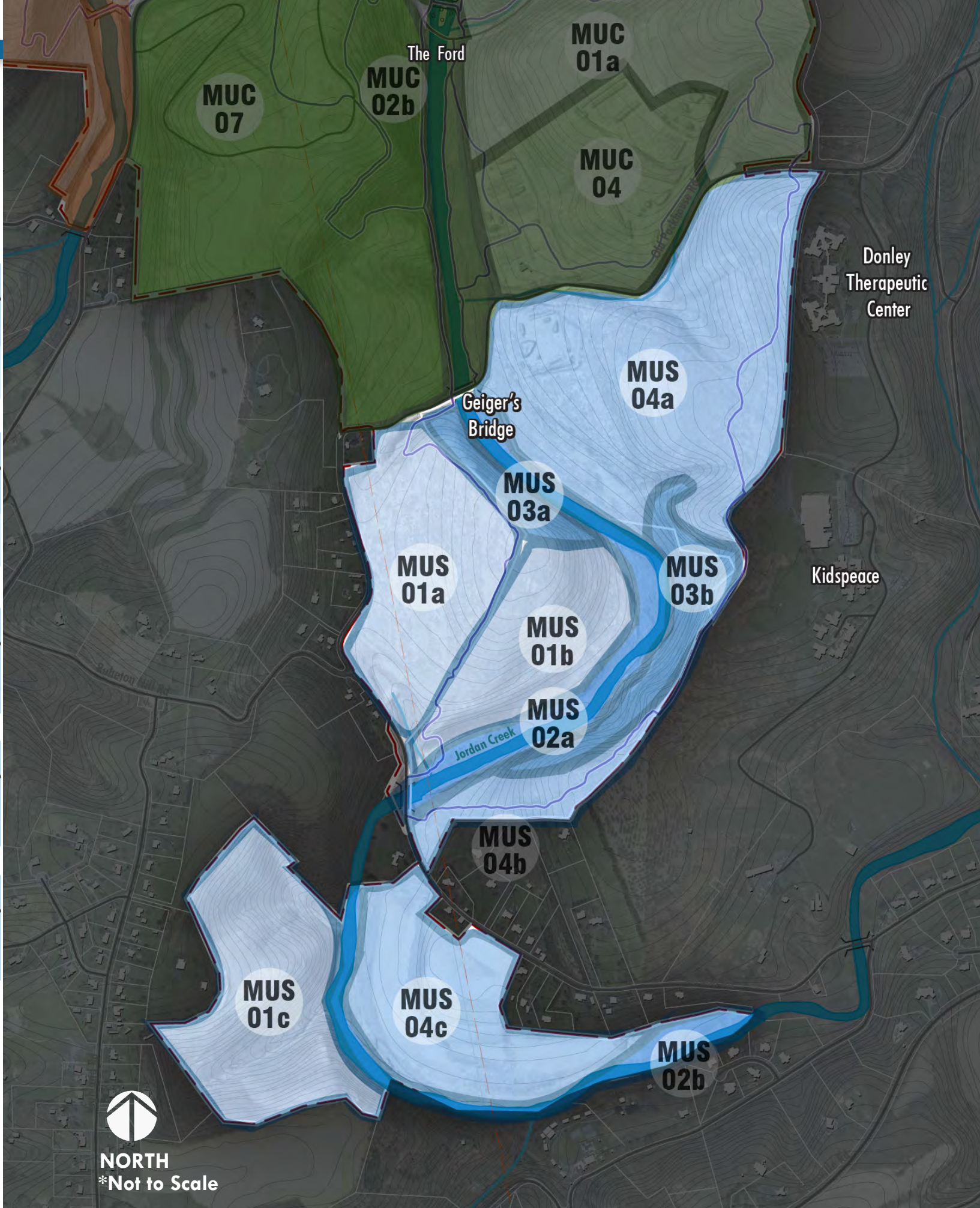
MUS  
04b

Key	Goal	Recommendation
S4b-E1	Conduct polygon-wide invasive species	Use methods proposed in above sections to systematically control invasives and promote native plant communities.

South Range East (Agricultural Outlier): 46 Acres

MUS  
04c

Key	Goal	Recommendation
S4c-E1	Install high quality meadow on either side of new trail	Install high quality meadow on either side of new trail; seed in and then plug hotspots along trail/viewsheds. Seed in then plug hotspots along trail/viewsheds.





RECOMMENDATIONS

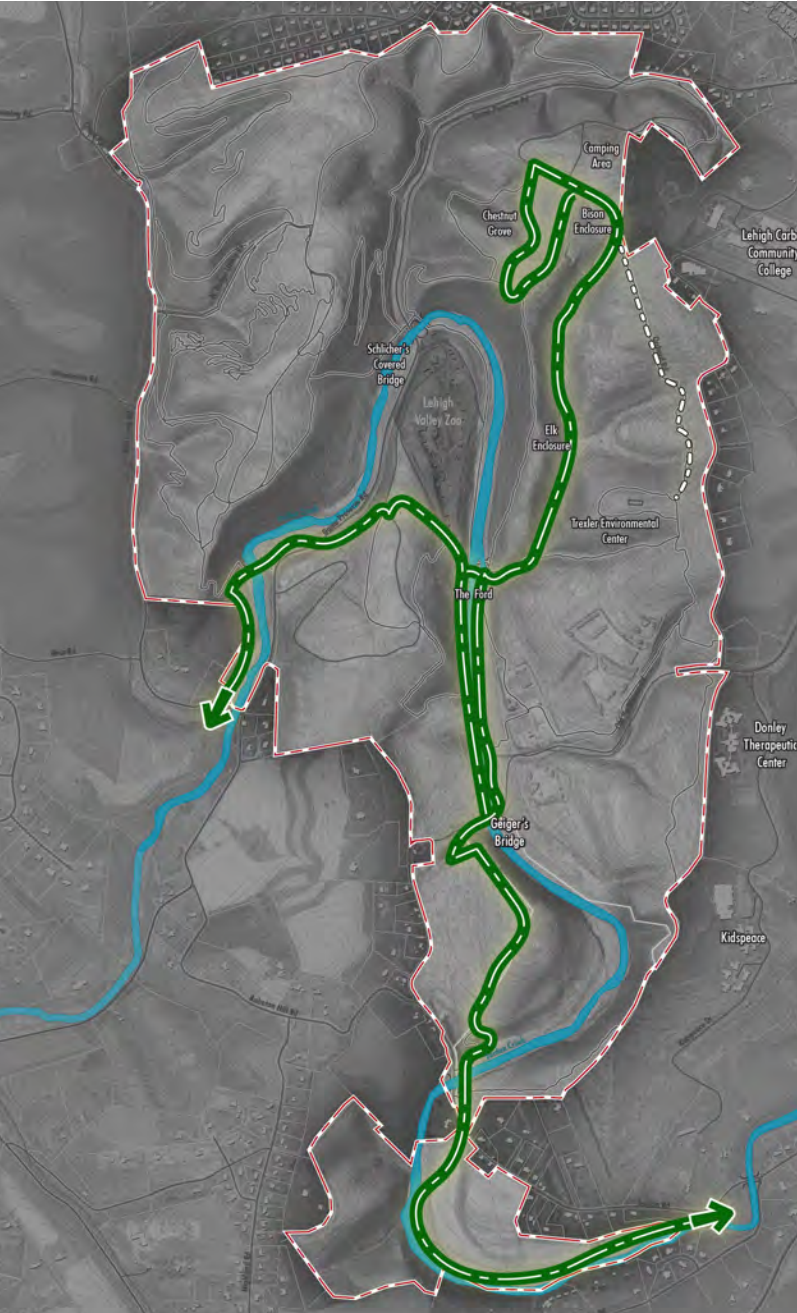
# SOUTH RANGE

South Range Trails

Easy Trail Difficulty   Medium Trail Difficulty   Difficult Trail Difficulty   Trails where suggested users are modified

Name	Blaze	Description	Existing Condition	DCNR Trail Rating	Target DCNR Trail Rating	Existing Suggested Use	Proposed Suggested Use	Distance (Miles)
Border Trail	▲	Multi-Use Perimeter Loop Trail	Single Track Portions; Steep Running Slopes	Most Difficult	More Difficult; Adjust Width Provide Resting Landings	Hike, Bike, Horse	Hike, Horse	8.75

Conceptual Jordan Greenway  
Connection via the South Range



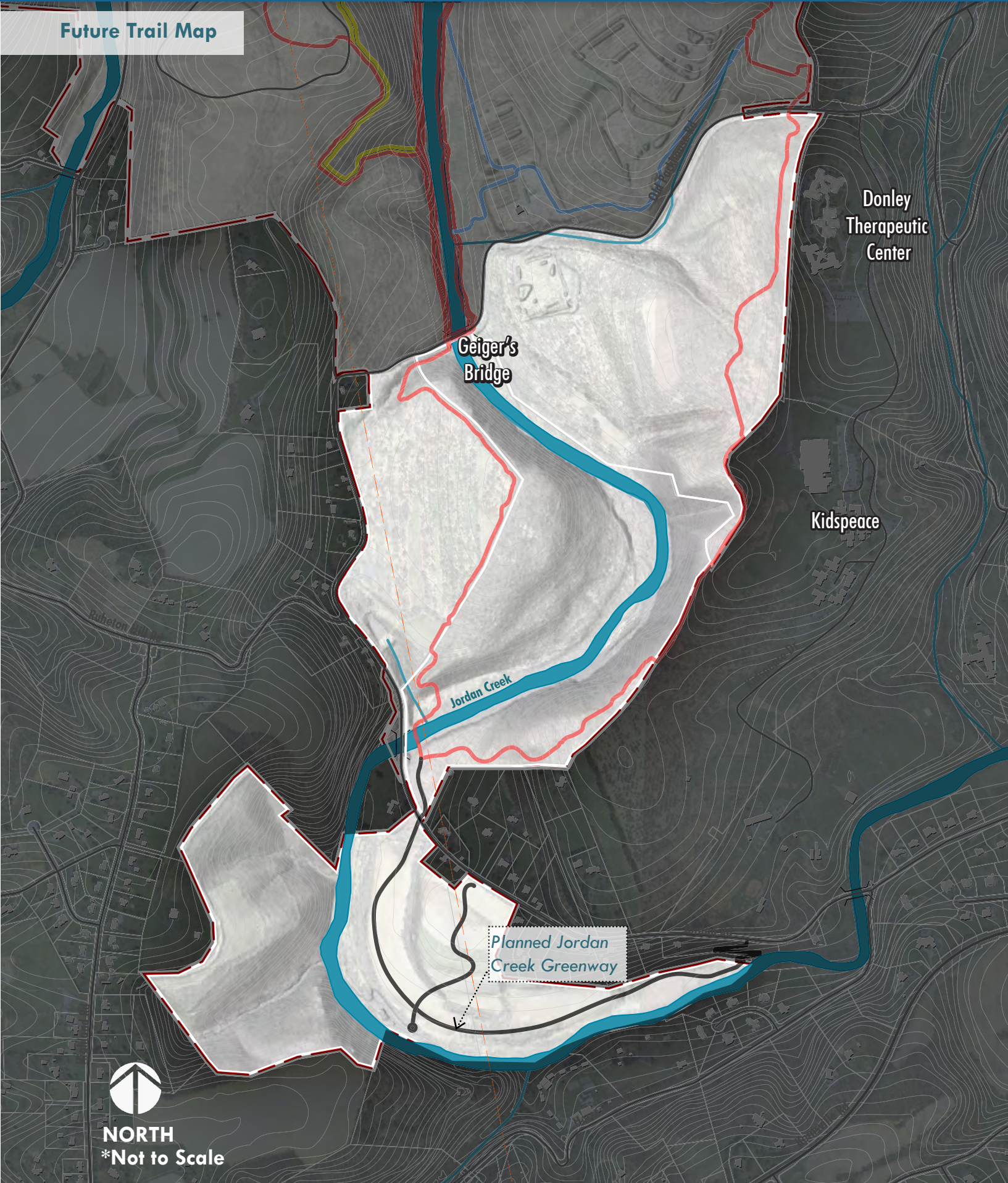
Update to Trail Difficulty & Suggested Users

Under current conditions, the only trail in the South Range is the Border Trail, which has a ‘most difficult’ rating. Through specific trail improvements noted over the following pages, it is recommended that the Border Trail shift from most difficult to medium difficulty.

Under current conditions the Border Trail does not conform to design standards for three user groups (cyclists, hikers, equine). This report recommends limiting this trail to hikers and equine users only, with the possibility of bike use in the future if specific trail improvements are made (i.e. trail widening, trail surface improvements, etc).

The South Range is the location where the Jordan Creek Greenway connects to the preserve from the east. Specific trail facilities are noted over the following pages, and the conceptual greenway route is depicted to the left.

Future Trail Map







South Range West (Agricultural): 45 Acres

	Key	Recommendation	Priority
MUS 01a	S1a-T1	Border Trail - Single Track in the area. Widen trail bed.	Low

South Range West (Forest): 33 Acres

	Key	Recommendation	Priority
MUS 01b	S1b-T1	Border Trail - Address steep cross slope reroute trail	Med

Jordan Creek and Floodplain: 26 Acres

	Key	Recommendation	Priority
MUS 02a	S2a-T1	Proposed ped. bridge over Jordan Creek	Med
	S2a-T2	Border Trail - Install Boardwalk to address seasonally wet area near Jordan Creek	High

South Range East (Agriculture): 97 Acres

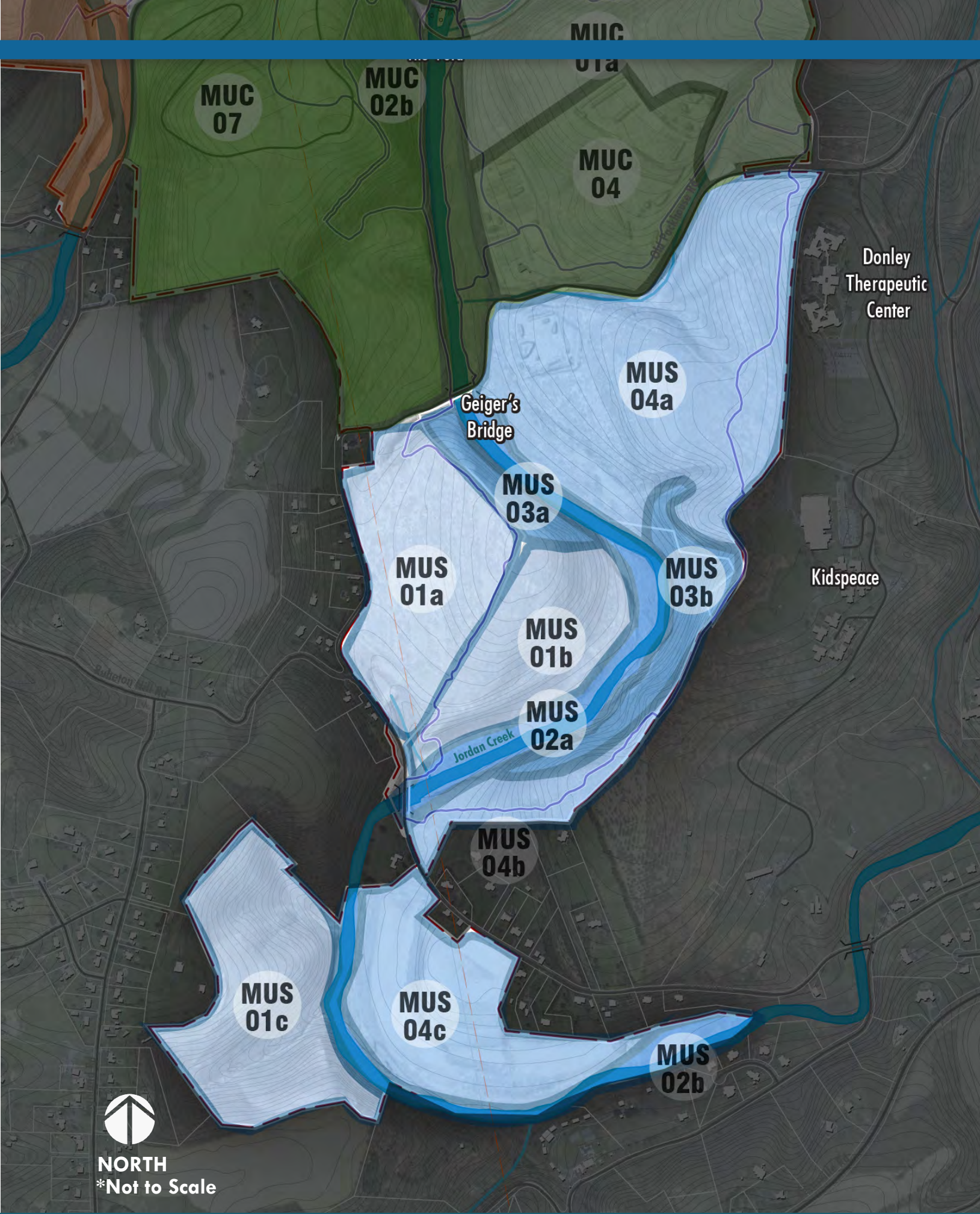
	Key	Recommendation	Priority
MUS 04a	S4a-T1	Border Trail - Widen trail bed and shoulder; Add rolling grade dips to address rutting from Old Packhouse Road to Kids Peace shared trail access	Low

South Range East (Forest): 15 Acres

	Key	Recommendation	Priority
MUS 04b	S4b-T1	Border Trail - Trail grade unsustainable reroute trail and restore old trail bed to address steep running slope and erosion	High

South Range East (Agricultural Outlier): 46 Acres

	Key	Recommendation	Priority
MUS 04c	S4c-T1	Jordan Creek Greenway Extension - 10' wide paved	Planned
	S4c-T2	Jordan Creek Greenway Extension - 10' boardwalk	Planned
	S4c-T3	Jordan Creek Road Crosswalks	Planned
	S4c-T4	Greenway Trailhead Connector Trail - 5' Native Surface	Med





RECOMMENDATIONS

# SOUTH RANGE

ECOLOGY

TRAILS

FACILITIES

SIGNAGE



Hemlock Ravine (Southwest): 8 Acres

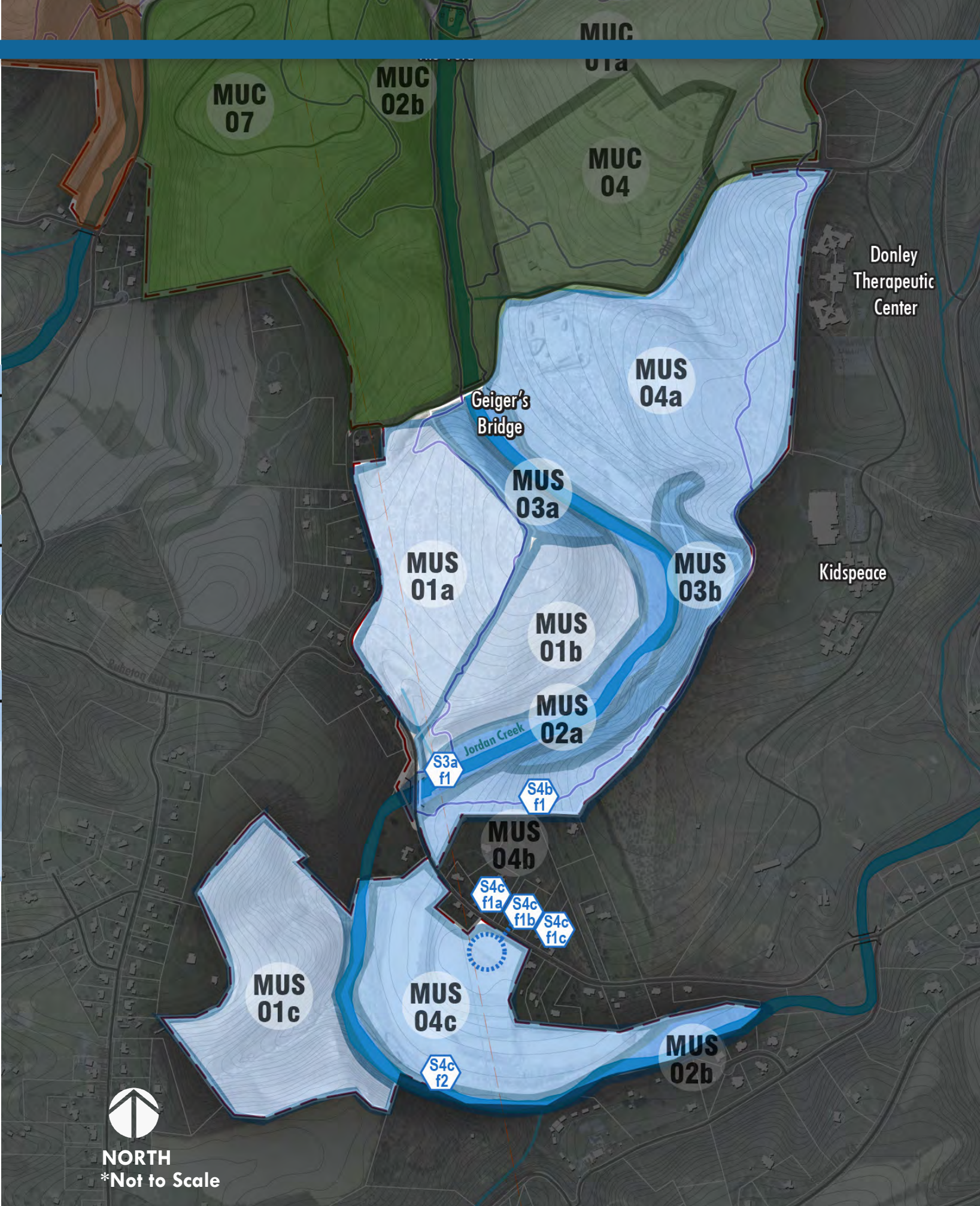
	Key	Recommendation	Priority
<b>MUS 03a</b>	S4b-F1	Border trail - Provide creek access observation platform	Med

South Range East (Forest): 15 Acres

	Key	Recommendation	Priority
<b>MUS 04b</b>	S4b-F1	Border Trail - Upgrade shelter	Low

South Range East (Agricultural Outlier): 46 Acres

	Key	Recommendation	Priority
<b>MUS 04c</b>	S4c-F1a	Jordan Creek Road - Provide asphalt driveway 18' width	Med
	S4c-F1b	Jordan Creek Road - Provide vehicular gate	Med
	S4c-F1c	Jordan Creek Road - Provide gravel trailhead parking (16 Spaces)	Med
	S4c-F2	Jordan Creek Greenway - Provide creek observation platform	Med





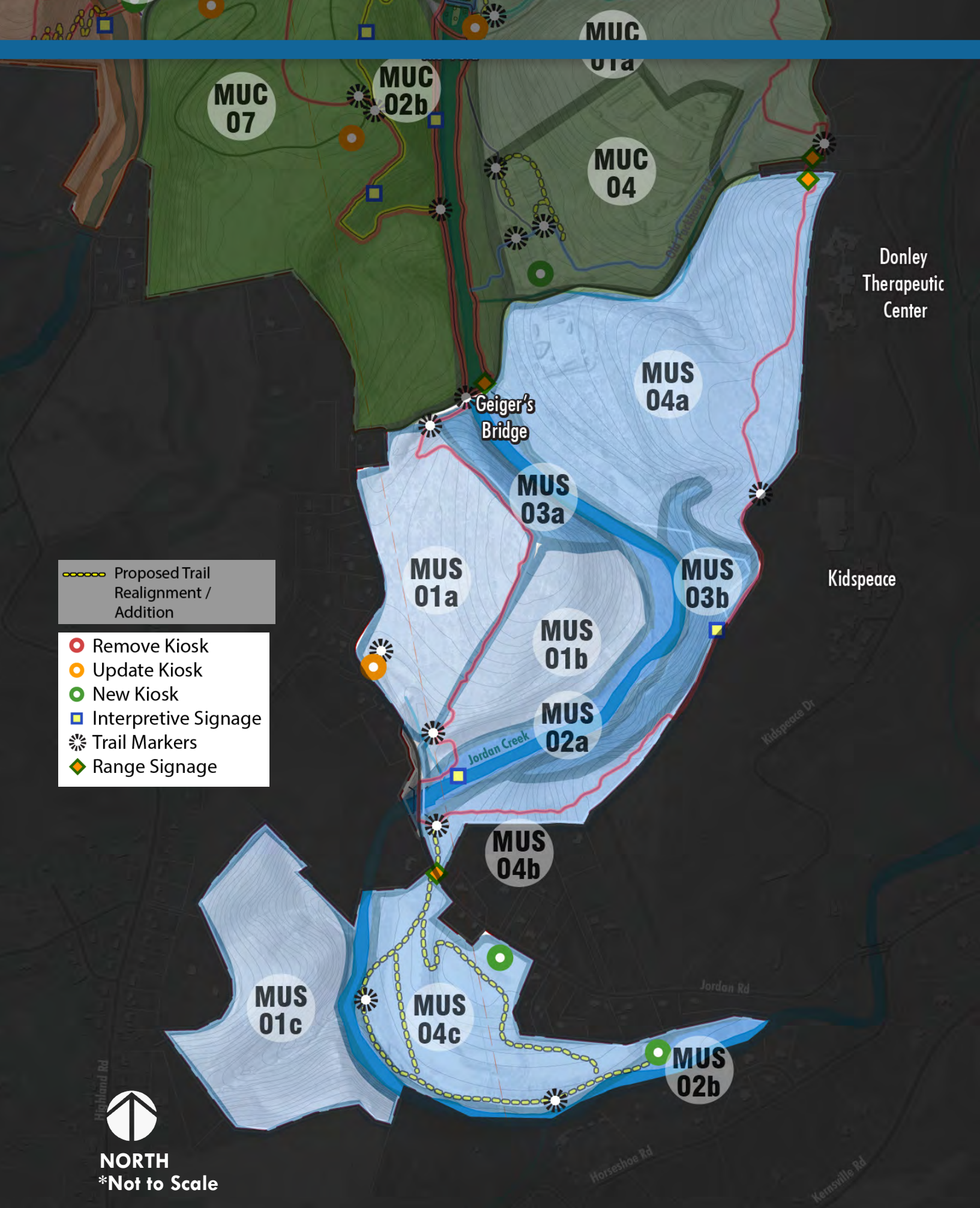
RECOMMENDATIONS  
SOUTH  
RANGE

Conceptual kiosk update with trail marker

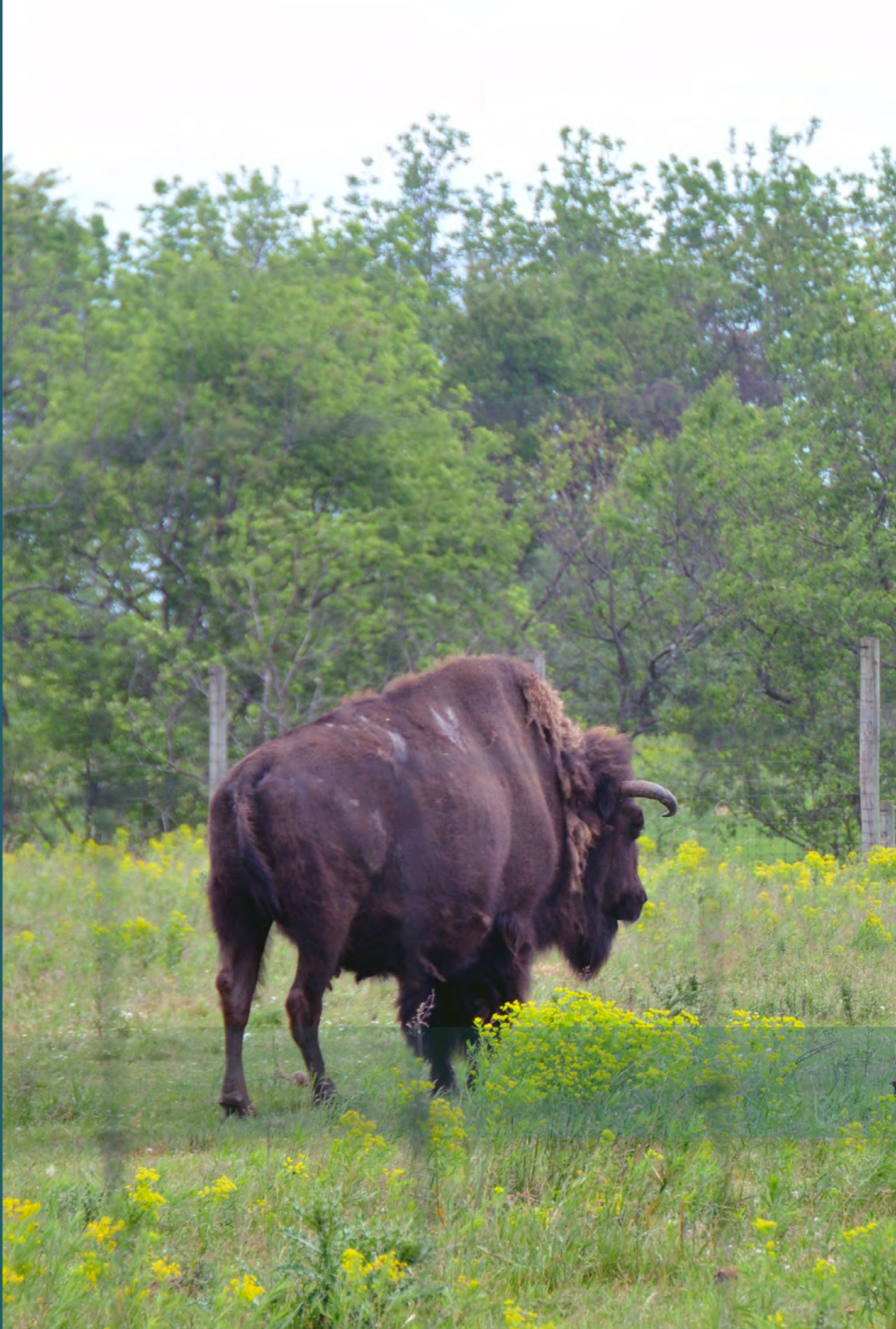


The consultant team critically reviewed all existing signage in the South Range to determine the signage and wayfinding recommendations indicated on the following page. These recommendations can be organized by the following potential improvements:

- Remove Kiosk
- Update Kiosk
- New Kiosk
- Interpretive Signage
- Trail Markers
- Range Signage











**Implementation**

**4**





# Probable Costs of Proposed Improvements

Cost estimates were prepared for all improvements proposed in the Trexler Nature Preserve 2020 Master Plan Update. Unit costs are based on previously completed PennDOT District 5 projects, data industry standards, estimates used for other similar preserve projects, and based on the consultant team’s experience.

The matrix below delineates probable cost totals, organized by range and improvement type (ecological stewardship, trails, facilities, signage).

The full cost estimate matrix is available in the appendix of this report.

TREXLER NATURE PRESERVE COST SUMMARY			
Range	Recommendation Type	Sub Total Cost	Total Range Cost
North	Stewardship	\$ 86,700.00	\$ 1,177,900
North	Trails	\$ 991,600.00	
North	Facilities	\$ 89,400.00	
North	Wayfinding	\$ 10,200.00	
Central	Stewardship	\$ 1,594,200.00	\$ 2,968,400
Central	Trails	\$ 347,000.00	
Central	Facilities	\$ 1,017,700.00	
Central	Wayfinding	\$ 9,500.00	
South	Stewardship	\$ 598,500.00	\$ 2,280,700
South	Trails	\$ 1,597,800.00	
South	Facilities	\$ 75,900.00	
South	Wayfinding	\$ 8,500.00	
Total Probable Cost of Development & Stewardship			\$ 6,430,000



# Stewardship Improvement Phasing

The matrix below organizes and prioritizes ecological stewardship Preserve recommendations made in chapter 3 over a conceptual 10-year time frame.

Full recommendation matrix and yearly stewardship cost totals are available in the Appendix of this report.

Year	North Range	Central Range	South Range	Total Cost
1	\$ 22,898	\$ 294,175	\$ 65,522	\$ 382,595
2	\$ 20,370	\$ 199,328	\$ 57,552	\$ 277,250
3	\$ 8,000	\$ 877,563	\$ 30,209	\$ 915,772
4	\$ 18,075	\$ 60,713	\$ 273,032	\$ 351,820
5	\$ 9,760	\$ 50,013	\$ 62,574	\$ 122,347
6	\$ 6,150	\$ 36,500	\$ 35,520	\$ 78,170
7	\$ 400	\$ 22,600	\$ 22,508	\$ 45,508
8	\$ 400	\$ 19,000	\$ 27,508	\$ 46,908
9	\$ 400	\$ 17,850	\$ 19,575	\$ 37,825
10	\$ 200	\$ 16,500	\$ 4,500	\$ 21,200
Totals	\$ 86,653	\$ 1,594,242	\$ 598,500	\$ 2,279,395

# Capital Improvement Project Phasing

The trail, facility, and signage recommendations noted in chapter three will not be completed all at once, and may fluctuate depending on preference of Lehigh County leadership as well as available grant funding.

The matrix below organizes and prioritizes Preserve recommendations within a conceptual 10-year time frame. Recommendations from all ranges are organized by priority level:

- Planned Improvement
  - High Priority
  - Medium Priority
  - Low Priority
- This matrix is intended to guide the County as it pursues funding and plans improvements for the Preserve over the next decade.

Priority	Year	Total Cost	Summary of Major Improvements
Planned	1	\$ 640,930	Jordan Creek Greenway through southern parcel
High	2	\$ 731,382	Old Packhouse Trail Head, Safety Improvements; Wayfinding Improvements; Elk Ridge Off road Trail
High	3	\$ 689,982	North Range Border Trail Realignments for Water Quality Improvements
High	4	\$ 267,658	North Range Border Trail Realignment & Jordan Creek Crossing Improvements / Connection to Central Range Trail Head
Medium	5	\$ 271,934	Game Preserve Road Trailhead; Ford area Trail Head Parking and Outdoor Classroom; Teardrop Trail Admenities
Medium	6	\$ 616,986	Jordan Creek Pedestrian Bridge
Medium	7	\$ 226,249	Fireman Trail Realignment & Improvements
Low	8	\$ 295,194	Old Packhouse Trail Head; Widen Border Trail in North and South Range; Grade Improvement along Border Trails
Low	9	\$ 112,211	Elk Run Trail Improvements; Jordan Creek Road Trail Head
Low	10	\$ 294,928	Tear Drop Trail Stone Dust Surface
Total Probable Cost of Development		\$ \$4,150,000	Estimated total over 10 years



# Design, Engineering & Permitting

## Chapter 105/106 General Permit

The construction of bridges, boardwalks, and restoration plantings will require a PaDEP chapter 105/106 general permit. To complete the permit application, the delineation of wetlands will be required. During the permit process it may be determined that a survey for bog turtle habitat be conducted and a follow up bog turtle survey could be required.

## NPDES Permits

Construction projects that involve the disturbance of more than one acre of earth will require a National Pollutant Discharge Elimination System (NPDES) permit. The permit is a federal requirement that is administered at the state level with the overall goal to improve water quality.

The permit plans are divided into two (2) parts. First, all project phases must comply with the stipulations of PA Code Chapter 102, Erosion and Sediment Control and are reviewed and approved by the local Conservation District. The Erosion & Sedimentation Pollution Control plans (ESPC) are to be implemented by the contractor throughout construction until the site is stabilized by permanent plant growth. A second part of the NPDES permitting process is proposed stormwater management areas. The Post Construction Stormwater Control Plans (PCSC) are designed to manage stormwater for the 2-year storm event with the goal of infiltrating it into the ground. BMP facilities are to be constructed during the project, recorded as part of the property deed, and maintained by the site owner for the life of the improvement.

In some cases, local conservation districts will waive NPDES requirements for trail projects that disturb slightly more than 1 acre of land. Conservation districts usually wish to review the project development plan, even if it will be constructed in phases. The master plan identifies general types and locations of BMP facilities that may be required to secure required permits.



# Maintenance Recommendations & Responsibilities

The County should develop and fund a formalized maintenance program based on information in this master plan as well as from other sources. To be successful in the long term, ecological recommendations will need to be properly funded as part of annual maintenance budgets. Management of the Preserve is based on the needs associated with re-establishing and enhancing habitat and providing safe public access to trails and facilities. Habitat management requires maintenance at key times during the year. As noted in detail in the ecological recommendation matrix, shrubland and reforestation areas will require periodic removal of invasive plant species. The regular review and maintenance of trails will maintain a safe user environment while identifying any necessary repairs. Periodic repairs will be necessary to maintain the quality of facilities at Trexler Nature Preserve.

The following is an outline of basic monthly maintenance tasks that should be completed. The frequency (by month) of these maintenance tasks is indicated in parentheses. It is assumed that snow removal is not part of the maintenance schedule, and can be added in the future if desired.



January
Inspect trails, bridges & culverts / make repairs (1)
February
Inspect trails, bridges & culverts / make repairs (1)
Signage inspection and repairs (1)
Inspect and mechanically remove invasive plants
March
Open restrooms (1)
Clean restroom Bi-weekly (2)
Inspect trails, bridges & culverts / make repairs (1)
First mowing of trails shoulders (1) Inspect trail conditions
Inspect site trees for winter damage / perform work (1)
Inspect and mechanically remove invasive plants
Inspect BMPs and remove debris as required (1)
April
Clean restrooms twice weekly (8)
First mowing of trails shoulders (1) visually inspect trails
Plant / replant (re-vegetate target areas) (1)
Inspect trails, bridges, and culverts / make repairs weekly (4)
May
Clean restrooms twice weekly (8)
Mow trails shoulders bi-weekly (2) visually inspect trails
Inspect trails, bridges, and culverts / make repairs weekly (4)
June
Clean restrooms twice weekly (8)
Mow trails shoulders bi-weekly (2) visually inspect trails
Inspect trails, bridges, and culverts / make repairs weekly (4)



July
Clean restroom twice weekly (8)
Mow trails shoulders bi-weekly (2) visually inspect trails
Inspect trails, bridges, and culverts / make repairs weekly (4)
Inspect meadows for invasive plants – Mow ½ of meadow if required (1)
August
Clean restrooms twice weekly (8)
Mow trails shoulders bi-weekly (2) visually inspect trails
Inspect trails, bridges, and culverts / make repairs weekly (4)
September
Clean restrooms weekly (4)
Mow trails shoulders (1) visually inspect trails
Signage inspection (1)
Inspect trails, bridges, and culverts / make repairs weekly (4)
October
Clean restroom weekly (2)
Mow trails shoulders (1) visually inspect trails
Inspect trails, bridges, and culverts / make repairs weekly (4)
Inspect BMPs and remove debris as required (1)
November
Winterize restrooms Mid-Month (1)
Inspect trees / prune as required (1)
Inspect trails, bridges, and culverts / make repairs biweekly (2)
December
Inspect trails, bridges, and culverts / make repairs biweekly (2)





## Funding Sources

The following is a summary of grants, programs, funds, and other potential partnerships/sources that can assist with the funding of Trexler Nature Preserve improvements. Various sources can be pursued during Preserve improvement phases, based on availability of funds aligning goals of partner agencies, and County priorities for each year.

### Pennsylvania Department of Conservation & Natural Resources (PA DCNR)

#### Community Conservation Partnership Program (C2P2)

The Community Recreation and Conservation Program through the PA DCNR Community Conservation Partnership Program (C2P2) provides funding to municipalities and authorized nonprofit organizations for recreation, park, trail, and conservation projects. These include planning for feasibility studies, trail studies, conservation plans, master site development plans, and comprehensive recreation park and open space and greenway plans. In addition to planning efforts, the program provides funding for land acquisition for active or passive parks, trails and conservation purposes, and construction and rehabilitation of parks, trails, and recreation facilities. Most of these projects require a 50% match, which can include a combination of cash and/or non-cash values. Following completion of a park master plan, an implementation or construction grant is the next stage grant from DCNR. Grant applications for the C2P2 program are accepted annually—usually in April.

More information can be found at: <http://www.dcnr.state.pa.us/brc/grants/grantpolicies/index.htm>

POTENTIAL STATE / FEDERAL FUNDING PROGRAMS & PARTNERS	PROJECT & ACTION TOPICS																	
	Recreation Planning	Conservation Planning	Feasibility Studies *	Scientific Research Planning**	_Trail Building or Re routing	Signage (wayfaring, interpretive)	Park Amenities (trash receptacles, benches, etc.)	Stream and Riparian Restoration	Stormwater Management (green infrastructure, etc.)	Erosion Control (w/ primary element	Invasive Plant Control	Habitat Enhancement t or Restoration	Short or Long term Vegetative Management	Deer Exclusion Fencing	Monitoring	Faunal Surveys	Scientific Research**	Environmenta l Education
C2P2: Community Recreation and Conservation Planning	○	○	○		○													
C2P2: Park / Trail Rehabilitation / Development					○	○	○	○	○	○		○		○				
C2P2: Motorized and Non motorized Trail Development (flow thru Federal)					○	○				○								
C2P2: Peer / Circuit Rider Management	○	○																○
C2P2: Rivers Conservation - Planning	○	○	○															
C2P2: Rivers Conservation - Development					○	○		○	○			○						
C2P2: DCNR Riparian Forest Buffers - Development					○			○		○	○	○	○	○	○			
DCNR: Land & Water Conservation Fund (LWCF) (flow thru Federal) - Development			○		○	○	○	○	○	○		○						
DCNR: WRCP														○	○	○	○	○
DCED: GTRP - Development	○				○	○	○	○	○	○	○	○						
DEP: Environmental Education Grants															○			○
PENNVEST: CWSRLF			○		○			○	○	○		○						
PFBC: SWG Grants				○								○			○	○	○	
NUCFAC (USDA US Forest Service)				○										○	○	○	○	
NOAA: SeaGrant Pennsylvania				○												○	○	
NFWF: Delaware River Restoration Fund								○	○	○		○		○	○			○
NFWF: 5 Star and Urban Waters Restoration								○	○	○	○	○						○
SFI Conservation Grants				○								○		○	○	○	○	○
OSI: Delaware River Watershed Fund								○										

ABBREVIATIONS	
DCNR	Department of Conservation and Natural Resources
C2P2	Community Conservation Partnership Program
WRCP	Wild Resource Conservation Program
DCED	Department of Commerce and Economic
GTRP	Greenways, Trails and Recreation Program
DEP	Department of Environmental Protection
PENNVEST	Pennsylvania Infrastructure Investment Authority
CWSRLF	Clean Water State Revolving Loan Fund
PFBC	Pennsylvania Fish and Boat Commission
SWG	State Wildlife Grant
NUCFAC	National Urban and Community Forestry Advisory
NOAA	National Ocean and Atmospheric Administration
SFI	Sustainable Forestry Initiative
OSI	Open Space Institute
NFWF	National Fish and Wildlife Foundation

\* e.g., dam and culvert removals, severe erosionproblems

\*\*e.g., carbon sequestration, water quality, biodiversity, impacts of Jordan Creek on Delaware River Watershed

\*\*\* Volunteer labor (e.g., student labor, professional supervision of students) might be eligible as in-kind contributions

State Federal Non-Profit

#### Land and Water Conservation Fund (LWCF)

The Land and Water Conservation Fund (LWCF) State Assistance Program, established in 1965, is a federal source of funding distributed to all states by the U.S. Department of the Interior’s National Park Service.

The program provides matching grants for the acquisition and development of public outdoor recreation areas and facilities. DCNR administers the LWCF Program for Pennsylvania.

More info at: <https://www.dcnr.pa.gov/Communities/Grants/Pages/default.aspx>

#### Wild Resources Conservation Program

Each year, these funds support the survey, research, management, and conservation of wild resources through DCNR’s Wild Resource Conservation Program (WRCP).

WRCP identifies research and conservation needs on the Commonwealth’s native flora and non-game wildlife. The program provides grants and facilitates the flow of information between researchers, conservationists, and educators.

More info at: <https://www.dcnr.pa.gov/Conservation/Biodiversity/WildResourceConservationProgram/Pages/default.aspx#:~:text=Wild%20Resources%20Conservation%20Program%20The%20Wild%20Resources%20Conservation,conservation%20of%20the%20commonwealth%E2%80%99s%20flora%20and%20non-game%20fauna.>



*DCNR Forest Buffer Program*

The Riparian Forest Buffer Program through PA DCNR provides funding for organizations implementing a variety of forest buffers including conventional riparian forest buffers and multi-functional buffers. Pennsylvania has a goal of planting 95,000 acres of riparian buffers by 2025 to improve state waterways and the Chesapeake Bay. There is no match required to be eligible for this grant. Grant applications are usually accepted October to late December.

DCNR has provided funding to County Conservation Offices. Grants awards are made by the local conservation office for the planting of multi-functional buffers.

More information is available on the PA DCNR website: <https://www.dcnr.pa.gov/Conservation/Water/RiparianBuffers/Pages/default.aspx>

**Pennsylvania Department of Community and Economic Development (PA DCED)**

*Commonwealth Financing Agency (CFA) - Greenways, Trails and Recreation Program (GTRP)*

The Greenways, Trails, and Recreation Program (GTRP) provides funding for: public park and recreation area projects, greenway and trail projects, and river or creek conservation projects. The program requires a 15% local cash match of the total project cost and DCED share must not exceed \$250,000. Applications are typically due in June.

More information can be found at: <https://dced.pa.gov/programs/greenways-trails-and-recreation-program-grtp/>

**Pennsylvania Department of Environmental Protection (DEP)**

*DEP Growing Greener Watershed Protection Program*

Funded through the state Growing Greener Environment Stewardship Funds, applications should be targeted toward clean-up of non-point source pollution. The grant will fund local watershed-based conservation projects with the average award totaling \$150,000 and requires a 15% match from a non-DEP fund source. Applications are typically due in January.

More information on this program can be found at the DEP website: <http://www.dep.pa.gov/Citizens/GrantsLoansRebates/Growing-Greener/Pages/default.aspx>

*DEP Non-Point Source Implementation Programs Grant*

Provides funding assistance for projects aimed at implementing Pennsylvania's Non-point Source Management Program. Targeted projects include control of urban runoff, and natural channel design/stream bank stabilization projects. The grant will fund local projects with the average award being \$200,000. Applications are typically due in July.

More information on this program can be found at the DEP website: <http://www.dep.pa.gov/Business/Water/PlanningConservation/NonpointSource/Pages/default.aspx>

**PennVEST (Pennsylvania Infrastructure Investment Authority)**

PennVEST offers both grants and low interest loans for projects that help to manage stormwater and improve water quality. Several recommendations for Trexler Preserve may attract PennVEST funds, since they include stormwater BMPs.

More information can be found at: <https://www.pennvest.pa.gov/Information/Funding-Programs/Pages/default.aspx>

*Clean Water State Revolving Fund (CWSRF)*

The PENNVEST Clean Water State Revolving Fund (CWSRF) provides affordable financing for wastewater and certain other projects throughout Pennsylvania for the construction, improvement, extension, expansion, repair or rehabilitation of wastewater collection, treatment or disposal facilities, storm water management, nonpoint source pollution controls including but not limited to agricultural best management practices and watershed and estuary management.

The program offers low interest loans with flexible terms and principal forgiveness funds where applicable and available.

PENNVEST performs similarly to a bank for the CWSRF program in Pennsylvania and manages the financial aspects of the fund, while the Department of Environmental Protection is the technical arm for the program. The seed money for the CWSRF has been distributed to states annually under Congressional authorization pursuant to the Clean Water Act of 1987. The funds and the program are administered nationally by United States Environmental Protection Agency (EPA).

More info at: <https://www.pennvest.pa.gov/Information/Funding-Programs/Pages/Clean-Water-State-Revolving-Fund.aspx>

**Pennsylvania Fish & Boat Commission (PFBC)**

*State Wildlife Grants Program (SWGP)*

Created in 2000 by Congress, SWG has enabled the Pennsylvania Fish & Boat Commission and Pennsylvania Game Commission to direct conservation efforts toward species in decline or vulnerable to decline, with the goal of preventing endangered species listings. State Wildlife Grant funding to Pennsylvania has ranged from \$1.5 to \$2.5 million per year, shared equally between the Fish & Boat Commission and Game Commission.

The State Wildlife Grants program (SWG) is the nation's core program for preventing species from becoming endangered. This program provides needed funds to states to develop and implement conservation actions identified in their State Wildlife Action Plan. These funds benefit wildlife and their habitat, including species not hunted or fished.

Since 2001, the Pennsylvania Fish & Commission has supported more than 60 fish, amphibian, reptile, and freshwater invertebrate conservation projects through State Wildlife Grant funding, including research, species surveys, habitat improvement, and other efforts.

More info at <https://www.fishandboat.com/Resource/StateWildlifeGrantProgram/Pages/default.aspx>



**U.S. Forest Service**

*National Urban and Community Forestry Advisory Council*

The National Urban and Community Forestry Advisory Council (NUCFAC) is a Congressionally designated advisory council to the Secretary of Agriculture on urban forestry and related issues. The 1990 Farm Bill created NUCFAC to bring together the wide variety of voices raised about a common concern: the present health and future preservation of America's urban forests. NUCFAC was founded to synthesize the full spectrum of views into a consistent vision, as a foundation for practical policy on urban forestry and related natural resources.

NUCFAC evaluates innovative grant proposals that help to implement the Ten-Year Action Plan and recommends them for funding to the Secretary of Agriculture.'

More info at: <https://www.fs.usda.gov/managing-land/urban-forests/ucf/nucfac>

**National Oceanic and Atmospheric Administration (NOAA)**

*Pennsylvania Sea Grant*

Sea Grant is a Federal-University partnership program that brings science together with communities for solutions that work.

The National Sea Grant College program was established by the U.S. Congress in 1966 and works to create and maintain a healthy coastal environment and economy. The Sea Grant network consists of a federal/university partnership between the National Oceanic and Atmospheric Administration (NOAA) and 34 university-based programs in every coastal and Great Lakes state, Puerto Rico, and Guam. The network draws on the expertise of more than 3,000 scientists, engineers, public outreach experts, educators and students to help citizens better understand, conserve and utilize America's coastal resources.



More info at: <https://seagrant.noaa.gov/Program-Locations/PA>

### National Fish and Wildlife Foundation

NFWF supports conservation efforts in all 50 states and U.S. territories. More than 18,600 projects have been supported since founding – are rigorously evaluated and awarded to some of the nation’s largest environmental organizations. Financial commitments since the organization’s founding total \$6.1 billion.

#### *Delaware River Restoration Fund*

The Delaware River Restoration Fund (DRRF) is dedicated to improving the water quality and accelerating restoration of habitats of the Delaware River and its tributaries. The fund was launched in late 2013 to help community-based nonprofits, municipalities and landowners efficiently work together to clean up and restore polluted waters and improve habitat in strategic geographies within the Delaware Watershed.

The DRRF awards approximately \$2 million per year in competitive grants for three priority strategies: stewardship of working lands and delivery of agriculture conservation practices; restoration of wetlands, floodplains and stream corridors; and promoting adoption of green infrastructure in urban/suburban landscapes. The fund also commits a subset of resources to grants that propose innovative conservation approaches. In six years, the fund has invested a total of \$14.7 million in 90 projects, leveraging more than \$23.36 million in conservation resources.

More info at: <https://www.nfwf.org/programs/delaware-river-program>

#### *The Five Star and Urban Waters Restoration Program*

The Five Star and Urban Waters Restoration Program focuses on the stewardship and restoration of coastal, wetland and riparian ecosystems across the country. Its goal is to meet the conservation needs of important species and habitats, providing measurable and meaningful conservation and educational outcomes. The program requires the establishment and/or enhancement of diverse partnerships and an education/outreach component that will help shape and sustain behavior to achieve conservation goals.

To date, the Foundation has funded over 800 projects in 50 states, including the District of Columbia, Puerto Rico, and the U.S. Virgin Islands, through this program. More than \$18 million in grants has leveraged more than \$67 million in other funds or donated services.



More info at: <https://www.nfwf.org/programs/five-star-and-urban-waters-restoration-grant-program>

### Sustainable Forestry Initiative (SFI)

The Sustainable Forestry Initiative (SFI) is a North American ‘forest certification standard’ a non-profit organization. The Sustainable Forestry Initiative is the world’s largest single forest certification standard by area and is headquartered in Ottawa, Ontario Canada and Washington D.C. USA.

SFI works with the forest sector, brand owners, conservation groups, resource professionals, landowners, educators, local communities, Indigenous Peoples, governments and universities. SFI standards and on-product labels help consumers make responsible purchasing decisions.

#### *Conservation Grants Program*

The SFI Conservation Grants Program fosters partnerships between organizations interested in improving forest management in the United States and Canada, and responsible procurement globally. Projects address topics of current importance such as improving wildlife habitat management and conservation of biodiversity, avoiding controversial sources of fiber such as those resulting from illegal logging.

Since 2010, SFI has awarded 64 grants totaling more than \$4.4 million to foster research and pilot efforts to better inform future decisions about our forests. When leveraged with project partner contributions, total investment exceeds \$11 million.

The grant program builds on the fact that SFI is the only forest certification standard in North America that requires participants to support and engage in research activities to improve forest health, productivity and sustainable management of forest resources, and the environmental benefits and performance of forest products. Since 1995, SFI program participants have invested more than \$1.6 billion in forest research activities.

<https://old.sfiprogram.org/conservationgrants/>


### Open Space Institute (OSI)

Established in 1964, the OSI seeks to preserve scenic, natural and historic landscapes for public enjoyment, conserve habitats while sustaining community character, and help protect the environment. OSI uses policy initiatives and ground-level activism to help accomplish its goals.

#### *Delaware River Watershed Protection Fund*

Launched in 2014, the Delaware River Watershed Protection Fund seeks to ensure abundant, clean water through support





of land protection and improved land use planning, as part of the broader Delaware River Watershed Initiative, a coordinated effort involving 65 organizations working together to protect and restore clean water in the Delaware River watershed. The Initiative, generously supported by the William Penn Foundation and now entering a second phase, supports land protection, restoration and water quality monitoring in eight regions of the watershed. The William Penn Foundation has also commissioned an assessment of the contribution of capital investments in protection and restoration to ensure water quality.

The Fund also makes short-term, low-interest loans to bridge gaps in public or private funding for land protection projects.

The Delaware River Watershed Protection Fund now has \$11 million available to support land acquisition; not more than \$2.2 million will be allocated for Farm Buffer Grants.

More info at: <https://www.openspaceinstitute.org/funds/delaware-river-watershed-fund>

### Harry C. Trexler Trust

General Trexler died in 1933 leaving a residuary estate of approximately ten million dollars. His will directed that it should be held upon a perpetual trust, the income from which would benefit his wife during her lifetime and the citizens of Lehigh County, Pennsylvania after her death. Mary Trexler's will complemented that of her husband. Her estate was merged with his upon her death in 1934, bringing the corpus of the Trust to nearly twelve million dollars.

At present, the value of the Trust's assets is over \$120 million dollars. During the more than 85 years of its operation, the Trust has aided the work of Lehigh County charities by providing them with nearly \$165 million in funding, including more than \$51 million to the City of Allentown for the "improvements, extension and maintenance of all its parks." General and Mrs. Trexler's generosity toward the citizens of Allentown and Lehigh County continues through this Trust.

### Legislative Funding

State and federal elected officials can sometimes include items into legislation for worthy projects in their districts. A conversation between county and municipal officials and legislators is the way to begin this process. This type of funding should be targeted toward capital improvement projects.

### Private Foundations

There may be regional corporations and foundations that support public works such as park development.

Competition for these funds is usually brisk, but opportunities should be researched. Funding is often to non-profit organizations.

Foundations and institutions represent another potential source of funding for education-related site improvements and programming. Grants are available to support student field trips, provide teacher training in science, and provide other educational opportunities. Education tied to research can increase the pool of potential funds. The science community and research institutions are the logical starting points for solicitation foundation funds.

### Schools and Local Organizations

Local schools and local organizations may also be of assistance in several ways. Local scout groups and mountain bike community are two such examples. These groups might get involved with club, fundraising events, and park cleanup days. The school faculty might incorporate the Park, especially the proposed environmental education areas and nature trails, into various curricula with students helping to develop and volunteer time to maintain the Preserve as part of a classroom assignment or after school club. While the amount of funds raised may be relatively small, this process builds constituents and support that is critical to the long-term success of the Preserve.

### Friends of Trexler Preserve Nonprofit

Similar to participation by school groups, the establishment of a non-profit (501(C)3) Friends-of-the-Preserve group can help raise grass roots funding for the park and be a conduit for tax-deductible donations and foundation funding.

The Friends group can assist in setting a policy for staff to set program fees, sponsorship opportunities and costs, and all other policies necessary for the successful administration of a County Preserve. The Friends can serve as additional eyes and ears for the park, providing necessary feedback to the administration and maintenance staff.

For more detailed guidelines for establishing a (501(C)3) non-profit charitable organization in Pennsylvania: <https://pano.org/starting-a-nonprofit-organization-in-pennsylvania/>

### Donation Opportunities

It is recommended that the County create a list, with prices, of physical donation opportunities for the park consistent with the plan. Rather than having physical markers in the park noting the donation (which can become cumbersome over time) a list of donors might be prominently displayed on the County Parks website or a funders' donation wall at a central location.







# Appendix

# 5

## Contents

Trexler Nature Preserve Improvement Matrix & Cost Estimates

Trexler Ecological Assessment - Applied Ecological Services

Meeting Minutes

Press Releases

Public Opinion Survey Results

2006 Trexler Nature Preserve Master Plan



TREXLER NATURE PRESERVE COST SUMMARY			
Range	Recommendation Type	Sub Total Cost	Total Range Cost
North	Stewardship	\$ 86,700.00	\$ 1,177,900
North	Trails	\$ 991,600.00	
North	Facilities	\$ 89,400.00	
North	Wayfinding	\$ 10,200.00	
Central	Stewardship	\$ 1,594,200.00	\$ 2,968,400
Central	Trails	\$ 347,000.00	
Central	Facilities	\$ 1,017,700.00	
Central	Wayfinding	\$ 9,500.00	
South	Stewardship	\$ 598,500.00	\$ 2,280,700
South	Trails	\$ 1,597,800.00	
South	Facilities	\$ 75,900.00	
South	Wayfinding	\$ 8,500.00	
Total Probable Cost of Development & Stewardship			\$ 6,430,000



TREXLER NATURE PRESERVE STEWARDSHIP SUMMARY				
Year	North Range	Central Range	South Range	Total Cost
<b>1</b>	\$ 22,898	\$ 294,175	\$ 65,522	\$ 382,595
<b>2</b>	\$ 20,370	\$ 199,328	\$ 57,552	\$ 277,250
<b>3</b>	\$ 8,000	\$ 877,563	\$ 30,209	\$ 915,772
<b>4</b>	\$ 18,075	\$ 60,713	\$ 273,032	\$ 351,820
<b>5</b>	\$ 9,760	\$ 50,013	\$ 62,574	\$ 122,347
<b>6</b>	\$ 6,150	\$ 36,500	\$ 35,520	\$ 78,170
<b>7</b>	\$ 400	\$ 22,600	\$ 22,508	\$ 45,508
<b>8</b>	\$ 400	\$ 19,000	\$ 27,508	\$ 46,908
<b>9</b>	\$ 400	\$ 17,850	\$ 19,575	\$ 37,825
<b>10</b>	\$ 200	\$ 16,500	\$ 4,500	\$ 21,200
Totals	\$ 86,653	\$ 1,594,242	\$ 598,500	\$ 2,279,395



NORTH RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-Term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUN01	The North Flats (122 Acres)	N1-E1	Maintain Upland Meadow Habitat	Conduct prescribed burns in years 1,3,5,7,and 10. Develop burn plan with sub-units to cascade burns over site on alternating years (some areas burned each year)	2	Pennsylvania Game Commission managing this area	1,3,5,7, & 10	Currently supported by Pennsylvania Game Commission
		N1-E2	Maintain Upland Meadow Habitat	Winter brush all non-native woody plants in MU. Immediately follow-up with a stump treatment of herbicide and bark-penetrating oil (saturated sponge on spray applicator). Control native woodies as well to keep open meadow structure (can consider salvaging volunteer native trees and shrubs for use on other parts of the site)	1	Pennsylvania Game Commission managing this area	1,2,3,4,& 5	Currently supported by Pennsylvania Game Commission
		N1-E3	Maintain Upland Meadow Habitat	Spot spray invasive herbaceous and graminoid plant species with a back-pack applicator (diluted glyphosate with surfactant)	1	Pennsylvania Game Commission managing this area	1,2,3,4,& 5	Currently supported by Pennsylvania Game Commission
		N1-E4	Maintain Upland Meadow Habitat	Hand-distribute native seed mix (spring or fall) in bare areas, especially locations where monocultures of invasive species have been removed/killed. Apply seed one week after last herbicide application. Throw straw mulch in larger areas that have been reseeded	2	Pennsylvania Game Commission managing this area	1,2,3,&4	Currently supported by Pennsylvania Game Commission
		N1-E5	Promote Optimal American Kestrel Foraging Habitat	Ensure seed mixes/plant establishment provided wildflowers and grasses that support a robust native insect community. Primary prey include grasshoppers and dragonflies, the latter of which requires a robust primary consumer insect diversity (therefore need nectar sources and host plants concurrently)	2	Pennsylvania Game Commission (PGC) managing this area	concurrent with above	Currently supported by Pennsylvania Game Commission
MUN02	Jordan Creek and Floodplain (24 Acres)	N2-E1	Control Invasive Plants	Cut Japanese knotweed (using brush saws) in May. Revisit and spray with herbicide post breeding bird season (July). Plant native riparian plants, especially live stakes (dogwoods, winterberry, black willow, viburnum species, etc.) And hand-distribute native, shade-tolerant wet-mesic seed mix. Revisit each April-May to spot treat resprouts and/or hand-pull.	2	mow then spray then over seed and plant with shrubs	through	see matrix codes
		N2-E2	Control Invasives Plants	Cut non-native shrubs (using brush saws) in winter months. Immediately apply herbicide with a bark penetrating oil via saturated sponge on backpack spray applicator. Revisit and spray any resprouts with herbicide in April/May. Plant native riparian plants, especially live stakes (dogwoods, winterberry, black willow, viburnum species, etc.) And hand-distribute native, shade-tolerant wet-mesic seed mix. Revisit each April-May to spot treat resprouts and/or hand-pull.	1	assumes 4 acres invasive woodies = 5,824 initial stump treat, hand seed wet mesic (2 ac) = 3700, 1000 live stakes = 3,700, maint = 1200/yr	1,2,3, & 4	see matrix codes
		N2-E3	Establish Stormwater BMPs Where Possible	All tributaries and stormwater runoff feeds (especially coming from the adjacent road) should have surface capture wetlands to slow and filter stormwater before entering Jordan Creek	3	low-tech fixes and mostly can be completed following olive eradication	1 thru 6	
		N2-E4	Increase Riparian Buffer Habitat	Convert toe of slope in MUN03 and transition to this MU to native woodland habitat by eradicating autumn olive, other invasive shrubs, stilt grass, and invasive vines following methods described above.	2	assumes 4 acres invasive woodies = 5,824 initial stump treat, hand seed mesic mix 4,250, stabilize slope with added shrubs/trees (200 = 3360), 800 first 2 years maint, 400 after	4 thru 10	see matrix codes



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
										\$ -
										\$ -
										\$ -
										\$ -
										\$ -
\$ 8,824	\$ 1,200	\$ 1,200	\$ 1,200							\$ 12,424
\$ 8,824	\$ 1,200	\$ 1,200	\$ 1,200							\$ 12,424
\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000					\$ 30,000
			\$ 10,075	\$ 4,160	\$ 800	\$ 400	\$ 400	\$ 400	\$ 200	\$ 16,435



NORTH RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-Term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUN03	The North Slopes (302 Acres)	N3-E1	Maintain Upland Meadow Habitat	Conduct prescribed burns in years 1,3,5,7,and 10. Develop burn plan with sub-units to cascade burns over site on alternating years (some areas burned each year)	2	PGC managing this area	3,5,7, & 1	see matrix codes
		N3-E2	Maintain Upland Meadow Habitat	Winter brush all non-native woody plants in MU. Immediately follow-up with a stump treatment of herbicide and bark-penetrating oil (saturated sponge on spray applicator). Control native woodies as well to keep open meadow structure (can consider salvaging volunteer native trees and shrubs for use on other parts of the site)	1	PGC managing this area	1,2, & 3	see matrix codes
		N3-E3	Maintain Upland Meadow Habitat	Spot spray invasive herbaceous and graminoid plant species with a back-pack applicator (diluted glyphosate with surfactant)	1	PGC managing this area	2, 3, 4, &	see matrix codes
		N3-E4	Maintain Upland Meadow Habitat	Hand-distribute native seed mix (spring and fall) in bare areas, especially locations where monocultures of invasive species have been removed/killed. Apply seed one week after last herbicide application. Throw straw mulch in larger areas that have been reseeded	1	PGC managing this area		see matrix codes
		N3-E5	Establish Early- To Mid-Succession Habitat Establishment	Locate 25'-50' diameter sections of sloped habitat to plant native shrubs. Protect (from deer herbivory) with fencing and control invasives following methods described above. This will promote semi-nomadic, early succession breeding bird occupation (especially blue-winged warbler, golden-winged warbler, blue grosbeak, and yellow-breasted chat)	1	6,000 for two deer exclosures, 200 plants per exclosure = 6,720, 350 maint per year	2 thru 10	see matrix codes
		N3-E6	Protect Drainage Ways and Associated Wetlands	Include the above (early- to mid- succession habitat establishment) in transitions and toes of slopes to combine these with wetland buffering and increase wood plant diversity (hydrologic variation = plant diversity). Follow same management recommendations to ensure proper establishment and combat invasives.	1	PGC managing this area	2 thru 10	see matrix codes
MUN03	The North Slopes (302 Acres)	N3-E7	Protect Drainage Ways and Associated Wetlands	Control invasive reed canary grass in all drainage ways. If possible, include in prescribed burns. Must treat with a combination of mowing, herbicide, and (if possible) fire to effectively kill. Seed and (if possible) plug native plants into the killed areas. Visit to spot spray resprouts at least twice per year for first five years.	2	Engage PGC for prescribed fire	3,4,5,6,&	see matrix codes
		N3-E8	Protect Jordan Creek	Invest heavily in the above actions for establishing a mosaic of native meadow and patches of shrubland/teenage forest along the southernmost slopes in this MU (drains direct to Jordan Creek)	1	PGC managing this area	1 thru 5	see matrix codes
		N3-E9	Protect Drainage Ways and Associated Wetlands	These locations are remote. Allow dead-standing ash trees to fall on their own over time. Should any trails approach these (or other dead trees) limb them but leave at least 10' of standing primary stem as wildlife habitat.	3	PGC managing this area	ongoing	see matrix codes
North Range Stewardship Totals								



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
										\$ -
										\$ -
										\$ -
										\$ -
	\$ 12,720	\$ 350	\$ 350	\$ 350	\$ 350					\$ 14,120
										\$ -
										\$ -
										\$ -
\$ 250	\$ 250	\$ 250	\$ 250	\$ 250						\$ 1,250
\$ 22,898	\$ 20,370	\$ 8,000	\$ 18,075	\$ 9,760	\$ 6,150	\$ 400	\$ 400	\$ 400	\$ 200	\$ 86,653



CENTRAL RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-Term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUC01a	Environmental Education Center (Central East) (122 Acres)	C1a-E1	Enhance Meadows	Currently, the meadows surrounding the env ed center are a simple Implementation projects, consisting of 2 primary grasses and about 5 other plants. Plug "hot spots" into the meadows to increase value for wildlife and improve aesthetics. Hot spots should be clusters of native wildflower and warm season grass plugs (100-250) planted 12-18" on center. Target locations that will improve the view from the roof deck and from the walking path.	1	4,030 for 10 ac of inv herbaceous treatment, 3,000 for mow, 8,970 for diverse seeding, 7,200 for 2,000 herbaceous plugs, 4,030 first year maint, 2k per year after for 5 years		
		C1a-E2	Enhance Meadows	Continue to eradicate Eleagnus and any other non-native wood plants from establishing in this polygon. Remove existing mature olive with a chainsaw/brushsaw followed by herbicide and a bark penetrating oil (dabbed from a saturated sponge on backpack sprayer tip). Scarify earth under removed crowns and seed in native mix with heavy cover crop (VA wild rye) and straw mulch	1	assume 50 acres of olive - \$72,800 for initial stump treatment, 20,150 for herbicide site prep, 25,000 for native meadow mix (drill seed), 10,000 for spot spray in y2,3,4, 5k in 6,7,8		NFWF
		C1a-E3	Protect Ephemeral Streams	Most of the remaining olive in this polygon is in the 30' buffer to the ephemeral drainageways on site. Remove all of the olive and stabilize (using recommended methods Then plant live stakes and/or containerized native shrubs into this swale and margin to increase breeding bird habitat diversity, provide ecosystems serves related to water conveyance and water cleansing (nutrient uptake, slow velocity, remove tss, lower conductivity, etc.), and shade waterway.	1	olive removed in above task - plant new trees and shrubs over appx 5 acres = \$8,400 for 500 trees/shrubs, 2000 for maint first 3 years, 1k after	1 thru 10	NFWF (part of larger area grant)
MUC01a	Environmental Education Center (Central East) (122 Acres)	C1a-E4	Repair the Native Garden	There is educational signage about native plants along the pathway to the env ed center that overlooks a nearly entirely invasive patch of foxtail grass, mugwort, and ragweed. There are some native plants growing beneath this. Consider hand-pulling all invasives (to reduce damage to extant native plants) then hand-seeding and plugging more native plants to produce a robust and functional display	2	250 hand pull, plant 300 plugs = 1000, maint 100 per year		
MUC01b	Environmental Education Nature Center (North East) (81 Acres)	C1b-E1	Enhance Meadows	Currently, the meadows surrounding the env ed center are a simple association, consisting of 2 primary grasses and about 5 other plants. Plug "hot spots" into the meadows to increase value for wildlife and improve aesthetics. Hot spots should be clusters of native wildflower and warm season grass plugs (100-250) planted 12-18" on center. Target locations that will improve the view from the roof deck and from the walking paths	1	4,030 for 10 ac of inv herbaceous treatment, 3,000 for mow, 8,970 for diverse seeding, 7,200 for 2,000 herbaceous plugs, 4,030 first year maint, 2k per year after for 5 years	1 thru 6	Part of NFWF grant? (monet saved if using fire)
		C1b-E2	Restore Spring-Fed Wetland	A springhouse is located in the eastern part of this polygon. The resultant seepage is supporting the hydrology for a beautiful sloped muck wetland. Unfortunately, the wetland has been degraded. De-watering at the low end via ditching and culverts for the road, coupled with planting of reed canary grass (Phalarus arundinaceae) has resulted in a drastic alteration of this high-quality headwater wetland. Design, permit, and build a wetland restoration here that is part of the proposed stream and wetland restoration found in muc05. Rethink the road and water conveyance to improve/restore	1	30-100k	design and permit 2021, construct 2022	Combine with MUC05 stream restoration project
		C1b-E3	Enhance Forest	A number of invasive species, mostly shrubs, have invaded and simplified the forested sections of this MU. Winter brush (cut and stump treat) all invasive shrubs. Return to spray resprouts then plant trees, shrubs, and seed in areas of bare soil	5	spot treat each year, possible preemergent for stilt grass after 2 years of perennial establishment	6 thru 10	



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Total
\$ 16,000	\$ 11,230	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000					\$ 35,230
\$ 117,950	\$ 20,150	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 198,100
	\$ 8,400	\$ 2,000	\$ 2,000	\$ 2,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 19,400
\$ 1,250	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 2,150
\$ 16,000	\$ 11,230	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000					\$ 35,230
apply for grant	\$ 15,000	\$ 85,000	\$ 4,500	\$ 2,200	\$ 1,000	\$ 1,000	\$ 500	\$ 500	\$ 500	\$ 110,200
					\$ 4,500	\$ 4,500	\$ 2,250	\$ 2,250	\$ 1,000	\$ 14,500



CENTRAL RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-Term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUC02a	Jordan Creek and Floodplain (Central North) (16 Acres)	C2a-E1	Ensure Passage Through the Stream	Remove (at least in part) some sections of the ford to enable safe fish and other mobile aquatic fauna to navigate above and below this feature	5	tbd - design dependent	Future	American Rivers
MUC02b	Jordan Creek and Floodplain (Central South) (19 Acres)	C2b-E1	Enhance Wetlands in Floodplain	Toe of slope and floodplain wetlands occur in the riparian zone of Jordan Creek. Most are separated from Jordan Creek by a trail. Eradicate invasive forbs and shrubs from these wetlands	2	4 acres of wetland for enhancement and invasives control. Assumes spot treatment for invasives and plug plantings in "Hot Spots" over 5 years (use volunteers when possible)		
		C2b-E2	Control/Eradicate Invasives	Similar to above but on the natural levees and creek banks	2	assumes 2 acres of knotweed = 1,068 to mow, 806 to spray, 3084 for hand seeding wet mesic mix, 803 maint for 3 yrs		
MUC03a	Hemlock Ravine (Central North) (13 Acres)	C3a-E1	Maintain and Protect Hemlock Trees	Treat the largest and healthiest hemlocks to prevent death by hemlock woolly adelgid. Consider cutting any dead/dying trees whose collapse would result in human safety risks (near trails) and/or would result in uprooting the steep slope upon falling (to prevent erosions). Cut crown and leave at least a 10' dead snag when possible for wildlife habitat	3	assumes 250 dbh @ 3.50 per dbh		
MUC03b	Hemlock Ravine (Central South)	C3b-E1	Maintain and Protect Hemlock Trees	Treat the largest and healthiest hemlocks to prevent death by hemlock woolly adelgid. Consider cutting any dead/dying trees whose collapse would result in human safety risks (near trails) and/or would result in uprooting the steep slope upon falling (to prevent erosions). Cut crown and leave at least a 10' dead snag when possible for wildlife habitat	3	assumes 250 dbh @ 3.50 per dbh		
MUC04	Maintenance Yard (51 Acres)	C4-E1	Eradicate Invasives		1	part of design/build	grant writ	Grant TBD
		C4-E2	Re-Grade to Create More Natural Topography		1	part of design/build	grant writ	Grant TBD
		C4-E3	Establish Demonstration Gardens and Reflection Areas	This is a very good location to teach and interpret nature. Create yard-sized demonstrations of landscaping with native plants to encourage visitors to do the same at home	1	part of design/build	grant writ	Grant TBD
		C4-E4	Plant and Seed in Sections with Native Grasses, Wildflowers, And Seed	Mimic early succession habitats know to the region regarding plant selection and structure	1	part of design/build	grant writ	Grant TBD



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Total
										\$ -
\$ 1,200	\$ 1,200	\$ 4,200	\$ 500	\$ 500	\$ 500	\$ 500	\$ 250	\$ 250	\$ 250	\$ 9,350
	\$ 4,958	\$ 803	\$ 803	\$ 803	\$ 400	\$ 400	\$ 400	\$ 400	\$ 400	\$ 9,367
			\$ 875	\$ 875				\$ 875	\$ 875	\$ 3,500
			\$ 875	\$ 875				\$ 875	\$ 875	\$ 3,500
grant writing	\$ 55,000	\$ 350,000	\$ 4,000	\$ 4,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 423,000
part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	\$ -
part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	\$ -
part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	part of above	\$ -



CENTRAL RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-Term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUC05	Working Lands (94 Acres)	C5-E1	Eradicate Olive	Follow methods described above	2	\$29,120 (brush/treat 20ac) \$8,060 per year for spot treat (est. 4 years)		
		C5-E2	Control Other Invasive Plants	Remove all invasives as part of above	2	included in above		
		C5-E3	Improve Herd Health and Pasture Resources	Set up smaller paddocks in existing pastures - use temporary lines to restrict and control movement of bison in smaller paddocks on site. Set goal for 60-90 day relief when cycling (move every 30 days). Bison cannot be moved as regularly as cattle	2	fence construction = 15,000 and training for staff = 2,500 do after pastures are enhanced/improved		
		C5-E5	Improve Herd Health and Pasture Resources	Enhance pastures with mix of native and non-native seeds to promote healthier buffalo and ecosystem	1	one-time perennial forage change - continue overseeding with annual grains as desired (assumes 15 acres)		
		C5-E6	Protect and Enhance Water Resources	Enact stream restoration asap in reach between buffalo and elk. Incorporate associated wetlands (including from muc02). write a grant application to support a stream restoration to reconnect the degraded and eroded tributry stream to its floodplain, boost hydrology in associated wetlands, and create critical wildlife and plant habitat	1	400k - grant supported	1 thru 10	CWA and 104
		C5-E7	Protect and Enhance Water Resources	Exclude bottomland wetland from elk enclosure. move elk during construction, exlcude them from actual wetland and stream when returned	1			
		C5-E8	Improve Herd Health and Pasture Resources	Allow elk to age out - do not add new individuals	3			
		C5-E9	Enhance Bird Habitat	Install bird boxes on fence posts	4	500		
MUC06	North Woods (80 Acres)	C6-E1	Eradicate Invasives And Enhance Natural Community		1	front lines of olive - surgical removal while still sparse - assumes ~ 10 ac of invasvie woodies		
MUC07	The West Meadows (158 Acres)	C7-E1	Enhance Meadows	Immediately enhance with native seed: spot spray for any large colonies of invasives, direct drill in native seed mix, plant wildflower and grass plugs in high visibility areas.	1	90k for drill seed new meadow sp, maintain after	install year 1 maintain after	
		C7-E2	Create Savanna Habitat	Open windrows by removing invasives and clearing certain areas to promote a savanna condition; all tree removal should be done after USFWS consultation for bats	2	cut and limb 100 trees	3	
		C7-E3	Create Shrub Habitat	Plant shrub clusters in selected areas - plant 25-50 woody plants in clusters and protect with perimeter fence. Control invasives in these corrals over next 5 years as they mature	2	30,000 for 10 exclosures, 100 trees/shrubs per exclosure	3	
Central Range Stewardship Totals								



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Total
\$ 29,120	\$ 8,060	\$ 8,060	\$ 8,060	\$ 8,060						\$ 61,360
										\$ -
		\$ 17,500								\$ 17,500
\$ 7,995										\$ 7,995
apply for grant+O28:R28O O28	\$ 45,000	\$ 320,000	\$ 7,000	\$ 7,000	\$ 3,500	\$ 3,500	\$ 3,500	\$ 2,000	\$ 2,000	\$ 393,500
										\$ -
										\$ -
\$ 100		\$ 100		\$ 100		\$ 100		\$ 100		\$ 500
\$ 14,560	\$ 4,000	\$ 4,000	\$ 2,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 500	\$ 500	\$ 500	\$ 29,060
\$ 90,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 7,500	\$ 7,500	\$ 3,000	\$ 3,000	\$ 1,500	\$ 1,500	\$ 159,000
		\$ 10,000								\$ 10,000
		\$ 46,800	\$ 1,000	\$ 1,000	\$ 1,000	\$ 500	\$ 500	\$ 500	\$ 500	\$ 51,800
\$ 294,175	\$ 199,328	\$ 877,563	\$ 60,713	\$ 50,013	\$ 36,500	\$ 22,600	\$ 19,000	\$ 17,850	\$ 16,500	\$ 1,594,242



SOUTH RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUS01a	South Range West (Agricultural) (45 Acres)	S1a-E1	Harvest Black Walnut	Enact a competitive bid for the walnut harvest. Make sure strict BMPs are in place for contractor behavior and site condition!	2	possible revenue generator		
		S1a-E2	Eradicate Olive	Follow methods described in previous MUs	1	\$29,120 (brush/treat) \$8,060 per year for spot treat (est. 4 years)		
		S1a-E3	Replant with Native Communities	(Add detail on species selection and structure) - promote forage for deer and turkey	1	\$15,990 for 30 acre seeding \$8,400 for 500 trees/shrubs planted, \$5,842 for deer enclosures, \$770 for hardwood mulch		
		S1a-E4	Continue Hunting Here	Enhance natural areas to support hunting, keeping open sight lines and high-quality forage available	1	no added cost		
		S1a-E5	Establish Savanna and Meadow Community	significant invasives and low-quality native plants here. Convert to open oak savannah habitat to support robust wildlife community and hunting resources	3	4,000 for design of above plan		
		S1a-E6	Enhance Sloping Muck Wetland Community	there exists a robust PEM on (in some areas) deep muck. This is flanked by the road and an ag field. Control invasives, especially in the adjacent slopes, and conduct invasive species management in the wetland	3	\$800 for brushing, 1,200 for shrub planting, \$660 for herbaceous plugs, 403/year for maint		
MUS01b	South Range West (Forest) (33 Acres)	S1b-E1	Eradicate Olive	see above details for methodology	4	\$29,120 (brush/treat) \$8,060 per year for spot treat (est. 4 years)		
MUS01c	South Range West (Forest Outlier) (49 Acres)	S1c-E1	improve forest community	conduct polygon-wide invasive species management, prioritizing invasive shrubs (using above described methodologies. Consider a pre-emergent herbicide for any large concentrations of stilt grass.	4	\$7,280 for 5 ac shrub control, \$2,015/yr for spot sprays, \$5,330 for 10 ac of hand seeding, 5,000 straw mulch, \$4,030 for 10 ac preemergent herbicide for stilt grass		
MUS02a	Jordan Creek and Floodplain (26 Acres)	S2a-E1	Protect Vernal Pools in Floodplain Wetland Area	remove all invasives in a 200' buffer to these pools, ensure no trails or other promotion of access are constructed	1	\$1,200 for shrub control, 200/year for spot treatment, \$336 for 20 shrubs		
MUS02b	Jordan Creek and Floodplain (Outlier Parcel) (16 Acres)	S2b-E1	remove invasive species in buffer and floodplain	follow above-mentioned methods for invasive species	2	1,068 to mow 2 ac knotweed, 803 to spray, 3,084 to hand seed wet mesic mix, 877 for straw mulch, 803/year for spot spray mngmnt		
		S2b-E2	restrict human access to floodplain	do not add trails in this section	1	no cost		
MUS03a	Hemlock Ravine (South West) (8 Acres)	S3a-E1	assess hemlock grove health and treat key trees	conduct assessment of hemlocks within this grove to locate and treat primary trees with hemlock wooly adelgid pesticides.	3	3.50 per dbh (in) for 715 in per treatment year		
		S3a-E2	invasive species management	conduct site visits to control invasive shrubs	3	806 for initial spot treatment of appx 2 acres, 2130 for 2 ac hand seeding mesic mix, 806 for spot treat year 3, 1,612 for pre-emergent in stilt grass areas and spot treat, 806 after for spot treat		
MUS03b	Hemlock Ravine (South East) (17 Acres)	S3b-E1	assess hemlock grove health and treat key trees	conduct assessment of hemlocks within this grove to locate and treat primary trees with hemlock wooly adelgid pesticides.	3	3.50 per dbh (in) for 715 in per treatment year		
		S3b-E2	invasive species management	conduct site visits to control invasive shrubs	3	double the above recommendation		



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Total
\$ (5,000)										\$ (5,000)
\$ 29,120	\$ 8,060	\$ 8,060	\$ 8,060	\$ 8,060						\$ 61,360
\$ 15,990	\$ 15,012	\$ -	\$ -	\$ -						\$ 31,002
										\$ -
\$ 4,000										\$ 4,000
	\$ 2,660	\$ 403	\$ 403	\$ 403	\$ 403					\$ 4,272
			\$ 29,120	\$ 8,060	\$ 8,060	\$ 8,060	\$ 8,060	\$ 8,060		\$ 69,420
		\$ 7,280	\$ 7,345	\$ 2,015	\$ 2,015	\$ 4,030	\$ 4,030	\$ 2,015		\$ 28,730
\$ 1,200	\$ 550	\$ 200	\$ 200	\$ 200						\$ 2,350
\$ 1,869	\$ 4,764	\$ 803	\$ 803	\$ 803	\$ 803					\$ 9,845
										\$ -
	\$ 2,500	\$ 2,500					\$ 2,500	\$ 2,500		\$ 10,000
			\$ 806	\$ 2,130	\$ 1,612	\$ 806	\$ 806			\$ 6,160
	\$ 2,500	\$ 2,500					\$ 2,500	\$ 2,500		\$ 10,000
			\$ 1,612	\$ 4,260	\$ 3,224	\$ 1,612	\$ 1,612			\$ 12,320



SOUTH RANGE		ECOLOGICAL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Long-term Goal	Recommendation	Priority	Cost	Year(s)	Funding Source
MUS04a	South Range East (Agriculture) (97 Acres)		establish savanna and meadow community	significant invasives and low-quality native plants here. Convert to open oak savannah habitat to support robust wildlife community and allow for trail connections/access	2	\$116,480 for 80 acres of olive removal, \$32,240 for sitewide herbicide/prep, 71,760 for high quality drill seed, \$33,600 for 2,000 trees/shrubs, 29,212 for 10 exclosures, declining effort in spot treatments moving forward (see year columns)	2 thru 10	NFWF
MUS04b	South Range East (Forest) (15 Acres)		conduct polygon-wide invasive species management	use methods proposed in above sections to systematically control invasives and promote native plant communities	4			
MUS04c	South Range East (Agricultural Outlier) (46 Acres)	S4c-1	Establish Meadow Habitat	Install high quality meadow on either side of new trail; seed in and then plug hotspots along trail/viewsheds. seed in then plug hotspots along trail/viewsheds	1	\$17,940 for drill seed 20 acres high quality seed, 8,400 for 500 trees/shrubs, 5,843 for 2 deer exclosures, 7,200 for 2,000 herbaceous plugs, 8,060 for first year maint, then 4k for 3 years	1 thru 4	
Central Range Stewardship Totals								



Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Total
	apply for grant		\$ 220,280	\$ 32,240	\$ 15,000	\$ 7,000	\$ 7,000	\$ 3,500	\$ 3,500	\$ 288,520
\$ 403	\$ 403	\$ 403	\$ 403	\$ 403	\$ 403					\$ 2,418
\$ 17,940	\$ 21,103	\$ 8,060	\$ 4,000	\$ 4,000	\$ 4,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 63,103
\$ 65,522	\$ 57,552	\$ 30,209	\$ 273,032	\$ 62,574	\$ 35,520	\$ 22,508	\$ 27,508	\$ 19,575	\$ 4,500	\$ 598,500



## TREXLER NATURE PRESERVE RECOMMENDED PHASING SUMMARY

Priority	Year	Total Cost	Summary of Major Improvements
Planned	1	\$ 640,930	Jordan Creek Greenway through southern parcel
High	2	\$ 731,382	Old Packhouse Trail Head, Safety Improvements; Wayfinding Improvements; Elk Ridge Off road Trail
High	3	\$ 689,982	North Range Border Trail Realignments for Water Quality Improvements
High	4	\$ 267,658	North Range Border Trail Realignment & Jordan Creek Crossing Improvements / Connection to Central Range Trail Head
Medium	5	\$ 271,934	Game Preserve Road Trailhead; Ford area Trail Head Parking and Outdoor Classroom; Teardrop Trail Amenities
Medium	6	\$ 616,986	Jordan Creek Pedestrian Bridge
Medium	7	\$ 226,249	Fireman Trail Realignment & Improvements
Low	8	\$ 295,194	Old Packhouse Trail Head; Widen Border Trail in North and South Range; Grade Improvement along Border Trails
Low	9	\$ 112,211	Elk Run Trail Improvements; Jordan Creek Road Trail Head
Low	10	\$ 294,928	Tear Drop Trail Stone Dust Surface
Total Probable Cost of Development		\$ 4,150,000	<i>Estimated total over 10 years</i>



NORTH RANGE TRAIL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUN01	The North Flats (122 Acres)	N1-T1	Border Trail - Surface improvement	Low - 10	1400 LF	\$ 54,180.00
		N1-T2	Border Trail & Tear Drop Trail - Intersection improvement	Med - 4	40 LF	\$ 564.00
		N1-T3	Boarder Trail near Teardrop trail - Improve trail approach	Low - 10	30 LS	\$ 1,626.00
		N1-T4	Border Trail - Widen trail address crossslopes	Med - 7	1520 LF	\$ 3,040.00
		N1-T5	Teardrop Trail - Surface improvement	Low - 10	5720 LF	\$ 221,364.00
MUN02	Jordan Creek and Floodplain (24 Acres)	N2-T1	Border Trail - Improve and stabilize Jordan Creek ford	High - 3	1 LS	\$ 15,348.70
		N2-T2	Border Trail - Create boardwalk approach to Jordan Creek bridge	High - 4	85 LF	\$ 42,500.00
		N2-T3	Border Trail - ADA Trail connection to Game Preserve Road Parking	Med - 5	660 LF	\$ 35,772.00
MUN03	The North Slopes (302 Acres)	N3-T1	Border Trail - Improve Game Preserve Road crosswalk and trail approaches	Med - 5	35 LF	\$ 5,475.00
		N3-T2a	Border Trail - Realign trail at Hunsicker Valley and improve stream crossing	High - 3	769 LF	\$ 61,358.00
		N3-T2b	Border Trail - Stabilize Former Trail Bed	High - 3	500 LF	\$ 6,200.00
		N3-T3a	Border Trail - Realign trail at North Range access drive and improve stream crossing	High - 3	520 LF	\$ 41,490.00
		N3-T3b	Border Trail - Crosswalk improvements at North Range access drive	High - 3	35 LF	\$ 9,720.00
		N3-T3c	Border Trail - Add boardwalk approach over Stream Valley at North Range access drive	High - 3	50 LF	\$ 25,000.00
		N3-T3d	Border Trail - Stabilize former trail bed	High - 3	250 LF	\$ 3,100.00
		N3-T4	Buck Run Border Trail - Add Rolling Grade Dips to improve trail erosion and improve Border Trail intersection	Med - 7	5500 LF	\$ 3,229.00
		N3-T5	Buck Run Trail - Add Restoration Plantings in old Trail Bed; add temporary barrier at trail cut through	High - 2	20 LF	\$ 248.00
		N3-T6	Buck Run Trail - Add Restoration Plantings in old Trail Bed; add temporary barrier at trail cut through	High - 2	20 LF	\$ 248.00
		N3-T7	Border Trail - Widen trail bed and shoulder from North Range overlook to Buck Run Trail	Low - 8	4820 LF	\$ 67,962.00
		N3-T8a	Border Trail - Realign trail approach to Jordan Creek	High - 4	2000 LF	\$ 159,578.00
		N3-T8b	Border Trail - Stabilize former trail bed	High - 4	510 LF	\$ 6,324.00
		N3-T9a	Fireman's Trail - Realign trail approach to Jordan Creek	Med - 7	2600 LF	\$ 207,451.00
		N3-T9b	Fireman's Trail - Stabilize former trail bed	Med - 7	750 LF	\$ 9,300.00
		N3-T10	Broken Arrow Trail - Add Restoration Plantings in old Trail Bed; add temporary barrier at trail cut through	High - 2	20 LF	\$ 248.00
		N3-T11	Fireman's Trail - Add Rolling Grade Dips to improve drainage and address trail rutting	Med - 7	2230 LF	\$ 3,229.00
		N3-T12	Fireman's Trail - Improve approaches to at grade stream crossing	High - 3	10 LF	\$ 2,240.00
		N3-T13	Install crosswalk at Fireman's Trail and Game Preserve Road	High - 2	1 LS	\$ 4,120.00
		N3-T14	Fireman's Trail - Add railings to footbridge	High - 3	16 LF	\$ 672.00



NORTH RANGE		FACILITIES RECOMMENDATIONS				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUN01	The North Flats (122 Acres)	N1-F1	Boarder Trail at Teardrop trail - Retrofit shelter and improve approach	Low - 10	1 LS	\$ 909.80
		N1-F2a	Tear Drop Trail - Provide meadow overlook platform	High - 5	225 SF	\$ 17,640.00
		N1-F2b	TearDrop Trail - Provide meadow overlook access trail - 5' Wide stonedust and boardwalk ramp approach	High - 5	300 LF	\$ 3,984.00
		N1-F3	Teardrop Trail - Replace picnic area with boulder shade grove	High - 5	1 LS	\$ 4,156.00
		N1-F4	Tear Drop Trail - Provide meadow overlook on grade	Med - 5	225 SF	\$ 742.50
		N1-F5	Border Trail - Retrofit shelter	Low - 10	1 LS	\$ 3,500.00
		N1-F6	Teardrop and Buck Run Trail - Provide bolder seating at	High - 4	1 LS	\$ 240.00
MUN02	Jordan Creek and Floodplain (24 Acres)	N2-F1	Border Trail - Small Picnic Grove - 3 Tables	Mid - 5	1 LS	\$ 11,173.62
		N2-F2	Border Trail - Provide ADA floodplain overlook platform	High - 4	150 SF	\$ 11,760.00
		N2-F3	Game Preserve Road Pulloff - Convert to ADA Parking	Med - 5	5 EA	\$ 3,450.00
MUN03	The North Slopes (302 Acres)	N3-F1a	Game Preserve Road Trailhead - Provide asphalt driveway 18' width	Mid - 5	230 SY	\$ 1,840.00
		N3-F1b	Game Preserve Road Trailhead - Relocate vehicular gate	Mid - 5	1 EA	\$ 2,500.00
		N3-F1c	Game Preserve Road Trailhead - Provide gravel trailhead parking (16 Spaces)	Mid - 5	463 SY	\$ 15,846.00
		N3-F2	Game Preserve Trailhead - Provide single occupancy composting toilet	Mid - 5	1 LS	\$ 47.60
		N3-F3	Mill Creek Road Trailhead - Define parking rustic wheel stops	High - 4	50 EA	\$ 2,380.00
		N3-F4	Mill Creek Road Trailhead - Provide boulder shade grove	High - 4	1 LS	\$ 4,156.00
		N3-F5	Mill Creek Road Trailhead - Provide single occupancy composting toilet	High - 4	1 LS	\$ 47.60
		N3-F6	Game Preserve Road at Schlicher's Bridge - Install guide rail and vehicular gate to deter off-road parking	High - 2	100 LF	\$ 5,000.00



NORTH RANGE		WAYFINDING & INTERPRETATION RECOMMENDATIONS				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUN1	The North Flats (122 Acres)	N1-W1a	Border and Teardrop Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W1b	Border and Teardrop Trail - Remove trail kiosk	High - 2	1 EA	\$ 160.00
		N1-W2	Teardrop Trail - Provide interpretive signage about bird flyway and habitat at meadow overlook platform	Med - 5	1 EA	\$ 950.00
		N1-W3	Teardrop and North Range Utility Trail- Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W4	Teardrop and Half Pipe Trail - Provide trail markers (2 locations)	High - 2	4 EA	\$ 130.00
		N1-W5	Half Pipe Trail and Broken Arrow - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W6a	Teardrop and Turkey Ridge - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W6b	Teardrop and Turkey Ridge - Remove trailhead kiosk	High - 2	1 EA	\$ 160.00
		N1-W7	Teardrop and Broken Arrow - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W7	Teardrop and Broken Arrow - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W8	Turkey Ridge and Broken Arrow - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W9	Turkey Ridge and Fireman's Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W1	Turkey Ridge and Fireman's Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W11a	Teardrop and Turkey Ridge - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W11b	Teardrop and Turkey Ridge - Remove trailhead kiosk	High - 2	1 EA	\$ 160.00
		N1-W12	Teardrop Trail - Provide interpretive signage about meadow restoration at meadow clearing	Med - 5	1 EA	\$ 950.00
		N1-W13a	Teardrop and Brain's Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W13b	Teardrop and Brain's Trail - Remove Trailhead Kiosk	High - 2	1 EA	\$ 160.00
		N1-W14a	Teardrop and Border Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W14b	Teardrop and Border Trail - Remove trailhead kiosk	High - 2	2 EA	\$ 65.00
		N1-W15	Teardrop and Buck Run Trails - Update trail kiosk	High - 2	1 EA	\$ 360.00
		N1-W16	Teardrop and Buck Run - Provide trail markers	High - 2	2 EA	\$ 65.00
		N1-W17	Teardrop Trail Split - Provide trail markers	High - 2	2 EA	\$ 65.00
MUN2	Jordan Creek and Floodplain (24 Acres)	N2-W1	Border Trail - Provide interpretive signage about functions of floodplains at ADA floodplain overlook	Med - 4	1 EA	\$ 950.00
		N2-W2	Border Trail - Provide North Range identification sign	High - 2	1 EA	\$ 71.00
		N2-W2	Border Trail - Provide new trailhead kiosk at entrance into North Range	High - 2	1 EA	\$ 1,578.00
MUN3	The North Slopes (302 Acres)	N3-W1	Game Preserve Road Trail Head - Provide interpretive signage about deer management and hunting area safety	High - 2	1 EA	\$ 950.00
		N3-W2	Game Preserve Road Trail Head - Relocate and update trailhead kiosk	High - 2	1 EA	\$ 560.00
		N3-W3	Border and Fireman's Trail - Provide trail marker	High - 2	2 EA	\$ 65.00
		N3-W4	Border Trail - Provide interpretive signage about teenage forest habitat	High - 2	1 EA	\$ 950.00
		N3-W5	Border and Buck Run Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N3-W6	Border and Brian's Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		N3-W7	Brian's Trail and Bucks Run - Provide trail markers	High - 2	2 EA	\$ 65.00
		N3-W8	Brian's Trail and Half Pipe - Provide trail markers	High - 2	1 EA	\$ 33.00
		N3-W9	Mill Creek Trailhead - Update Trail Head Kiosk	High - 2	1 EA	\$ 360.00
		N3-W10	Fireman's Trail and Game Preserve Road crossing - Update Trailhead Kiosk	High - 2	1 EA	\$ 360.00
		N3-W11	Game Preserve Road - Provide North Range identification sign	High - 2	1 EA	\$ 71.00
		N3-W12	Fireman's and Broken Arrow Trail - Provide trail markers	High - 2	2 EA	\$ 65.00



CENTRAL RANGE		TRAIL STEWARDSHIP				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority Year	Units	Cost
MUC01a	Environmental Education Center (Central East) (122 Acres)	C1a-T1	Border Trail - Define trail separate from parking area and driveways, 5' wide ADA stone dust	High - 3	540 LF	\$ 8,964.00
		C1a-T2	Observation Trail - Improve cross slope, 5' wide stone dust	High - 3	2065 LF	\$ 63,396.00
		C1a-T3	Border Trail - Add rolling grade dips to address trail erosion north Trexler Environmental Education Center	Low - 8	500 LF	\$ 724.00
		C1a-T4	Border Trail - Widen trail bed and shoulder to 7'; Add rolling grade dips to address rutting from Trexler environmental Education Center to Old Packhouse Road	Med - 6	1983 LF	\$ 30,832.00
		C1a-T5	Trexler Nature Trail - Improve road crossing approach cross slope and erosion	High - 3	80 LF	\$ 9,664.00
		C1a-T6	Elk Viewing Trail - Realign trail head	Med - 6	165 LF	\$ 19,932.00
MUC01b	Environmental Education Nature Center (North East) (81 Acres)	C1b-T1	Border Trail - Add rolling grade dips to address trail erosion	Low - 8	607 LF	\$ 879.00
		C1b-T2	Border Trail - Create off-road connection for border trail at LCCC trail entry	High - 4	50 LF	\$ 2,710.00
MUC02a	Jordan Creek and Floodplain (Central North) (16 Acres)	C2a-T1	Elk Viewing Trail - Separate trail from exit drive, 5' wide ADA stone dust	High - 2	1525 LF	\$ 3,734.00
MUC02b	Jordan Creek and Floodplain (Central South) (19 Acres)	C2b-T1	Bird Watching Trail - Extend trail from preserve exit drive to proposed Ford boardwalk	High - 4	690 LF	\$ 37,398.00
		C2b-T2a	Covered Bridge Trail - Remove on road Parking Realign trail at ADA grades	Med - 5	278 SY	\$ 4,861.11
		C2b-T2b	Covered Bridge Trail - Regrade trail at ADA grades to cover bridge Asphalt 8' wide	Med - 5	85 SY	\$ 4,335.00
		C2b-T2	Covered Bridge Trail - Improve trail approach slope and crosswalk to ADA standards at exit drive crossing	Planned - 1	159 LF	Road Repaving Project



CENTRAL RANGE		TRAIL STEWARDSHIP				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority Year	Units	Cost
MUC03	Hemlock Ravine (Central North) (13 Acres)	N/A	N/A			
MUC04	Maintenance Yard (51 Acres)	C4-T1	Spur Trail - Adjust trail cross slope	High - 2	1075 LF	\$ 15,158.00
		C4-T2	Old Packhouse Trailhead - Realign unblazed trail for Ford connection, 5' wide stone dust	High - 2	200 LF	\$ 6,140.00
		C4-T3	Old Packhouse Trailhead- Improve Access, new access trails and walkways throughout proposed trail head - 5' wide stone dust	High - 2	2300 LF	\$ 38,180.00
MUC05	Working Lands (94 Acres)	C5-T1	Boy Scout Trail - Add rolling grade dips to address steep running and improve cross slopes	Low - 9	214 LF	\$ 3,327.00
		C5-T2	Boy Scout Trail - Add rolling grade dips to address steep running and improve cross slopes	Low - 9	550 LF	\$ 8,551.00
		C5-T3	Boy Scout Trail - Add reinforces grade dip to address erosion	Low - 9	400 LF	\$ 2,575.00
		C5-T4	Elk Ridge Trail - Provide off road trail connection at Bison Enclosure overlook	High - 3	50 LF	\$ 830.00
MUC06	North Woods (80 Acres)	C6-T1	Border Trail -Complete off road section at Preserve Exit Road and stream foot bridge (40' long)	High - 2	1040 LF	\$ 72,048.00
		C6-T2	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low - 9	400 LF	\$ 2,575.00
		C6-T3	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low - 9	800 LF	\$ 5,150.00
		C6-T4	Elk Ridge Trail - Add reinforces grade dip to address erosion	Low - 9	360 LF	\$ 2,318.00
		C6-T5	Elk Ridge Trail -Add reinforces grade dip to address erosion at Game Preserve Road	Low - 9	30 LF	\$ 966.00
		C6-T6	Elk Ridge Trail - Crosswalk at Game Preserve Road	High - 3	30 LF	
MUC07	West Meadows (158 Acres)	C7-T1	Border Trail - Add rolling grade dips to address steep running slope east of Game Preserve Road	Low - 8	600 LF	\$ 869.00
		C7-T2	Bird Watching Trail - Add rolling grade dips to address steep running slope leading to Cover bridge loop	Low - 8	600 LF	\$ 869.00



CENTRAL RANGE		FACILITIES RECOMMENDATIONS				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUC01a	Environmental Education Center (Central East) (122 Acres)	C1a-F1	Observation Trail - Provide ADA benches	High - 3	4 EA	\$ 8,800.00
		C1a-F2	Education Center - Provide photo point at roof lookout	High - 3	1 EA	\$ 300.00
		C1a-F3	Trexler Nature Trail - Remove bird blind structure	High - 2	1 LS	\$ 1,600.00
MUC01b	Environmental Education Nature Center (North East) (81 Acres)	C1b-F1	Border Trail - Create outdoor classroom forest habitat	Med - 6	1 LS	\$ 872.00
MUC02a	Jordan Creek and Floodplain (Central North) (16 Acres)	C2a-F1a	Exit Drive - Provide gravel trail head parking area 10 spaces	Med - 5	711 SY	\$ 24,320.00
		C2a-F1b	Exit Drive - Provide asphalt driveway apron to parking	Med - 5	66.67 SY	\$ 4,800.00
		C2a-F2	Exit Drive - Covert existing 7 spaces to ADA parking (3 existing)	Med - 5	7 EA	\$ 4,830.00
		C2a-F3	Exit Drive & Elk Viewing Trail - Provide trail gate	High - 2	1 EA	\$ 2,500.00
		C2a-F4	Along Exit Road - Install post and rail fencing along exit drive	High - 2	1525 LF	\$ 62,830.00
MUC02b	Jordan Creek and Floodplain (Central South) (19 Acres)	C2b-F1	Ford Area -Remove Parking and provide seat wall riparian habitat outdoor classroom	Med - 5	1 LS	\$ 44,732.50
		C2b-F2	Ford Area - Provide single occupancy composting toilet	Med - 5	1 LS	\$ 47.60
		C2b-F3	Ford Area - Provide shaded picnic grove 4-6 tables	Med - 5	1 LS	\$ 18,622.70
		C2b-F4	Cover Bridge Trail at Ford Area - Improve boardwalk	High - 2	1275 SF	\$ 47,812.50
MUC03	Hemlock Ravine (Central North) (13 Acres)	N/A	N/A			
MUC04	Maintenance Yard (51 Acres)	C4-F1	Old Packhouse Trailhead -Formalize existing parking area - 59 spaces	Med - 8	1 LS	\$ 223,891.00
		C4-F2	Old Packhouse Trailhead - Provide restroom pavilion- 20' x 17'	High - 2	1 LS	\$ 68,000.00
		C4-F3	Old Packhouse Trailhead -Provide equestrian trailer parking area - 13 spaces	High - 2	1 LS	\$ 184,036.70
		C4-F4	Old Packhouse Trailhead -Provide Ford access parking area - 44 spaces	High - 3	1 LS	\$ 120,521.00
		C4-F5	Old Packhouse Trailhead -Provide picnic pavilions	High - 2	3 LS	\$ 197,550.00
MUC05	Working Lands (94 Acres)	N/A	N/A			
MUC06	North Woods (80 Acres)	N/A	N/A			
MUC07	The West Meadows (158 Acres)	C7-F1	Birding Trail - Remove bird blind structure	High - 2	1 LS	\$ 1,600.00



CENTRAL RANGE		WAYFINDING & INTERPRETATION RECOMMENDATIONS				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUC01a	Environmental Education Center (Central East) (122 Acres)	C1a-W1	Trexler Environmental Educational Center Parking Area - Update Trailhead Kiosk	High - 2	1 EA	\$ 33.00
		C1a-W2	Border Trail south access - Provide trail markers	High - 2	1 EA	\$ 33.00
		C1a-W3	Border Trail north access - Provide trail markers	High - 2	1 EA	\$ 33.00
		C1a-W4	Border and Trexler Nature Trails - Provide trail markers	High - 2	2 EA	\$ 65.00
		C1a-W5	Border and Observation Trails - Provide trail markers	High - 2	4 EA	\$ 130.00
		C1a-W6	Border and Old Packhouse Parking Area Connector Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		C1a-W7	Packhouse Road - Provide Central Range identification sign	High - 2	1 EA	\$ 71.00
MUC01b	Environmental Education Nature Center (North East) (81 Acres)	C1b-W1	Border Trail at Elk Enclosure Maintenance Access - Provide trail markers	High - 2	2 EA	\$ 65.00
		C1b-W2	Border Trail at Preserve Exit Road - Trail marker	High - 2	2 EA	\$ 65.00
MUC02a	Jordan Creek and Floodplain (Central North) (16 Acres)	C2a-W1	Game Preserve Road - Provide Central Range identification sign	High - 2	1 EA	\$ 71.00
		C2a-W2	Elk Ridge Viewing and Fireman's Trail - Provide Central Range identification sign	High - 2	1 EA	\$ 71.00
MUC02b	Jordan Creek and Floodplain (Central South) (19 Acres)	C2ab-W1	Ford Area - Update Trailhead Kiosk	High - 2	1 EA	\$ 360.00
		C2b-W2	Covered Bridge and Elk Ridge Viewing Trail East and West - Provide trail marker	High - 2	4 EA	\$ 130.00
		C2b-W3	Covered Bridge and Trexler Nature Trail - trail marker	High - 2	2 EA	\$ 65.00
		C2b-W4	Elk Ridge Viewing and Fireman's Trail - Provide trail marker	High - 2	2 EA	\$ 65.00
		C2b-W5	Ford Area - Provide interpretive signage about riparian buffers and habitat	Med - 5	1 EA	\$ 950.00
MUC03	Hemlock Ravine (Central North) (13 Acres)	N/A	N/A			
MUC04	Maintenance Yard (51 Acres)	C4-W1	Old Packhouse Road access area - update existing and add new trailhead kiosk	High - 2	2 EA	\$ 720.00
		C4-W2	Spur to Border Trails - Provide trail markers	High - 2	1 EA	\$ 33.00
		C4-W3	Spur and Covered Bridge Trails - Provide trail markers	High - 2	1 EA	\$ 33.00
		C4-W4	Spur Trail to Ford - Provide trail markers	High - 2	1 EA	\$ 33.00



CENTRAL RANGE		WAYFINDING & INTERPRETATION RECOMMENDATIONS				
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUC05	Working Lands (94 Acres)	C4-W5	DCNR Test Plots - Interpretive signage about native versus invasive plants	High - 2	1 EA	\$ 950.00
		C5-W1	Bison overlook - Update trailhead kiosk	High - 2	1 EA	\$ 360.00
		C5-W2	Elk Viewing Trail and Preserve exit drive - Provide trail markers	High - 2	2 EA	\$ 65.00
		C5-W3	Boy Scout and Border Trails - Provide trail markers	High - 2	2 EA	\$ 65.00
		C5-W4	Chestnut Grove - Provide interpretive signage about the American Chestnut	High - 2	1 EA	\$ 950.00
		C5-W5	Bison Overlook - Provide interpretive signage about American Bison	High - 2	1 EA	\$ 950.00
MUC06	North Woods (80 Acres)	C6-W1	Provide trail markers Boy Scout & Elk Viewing Trail	High - 2	2 EA	\$ 65.00
		C6-W2	Provide trail markers Border Trail at Preserve Exit Road	High - 2	2 EA	\$ 65.00
		C6-W3	Game Preserve Road Crossing - Provide Central Range identification sign	High - 2	1 EA	\$ 71.00
MUC07	The West Meadows (158 Acres)	C7-W2	Game Preserve Road Parking - Update Trail Head Kiosk	High - 2	1 EA	\$ 360.00
		C7-W3	Bird Watching Trail Parking - Update Trail Head Kiosk	High - 2	1 EA	\$ 360.00
		C7-W4	Border Trail Access - Provide trail markers	High - 2	2 EA	\$ 65.00
		C7-W5	Border and Bird Watching Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		C7-W6	Border and Bird Watching Trails, and Covered Bridge Trail - Provide trail markers	High - 2	2 EA	\$ 65.00
		C7-W7	Bird Watching Trail and Preserve Exit Road - Provide trail markers	High - 2	2 EA	\$ 65.00
		C7-W8	Border Trail - Interpretive Signage - Woodland Birds	High - 2	1 EA	\$ 950.00
		C7-W9	Border Trail - Interpretive Signage - American Kestrel	High - 2	1 EA	\$ 950.00



SOUTH RANGE TRAIL STEWARDSHIP						
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUS01a	South Range West (Agricultural) (45 Acres)	S1a-T1	Border Trail - Single Track in the area. Widen trail bed.	Low - 9	1658 LF	\$ 23,378
MUS01b	South Range West (Forest) (33 Acres)	S1b-T1	Border Trail - Address steep cross slope reroute trail	Mid -5	486 LF	\$ 38,546
MUS01c	South Range West (Forest Outlier) (49 Acres)	N/A	N/A			
MUS02a	Jordan Creek and Floodplain (26 Acres)	S2a-T1	Proposed pedestrian bridge over Jordan Creek	Mid - 6	1 EA	\$ 564,400
		S2a-T2	Border Trail - Install Boardwalk to address seasonally wet area near Jordan Creek	High - 3	400 LF	\$ 200,000
MUS02b	Jordan Creek and Floodplain (Outlier Parcel) (16 Acres)	N/A	N/A			
MUS03a	Hemlock Ravine (South West) (8 Acres)	N/A	N/A			
MUS03b	Hemlock Ravine (South East) (17 Acres)	N/A	N/A			
MUS04a	South Range East (Agriculture) (97 Acres)	S4a-T1	Border Trail - Widen trail bed and shoulder; Add rolling grade dips to address rutting from Old Packhouse Road to Kids Peace shared trail access	Low - 10	800 LF	\$ 12,438
MUS04b	South Range East (Forest) (15 Acres)	S4b-T1	Border Trail - Trail grade unsustainable reroute trail and restore old trail bed to address steep running slope and erosion	High - 3	1195 LF	\$ 112,378
MUS04c	South Range East (Agricultural Outlier) (46 Acres)	S4c-T1	Jordan Creek Greenway Extension - 10' wide paved	Planned - 1	4988 LF	\$ 316,738
		S4c-T2	Jordan Creek Greenway Extension - 10' boardwalk	Planned - 1	403 LF	\$ 315,952
		S4c-T3	Jordan Creek Road Crosswalks	Planned -1	2 EA	\$ 8,240
		S4c-T2	Greenway Trailhead Connector Trail - 5' Native Surface	Mid - 5	403 LF	\$ 5,682



SOUTH RANGE FACILITIES RECOMMENDATIONS						
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
S01a	South Range West (Agricultural) (45 Acres)	N/A	N/A			
S01b	South Range West (Forest) (33 Acres)	N/A	N/A			
S01c	South Range West (Forest Outlier) (49 Acres)	N/A	N/A			
S02a	Jordan Creek and Floodplain (26 Acres)	N/A	N/A			
S02b	Jordan Creek and Floodplain (Outlier Parcel) (16 acres)	N/A	N/A			
S03a	Hemlock Ravine (South West) (8 Acres)	N/A	Border trail - Provide creek access observation platform	Med - 5	200 SF	\$ 15,680.00
S03b	Hemlock Ravine (South East) (17 Acres)	N/A	N/A			
S04a	South Range East (Agriculture) (97 Acres)	N/A	N/A			
S04b	South Range East (Forest) (15 Acres)	S4b-F1	Border Trail - Upgrade shelter	Low - 10	1 EA	\$ 910.00
S04c	South Range East (Agricultural Outlier) (46 Acres)	S4c-F1a	Jordan Creek Road - Provide asphalt driveway 18' width	Med - 9	230 SY	\$ 16,560.00
		S4c-F1b	Jordan Creek Road - Provide vehicular gate	Med - 9	1 EA	\$ 2,500.00
		S4c-F1c	Jordan Creek Road - Provide gravel trailhead parking (16 Spaces)	Med - 9	717 SY	\$ 24,525.20
		S4c-F2	Jordan Creek Greenway - Provide creek observation platform	Med - 9	200 SF	\$ 15,680.00



SOUTH RANGE WAYFINDING & INTERPRETATION RECOMMENDATIONS						
Management Unit Code	Management Unit Description	Key	Recommendation	Priority	Units	Cost
MUS01a	South Range West (Agricultural) (45 Acres)	S1a-W1	Jordan Creek Road Trailhead - Update trailhead kiosk	High - 2	1 EA	\$ 360.00
		S1a-W2	Border Trail Access Trail - Provide trail markers	High - 2	3 EA	\$ 97.80
MUS01b	South Range West (Forest) (33 Acres)	N/A	N/A			
MUS01c	South Range West (Forest Outlier) (48 Acres)	N/A	N/A			
MUS02a	Jordan Creek and Floodplain (26 Acres)	S2a-W1	Border Trail - Provide interpretative signage about wetlands and water resource protection	High - 2	1 EA	\$ 950.00
MUS02b	Jordan Creek and Floodplain (Outlier Parcel) (16 acres)	S2b-W1	Jordan Creek Greenway - Provide trailhead kiosk Greenway and Preserve mapping at trail entry	High - 2	1 EA	\$ 1,578.00
		S2b-W2	Jordan Road - Provide South Range identification sign at trail road crossing	High - 2	1 EA	\$ 70.90
		S2b-W3	Jordan Creek Greenway - Provide trail markers	High - 2	1 EA	\$ 32.60
MUS03a	Hemlock Ravine (South West) (8 acres)	S3a-W1	Border and Cover Bridge Trails - Provide trail markers	High - 2	1 EA	\$ 32.60
		S3a-W2	Old Packhouse Road - Provide South Range identification sign at road crossing	High - 2	1 EA	\$ 70.90
MUS03b	Hemlock Ravine (South East) (17 acres)	S3b-W1	Border Trail at Kid's Peace Access Drive - Provide trail markers both ends	High - 2	2 EA	\$ 65.20
		S3b-W2	Border Trail - Provide interpretative signage about Hemlock Forest	High - 2	1 EA	\$ 950.00
MUS04a	South Range East (Agriculture) (97 acres)	S4a-W1	Border Trail - Provide trail marker	High - 2	1 EA	\$ 32.60
		S4a-W2	Old Packhouse Road - Provide South Range identification sign at road crossing	Low - 9	1 EA	\$ 950.00
MUS04b	South Range East (Forest) (15 acres)	S4c-W1	Border Trail and Jordan Creek Greenway - Provide trail marker	High - 2	2 EA	\$ 65.20
MUS04c	South Range East (Agricultural Outlier) (46 acres)	S4c-W1	Jordan Creek Greenway - Provide new kiosk Greenway and Preserve mapping at trail head parking	Low - 9	2 EA	\$ 3,156.00
		S4c-W2	Jordan Creek Greenway - Provide trail markers	High - 2	1 EA	\$ 32.60
		S4c-W3	Jordan Creek Greenway & Greenway Trailhead Connector Trail - Provide trail marker	High - 2	2 EA	\$ 65.20



## Unit Cost Backup

### Vehicular Pavements

Driveway Pavement		1 SF		
1.	PADOT Class 1 Excavation	0.04 CY	\$ 55.92	\$ 2.07
2.	PADOT Subbase 6" Depth (No. 2a)	0.11 SY	\$ 19.31	\$ 2.15
3.	PADOT Superpave Asphalt Mixture Design, Base Course 4" Depth	0.11 SY	\$ 23.22	\$ 2.58
4.	PADOT Superpave Asphalt Mixture Design, Wearing Course 2" Depth	0.11 SY	\$ 10.07	\$ 1.12
			Total	\$ 7.92
			Cost / SF	\$ 8.00
			Cost / SY	\$ 72.00

Gravel Parking Area		1 SF		
1.	PADOT Class 1 Excavation	0.02 CY	\$ 55.92	\$ 1.38
2.	PADOT Subbase 8"Depth (No. 2a)	0.11 SY	\$ 20.95	\$ 2.33
			Total	\$ 3.71
			Cost / SF	\$ 3.80
			Cost / SY	\$ 34.20

ADA Parking		1 SF		
1.	ADA Stripping and symbol	1.00 EA	\$ 370.00	\$ 370.00
2.	ADA sign	1.00 EA	\$ 320.00	\$ 320.00
			Total	\$ 690.00
			Cost / EA	\$ 690.00

Vehicular Gate		1 EA			
1.	Vehicular Gate	1.00 EA	\$ 2,500.00	\$ 2,500.00	
				Total	\$ 2,500.00
				Cost / EA	\$ 2,500.00

PennDOT Type 2-w Guide Rail		1 EA		
1.	Type 2-W Guide Rail	1.00 LF	\$ 25.00	\$ 25.00
			Total	\$ 25.00
			Cost / EA	\$ 25.00

Pavement Removal, Soil & Planting Restoration		1 SF		
1.	PADOT Class 1B Excavation	0.04 CY	\$ 58.76	\$ 2.18
2.	PADOT Subbase 6" Depth (No. 2a)	0.11 SY	\$ 19.31	\$ 2.15
3.	Soil - 6 inch depth	0.04 CY	\$ 73.30	\$ 2.71
4.	Soil Amendments - 6 Inch Depth	0.11 SY	\$ 7.00	\$ 0.78
5.	Planting - Trees / Shrub/ Plugs	1.00 SF	\$ 8.50	\$ 8.50
6.	Mulch - Shredded Bark - 3 Inch Depth	0.11 SY	\$ 10.00	\$ 1.11
			Total	\$ 17.43
			Cost / SF	\$ 17.50
			Cost / SY	\$ 157.50



<b>Pavement Removal, Soil &amp; Lawn Restoration</b>		<b>1 SF</b>		
1.	PADOT Class 1B Excavation	0.04 CY	\$ 58.76	\$ 2.18
2.	PADOT Subbase 6" Depth (No. 2a)	0.11 SY	\$ 19.31	\$ 2.15
3.	Soil - 6 inch depth	0.04 CY	\$ 73.30	\$ 2.71
4.	Soil Amendments - 6 Inch Depth	0.11 SY	\$ 7.00	\$ 0.78
5.	Seed and Stabilize	0.005 LB	\$ 37.33	\$ 0.18
			<b>Total</b>	<b>\$ 8.00</b>
			<b>Cost / SF</b>	<b>\$ 8.00</b>
			<b>Cost / SY</b>	<b>\$ 72.00</b>

## Trail Surfaces

<b>Native Surface Hiking Trail - 3' wide 1' shoulder</b>		<b>5 SF</b>	<b>Sub Total</b>	
1.	Clear and Grubb Trail Bench	0.56 SY	\$ 5.00	\$ 2.78
2.	PADOT Class 1 Excavation	0.03 CY	\$ 55.92	\$ 1.73
3.	2" Native Soil Surface	0.03 CY	\$ 45.00	\$ 1.39
4.	Seed and Stabilize - 1 foot shoulders both sides	0.01 LB	\$ 37.33	\$ 0.37
			<b>Total</b>	<b>\$ 6.26</b>
			<b>Cost / LF</b>	<b>\$ 6.30</b>
			<b>Cost / SF</b>	<b>\$ 1.30</b>
			<b>Cost / SY</b>	<b>\$ 11.70</b>

<b>Native Surface Hiking Trail - 5' wide 1' shoulder</b>		<b>7 SF</b>	<b>Sub Total</b>	
1.	Clear and Grubb Trail Bench	0.78 SY	\$ 5.00	\$ 3.89
2.	PADOT Class 1 Excavation	0.04 CY	\$ 55.92	\$ 2.42
3.	2" Native Soil Surface	0.04 CY	\$ 45.00	\$ 1.94
4.	Seed and Stabilize - 1 foot shoulders both sides	0.01 LB	\$ 37.33	\$ 0.37
			<b>Total</b>	<b>\$ 8.61</b>
			<b>Cost / LF</b>	<b>\$ 8.60</b>
			<b>Cost / SF</b>	<b>\$ 1.20</b>
			<b>Cost / SY</b>	<b>\$ 10.80</b>

<b>Stone Dust - 5 Feet Wide</b>		<b>5 SF</b>		
1.	PADOT Class 1 Excavation	0.09 CY	\$ 55.92	\$ 5.18
2.	PADOT Subbase 4" Depth (No. 2a)	0.56 SY	\$ 12.87	\$ 7.15
3.	Geotextile, Class 4, Type A	0.56 SY	\$ 3.55	\$ 1.97
4.	Stone Dust Aggregate AASTHO #10 - 2 inch depth	0.03 CY	\$ 49.58	\$ 1.53
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 16.56</b>
			<b>Cost / LF</b>	<b>\$ 16.60</b>
			<b>Cost / SF</b>	<b>\$ 3.30</b>
			<b>Cost / SY</b>	<b>\$ 29.70</b>



<b>Stone Dust - 8 Feet Wide</b>		<b>8 SF</b>		
1.	PADOT Class 1 Excavation	0.15 CY	\$ 55.92	\$ 8.28
2.	PADOT Subbase 4" Depth (No. 2a)	0.89 SY	\$ 12.87	\$ 11.44
3.	Geotextile, Class 4, Type A	0.89 SY	\$ 3.55	\$ 3.16
4.	Stone Dust Aggregate AASTHO #10 - 2 inch depth	0.05 CY	\$ 49.58	\$ 2.45
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 26.06</b>
			<b>Cost / LF</b>	<b>\$ 26.10</b>
			<b>Cost / SF</b>	<b>\$ 3.30</b>
			<b>Cost / SY</b>	<b>\$ 29.70</b>

<b>Stone Dust - 12 Feet Wide</b>		<b>12 SF</b>		
1.	PADOT Class 1 Excavation	0.22 CY	\$ 55.92	\$ 12.43
2.	PADOT Subbase 4" Depth (No. 2a)	1.33 SY	\$ 12.87	\$ 17.16
3.	Geotextile, Class 4, Type A	1.33 SY	\$ 3.55	\$ 4.73
4.	Stone Dust Aggregate AASTHO #10 - 2 inch depth	0.07 CY	\$ 49.58	\$ 3.67
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 38.72</b>
			<b>Cost / LF</b>	<b>\$ 38.70</b>
			<b>Cost / SF</b>	<b>\$ 3.20</b>
			<b>Cost / SY</b>	<b>\$ 28.80</b>

<b>Asphalt Walkways 5</b>		<b>5 SF</b>		<b>Sub Total</b>
1.	PADOT Class 1 Excavation	0.15 CY	\$ 55.92	\$ 8.63
2.	PADOT Subbase 6" Depth (No. 2a)	0.56 SY	\$ 19.31	\$ 10.73
3.	PADOT Superpave Asphalt Mixture Design, Base Course 2"	0.56 SY	\$ 11.61	\$ 6.45
4.	PADOT Superpave Asphalt Mixture Design, Wearing Course 2"	0.56 SY	\$ 10.07	\$ 5.59
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 32.13</b>
			<b>Cost / LF</b>	<b>\$ 32.10</b>
			<b>Cost / SF</b>	<b>\$ 6.40</b>
			<b>Cost / SY</b>	<b>\$ 57.60</b>

<b>Asphalt Walkways 6</b>		<b>6 SF</b>		<b>Sub Total</b>
1.	PADOT Class 1 Excavation	0.19 CY	\$ 55.92	\$ 10.36
2.	PADOT Subbase 6" Depth (No. 2a)	0.67 SY	\$ 19.31	\$ 12.87
3.	PADOT Superpave Asphalt Mixture Design, Base Course 2"	0.67 SY	\$ 11.61	\$ 7.74
4.	PADOT Superpave Asphalt Mixture Design, Wearing Course 2"	0.67 SY	\$ 10.07	\$ 6.71
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 38.41</b>
			<b>Cost / LF</b>	<b>\$ 38.40</b>
			<b>Cost / SF</b>	<b>\$ 6.40</b>
			<b>Cost / SY</b>	<b>\$ 57.60</b>



<i>Asphalt Walkways 8</i>		<i>8 SF</i>	<i>Sub Total</i>	
1.	PADOT Class 1 Excavation	0.25 CY	\$ 55.92	\$ 13.81
2.	PADOT Subbase 6" Depth (No. 2a)	0.89 SY	\$ 19.31	\$ 17.16
3.	PADOT Superpave Asphalt Mixture Design, Base Course 2"	0.89 SY	\$ 11.61	\$ 10.32
4.	PADOT Superpave Asphalt Mixture Design, Wearing Course 2"	0.89 SY	\$ 10.07	\$ 8.95
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 50.97</b>
			<b>Cost / LF</b>	<b>\$ 51.00</b>
			<b>Cost / SF</b>	<b>\$ 6.40</b>
			<b>Cost / SY</b>	<b>\$ 57.60</b>

<i>Asphalt Walkways 10</i>		<i>10 SF</i>	<i>Sub Total</i>	
1.	PADOT Class 1 Excavation	0.31 CY	\$ 55.92	\$ 17.26
2.	PADOT Subbase 6" Depth (No. 2a)	1.11 SY	\$ 19.31	\$ 21.46
3.	PADOT Superpave Asphalt Mixture Design, Base Course 2"	1.11 SY	\$ 11.61	\$ 12.90
4.	PADOT Superpave Asphalt Mixture Design, Wearing Course 2"	1.11 SY	\$ 10.07	\$ 11.19
5.	Seed and Stabilize - 2 foot shoulders both sides	0.02 LB	\$ 37.33	\$ 0.73
			<b>Total</b>	<b>\$ 63.53</b>
			<b>Cost / LF</b>	<b>\$ 63.50</b>
			<b>Cost / SF</b>	<b>\$ 6.40</b>
			<b>Cost / SY</b>	<b>\$ 57.60</b>

<i>Trail Boardwalk with Railings</i>		<i>10 SF</i>	<i>Sub Total</i>	
1.	Wood Piling & Decking Boardwalk	10.00 SF	\$ 70.00	\$ 700.00
2.	Railings	2.00 LF	\$ 42.00	\$ 84.00
			<b>Total</b>	<b>\$ 784.00</b>
			<b>Cost / LF</b>	<b>\$ 784.00</b>
			<b>Cost / SF</b>	<b>\$ 78.40</b>
			<b>Cost / SY</b>	<b>\$ 705.60</b>

<i>Trail Boardwalk at Grade on Railings</i>		<i>10 SF</i>	<i>Sub Total</i>	
1.	Wood Piling & Decking Boardwalk	10.00 SF	\$ 50.00	\$ 500.00
			<b>Total</b>	<b>\$ 500.00</b>
			<b>Cost / LF</b>	<b>\$ 500.00</b>
			<b>Cost / SF</b>	<b>\$ 50.00</b>
			<b>Cost / SY</b>	<b>\$ 450.00</b>

<i>Pedestrian Crosswalk New at Grade</i>		<i>1 EA</i>	<i>Sub Total</i>	
1.	Crosswalk - Zebra Striped	1.00 EA	\$ 2,200.00	\$ 2,200.00
2.	Signage - Crossing ahead & Yield to Crosswalk	4.00 EA	\$ 230.00	\$ 920.00
3.	ADA landing with Detectable Warning Surface (no curbs)	40.00 SF	\$ 25.00	\$ 1,000.00
			<b>Total</b>	<b>\$ 4,120.00</b>
			<b>Cost / EA</b>	<b>\$ 4,120.00</b>



<b>Trail Ford Approach Stabilization - 12' wide, 15 LF Each Bank</b>		<b>360 SF</b>	
1.	PADOT Class 1 Excavation	16.67 CY	\$ 55.92 \$ 932.00
3.	Porous concrete Block Surface	360.00 SF	\$ 35.00 \$ 12,600.00
4.	Stabilize Slope Plugs - 20% coverage - 6' each side	600.00 SF	\$ 2.50 \$ 1,500.00
5.	Stabilize Slope Compost Blanket - Seeded with Formula N - 6' each side	66.67 SY	\$ 4.75 \$ 316.67
		<b>Total</b>	<b>\$ 15,348.67</b>
		<b>Cost / LS</b>	<b>\$ 15,348.70</b>
		<b>Cost / SF</b>	<b>\$ 42.60</b>
		<b>Cost / SY</b>	<b>\$ 383.40</b>

<b>New Pedestrian Bridge - 14' Clear Deck</b>		<b>1 LS</b>	
1.	Pedestrian Bridge - Deliver 10' wide Trail	1,680.00 SF	\$ 200.00 \$ 336,000.00
3.	Bridge Abutments	2.00 EA	\$ 75,000.00 \$ 150,000.00
4.	Boardwalk Trail Approaches	100.00 LF	\$ 784.00 \$ 78,400.00
		<b>Total</b>	<b>\$ 564,400.00</b>
		<b>Cost / LS</b>	<b>\$ 564,400.00</b>

### Trail Repairs

<b>Former Alignment Trail Rehabilitation - 8 Feet Wide</b>		<b>8 SF</b>	
1.	Grade Subbase	0.89 SY	\$ 1.18 \$ 1.05
2.	Soil Amendments - 3 inch depth	0.89 SY	\$ 3.50 \$ 3.11
3.	Plugs - 20% coverage	1.60 SF	\$ 2.50 \$ 4.00
4.	Compost Blanket - Seeded with Formula N	0.89 SY	\$ 4.75 \$ 4.22
		<b>Total</b>	<b>\$ 12.38</b>
		<b>Cost / LF</b>	<b>\$ 12.40</b>
		<b>Cost / SF</b>	<b>\$ 1.50</b>
		<b>Cost / SY</b>	<b>\$ 13.50</b>

<b>Earthen Trail Realignment on 33% slope - 5' wide 1' shoulder</b>		<b>7 SF</b>	
1.	PADOT Class 1 Excavation - 15" Average Depth	0.32 CY	\$ 55.92 \$ 18.12
2.	Placement & Compaction of Embankment & Fill - 15" Average Depth	0.32 CY	\$ 47.38 \$ 15.35
3.	Earthen Trail Surface with shoulders	7.00 SF	\$ 1.20 \$ 8.40
4.	Stabilize Slope Plugs - 20% coverage - 6' each side	2.40 SF	\$ 2.50 \$ 6.00
5.	Stabilize Slope Compost Blanket - Seeded with Formula N - 6' each side	1.33 SY	\$ 4.75 \$ 6.33
		<b>Total</b>	<b>\$ 54.21</b>
		<b>Cost / LF</b>	<b>\$ 54.20</b>
		<b>Cost / SF</b>	<b>\$ 7.70</b>
		<b>Cost / SY</b>	<b>\$ 69.30</b>

<b>Earthen Trail Rehabilitation - Widen trail and Adjust Cross Slope - 5' wide 1' sl</b>		<b>7 SF</b>	
1.	PADOT Class 1 Excavation - 6" Average Depth	0.13 CY	\$ 55.92 \$ 7.25
2.	Placement & Compaction of Embankment & Fill - 6" Average Depth	0.13 CY	\$ 47.38 \$ 6.14
3.	Seed and Stabilize - 2 foot width both sides	0.02 LB	\$ 37.33 \$ 0.73
		<b>Total</b>	<b>\$ 14.12</b>
		<b>Cost / LF</b>	<b>\$ 14.10</b>
		<b>Cost / SF</b>	<b>\$ 2.00</b>
		<b>Cost / SY</b>	<b>\$ 18.00</b>



<i>Earthen Trail Rehabilitation - Drainage: Knick - 7' wide 10' length</i>		<i>1 EA</i>	
1.	PADOT Class 1 Excavation	1.30 CY	\$ 55.92 \$ 72.49
3.	Seed and Stabilize - 2 foot width both sides	0.20 LB	\$ 37.33 \$ 7.30
		<b>Total</b>	<b>\$ 79.79</b>
		<b>Cost / EA</b>	<b>\$ 79.80</b>

<i>Earthen Trail Rehabilitation - Drainage: Rolling Grade Dip - 7' wide 30' long</i>		<i>1 EA</i>	
1.	PADOT Class 1 Excavation	1.30 CY	\$ 55.92 \$ 72.49
2.	Placement & Compaction of Embankment & Fill	2.59 CY	\$ 47.38 \$ 122.84
3.	Seed and Stabilize - 2 foot width both sides	0.59 LB	\$ 37.33 \$ 21.90
		<b>Total</b>	<b>\$ 217.23</b>
		<b>Cost / EA</b>	<b>\$ 217.20</b>
		<b>Cost / SF</b>	<b>\$ 1.00</b>
		<b>Cost / SY</b>	<b>\$ 9.00</b>

<i>Earthen Trail Rehabilitation - Drainage: Reinforced Armored Grade Dip</i>		<i>1 EA</i>	
1.	PADOT Class 1 Excavation	4.44 CY	\$ 55.92 \$ 248.53
2.	Placement water bar boulders - 15' long	5.00 EA	\$ 80.00 \$ 400.00
2.	Placement Retainer bar boulders - 15' long	7.00 EA	\$ 32.00 \$ 224.00
3.	Placement of Riprap Tray - 2' wide	0.74 CY	\$ 55.00 \$ 40.74
4.	Reinforcement Plantings a Water bar Outlet	16.00 SF	\$ 2.50 \$ 40.00
4.	Seed and Stabilize - 2 foot width both sides	0.33 LB	\$ 37.33 \$ 12.41
		<b>Total</b>	<b>\$ 965.68</b>
		<b>Cost / EA</b>	<b>\$ 965.70</b>

## Signage and wayfinding

<i>Trail Markers</i>		<i>1 EA</i>	
1.	60" Carsonite Trail Post with anchor	1.00 EA	\$ 19.00 \$ 19.00
2.	Information & Trail Use Decal	6.00 EA	\$ 2.15 \$ 12.90
3.	Seed and Stabilize - 2 foot width both sides	0.02 LB	\$ 37.33 \$ 0.73
		<b>Total</b>	<b>\$ 32.63</b>
		<b>Cost / EA</b>	<b>\$ 32.60</b>

<i>Range Sign</i>		<i>1 EA</i>	
1.	Reflective Aluminum Sign	1.50 SF	\$ 27.08 \$ 40.62
2.	Steel U Channel Post - 12'	1.00 EA	\$ 30.25 \$ 30.25
		<b>Total</b>	<b>\$ 70.87</b>
		<b>Cost / EA</b>	<b>\$ 70.90</b>

<i>Interpretive Signage</i>		<i>1 EA</i>	
1.	Custom High Pressure laminate Outdoor Graphic Panel	8.00 SF	\$ 100.00 \$ 800.00
2.	Wooden Post with Aluminum Mounting Hardware	1.00 EA	\$ 150.00 \$ 150.00
		<b>Total</b>	<b>\$ 950.00</b>
		<b>Cost / EA</b>	<b>\$ 950.00</b>



<i>New Trailhead Kiosk</i>		1 EA		
1.	Wood Structure	1.00 LS	\$ 250.00	\$ 250.00
2.	Roof - Decking and Shingle	32.00 SF	\$ 30.25	\$ 968.00
3.	Map Board	24.00 SF	\$ 15.00	\$ 360.00
			<b>Total</b>	<b>\$ 1,578.00</b>
			<b>Cost / EA</b>	<b>\$ 1,578.00</b>

<i>Update Trailhead Kiosk</i>		1 EA		
1.	Map Board	24.00 SF	\$ 15.00	\$ 360.00
			<b>Total</b>	<b>\$ 360.00</b>
			<b>Cost / EA</b>	<b>\$ 360.00</b>

<i>Remove Trailhead Kiosk</i>		1 EA		
1.	Demo Kiosk	32.00 SF	\$ 5.00	\$ 160.00
			<b>Total</b>	<b>\$ 160.00</b>
			<b>Cost / EA</b>	<b>\$ 160.00</b>

## Facilities

<i>Retrofit Shelters</i>		1 EA		
1.	Remove Plywood Sides Wood Structure	240.00 SF	\$ 0.50	\$ 120.00
2.	Rough Sawn Timber - 2 x 12	480.00 BF	\$ 1.50	\$ 720.00
3.	Plexi glass panel for viewing	24.00 SF	\$ 2.91	\$ 69.84
			<b>Total</b>	<b>\$ 909.84</b>
			<b>Cost / EA</b>	<b>\$ 909.80</b>

<i>Boulder Shaded Sitting Grove - 10' diameter</i>		80 EA		
1.	Stone Dust Paving	80.00 SF	\$ 3.20	\$ 256.00
2.	Boulder - approximate 3' x 2' x 3'	5.00 EA	\$ 80.00	\$ 400.00
3.	Shade Trees	7.00 EA	\$ 500.00	\$ 3,500.00
			<b>Total</b>	<b>\$ 4,156.00</b>
			<b>Cost / EA</b>	<b>\$ 4,156.00</b>

<i>Single Occupancy Composting Toilet</i>		120 SF		
1.	Concrete Pad	120.00 SF	\$ 6.00	\$ 720.00
2.	Modular Composting Toilet Unit	1.00 LS	\$ 12,000.00	\$ 12,000.00
			<b>Total</b>	<b>\$ 12,720.00</b>
			<b>Cost / EA</b>	<b>\$ 12,720.00</b>

<i>Rustic Wheel Stop</i>		1 EA		
1.	Salvaged Telephone Pole - 20'	0.50 EA	\$ 90.00	\$ 45.00
2.	#4 rebar Stakes - 18"	3.00 LF	\$ 0.88	\$ 2.64
			<b>Total</b>	<b>\$ 47.64</b>
			<b>Cost / EA</b>	<b>\$ 47.60</b>



<b>ADA Benches - 6' Long</b>		<b>1 EA</b>		
1.	Stone Dust Pad - Provide additional Area for Wheel Chair	31.50 SF	\$ 3.30	\$ 103.95
2.	Concrete Foundation	0.17 CY	\$ 350.00	\$ 61.06
3.	Steel Powder Coated Bench with Arm Rest	1.00 EA	\$ 2,000.00	\$ 2,000.00
			<b>Total</b>	<b>\$ 2,165.01</b>
			<b>Cost / EA</b>	<b>\$ 2,200.00</b>

<b>Photo Point</b>		<b>1 EA</b>		
1.	High Pressure Laminate Outdoor Graphic Panel with Insert for Phone	1.00 SF	\$ 100.00	\$ 100.00
2.	Concrete Foundation	0.09 CY	\$ 350.00	\$ 30.53
3.	Wooden Post with Aluminum Mounting Hardware	1.00 EA	\$ 150.00	\$ 150.00
			<b>Total</b>	<b>\$ 280.53</b>
			<b>Cost / EA</b>	<b>\$ 300.00</b>

<b>Demolition Bird Blind</b>		<b>1 LS</b>		
1.	Demo wood Structure	200.00 SF	\$ 8.00	\$ 1,600.00
			<b>Total</b>	<b>\$ 1,600.00</b>
			<b>Cost / LS</b>	<b>\$ 1,600.00</b>

<b>Outdoor Classroom Sitting Grove - 20' diameter</b>		<b>310 EA</b>		
1.	Clear and Grub Area	310.00 EA	\$ 5.00	\$ 1,550.00
2.	Stone Dust Paving	310.00 SF	\$ 1.20	\$ 372.00
3.	Cut log seats set in stone- approximate 18" Dia x 17" high, embed 6"	20.00 EA	\$ 25.00	\$ 500.00
			<b>Total</b>	<b>\$ 872.00</b>
			<b>Cost / EA</b>	<b>\$ 872.00</b>

<b>Post and Rail Fence</b>		<b>1 LF</b>		
1.	Post and Rail Fence	1.00 LF	\$ 28.00	\$ 28.00
2.	Stone Dust Paving - 4' road shoulder and trail shoulder	4.00 SF	\$ 3.30	\$ 13.20
			<b>Total</b>	<b>\$ 41.20</b>
			<b>Cost / EA</b>	<b>\$ 41.20</b>

<b>Seat wall Outdoor Classroom</b>		<b>1 LS</b>		
1.	Remove Asphalt Paving and restore lawn	4,425.00 SF	\$ 8.00	\$ 35,400.00
2.	Boulder Seat walls 18" high- approximate 3' x 2.5 x 3'	50.00 LF	\$ 30.00	\$ 1,500.00
3.	Stone Dust Paving	1,125.00 SF	\$ 3.30	\$ 3,712.50
2.	Pedestrian Crosswalk	1.00 LS	\$ 4,120.00	\$ 4,120.00
			<b>Total</b>	<b>\$ 44,732.50</b>
			<b>Cost / EA</b>	<b>\$ 44,732.50</b>

<b>Picnic Grove</b>		<b>1 LS</b>		
1.	Stone Dust Paving	200.00 SF	\$ 3.30	\$ 660.00
2.	Picnic Tables - 50% ADA	5.00 EA	\$ 2,400.00	\$ 12,000.00
3.	Shade Trees	10.00 EA	\$ 500.00	\$ 5,000.00
4.	Establish meadow along riparian edge - Formula N mix	13.75 LB	\$ 70.00	\$ 962.67
			<b>Total</b>	<b>\$ 18,622.67</b>
			<b>Cost / EA</b>	<b>\$ 18,622.70</b>



<i>Old Packhouse Road Trail Head - Ford Parking</i>		<i>1 LS</i>	
1. Entrance Drive and Drop-off Circle - Asphalt	131.11 SY	\$ 72.00	\$ 9,440.00
2. Ford Trailhead Parking - 44 Spaces Gravel	2,164.89 SY	\$ 34.20	\$ 74,039.20
3. Wheel Stops - concrete	44.00 EA	\$ 100.00	\$ 4,400.00
4. Shade Trees	25.00 EA	\$ 500.00	\$ 12,500.00
5. Establish meadow along riparian edge - Formula N mix	41.31 LB	\$ 70.00	\$ 2,891.78
6. BMP Allowance	277.78 SY	\$ 62.10	\$ 17,250.00
		<b>Total</b>	<b>\$ 120,520.98</b>
		<b>Cost / EA</b>	<b>\$ 120,521.00</b>

<i>Old Packhouse Road Trail Head - Equestrian Trailer Parking</i>		<i>1 LS</i>	
1. Driveway Apron - Asphalt	88.89 SY	\$ 72.00	\$ 6,400.00
2. Trailer Parking - 13 Spaces Gravel	4,209.11 SY	\$ 34.20	\$ 143,951.60
3. Wheel Stops - concrete	13.00 EA	\$ 100.00	\$ 1,300.00
3. Shade Trees	25.00 EA	\$ 500.00	\$ 12,500.00
5. Establish meadow along riparian edge - Formula N mix	37.64 LB	\$ 70.00	\$ 2,635.11
5. BMP Allowance	277.78 SY	\$ 62.10	\$ 17,250.00
		<b>Total</b>	<b>\$ 184,036.71</b>
		<b>Cost / EA</b>	<b>\$ 184,036.70</b>

<i>Old Packhouse Road Trail Head - Equestrian Trailer Parking</i>		<i>1 LS</i>	
1. Pavement Removal, Soil & Lawn Restoration	641.33 SY	\$ 72.00	\$ 46,176.00
2. New Asphalt Paving	992.22 SY	\$ 72.00	\$ 71,440.00
2. Milling of Asphalt, 2" Depth, Milling Retained By Contractor	1,936.56 SY	\$ 21.74	\$ 42,100.72
4. PADOT Superpave Asphalt Mixture Design, Wearing Course 2" Depth	1,936.56 SY	\$ 10.07	\$ 19,501.11
3. Wheel Stops - concrete	55.00 EA	\$ 100.00	\$ 5,500.00
3. Shade Trees	30.00 EA	\$ 500.00	\$ 15,000.00
5. Establish meadow along riparian edge - Formula N mix	98.90 LB	\$ 70.00	\$ 6,923.16
5. BMP Allowance	277.78 SY	\$ 62.10	\$ 17,250.00
		<b>Total</b>	<b>\$ 223,890.99</b>
		<b>Cost / EA</b>	<b>\$ 223,891.00</b>

<i>Small Picnic Shelter - 20' x 20'</i>		<i>1 LS</i>	
1. Concrete pad	625.00 SF	\$ 6.00	\$ 3,750.00
2. Pavilion Structure	400.00 SF	\$ 125.00	\$ 50,000.00
2. Picnic Tables - 50% ADA	4.00 SY	\$ 2,400.00	\$ 9,600.00
3. Shade Trees	5.00 EA	\$ 500.00	\$ 2,500.00
		<b>Total</b>	<b>\$ 65,850.00</b>
		<b>Cost / EA</b>	<b>\$ 65,850.00</b>



## STORMWATER BEST MANAGEMENT PRACTICES

<i>BMP Swale or rain garden - 1.5 average depth</i>		<i>1 SF</i>		
1.	PADOT Class 1 Excavation	0.06 CY	\$ 72.00	\$ 4.00
2.	Grade BMP	0.11 SY	\$ 1.18	\$ 0.13
4.	6" Clean #57 Subbase	0.02 CY	\$ 55.00	\$ 1.02
3.	Grade Subbase	0.11 SY	\$ 1.18	\$ 0.13
5.	Soil Amendments - 6 Inch Depth	0.11 SY	\$ 7.00	\$ 0.78
6.	Establish meadow along riparian edge - Formula N mix	0.005 LB	\$ 70.00	\$ 0.34
7.	Plugs - 20% coverage	0.20 SF	\$ 2.50	\$ 0.50
			<b>Total</b>	<b>\$ 6.90</b>
			<b>Cost / SF</b>	<b>\$ 6.90</b>
			<b>Cost / SY</b>	<b>\$ 62.10</b>





# TREXLER NATURE PRESERVE

## An Ecological Assessment in Support of a Site Master Plan

### Abstract

A comprehensive natural resource inventory by class and management unit and ecological recommendations.

Prepared by Applied Ecological Services  
On behalf of Simone Collins Landscape Architecture



## Table of Contents

Executive Summary.....	3
Acknowledgement .....	3
Introduction .....	3
Materials and Methods.....	4
Rapid Ecological Assessment .....	4
Plants.....	5
Birds .....	5
Herpetofauna .....	5
Time (and Area) Constrained Searches (TCS) .....	5
Random Opportunistic Sampling .....	6
Mammals .....	6
Scat and Track Analysis .....	6
Results .....	6
Plants and Animals .....	6
Plants.....	6
Birds .....	6
Herpetofauna .....	7
Mammals .....	8
Management Units .....	8
North Range .....	9
MUN01 The North Flats .....	9
MUN02 Jordan Creek and Floodplains .....	9
MUN03 The North Slopes .....	10



Central Range.....	10
MUC01a Environmental Education Center (Central East) .....	10
MUC01b Environmental Education Center (North East) .....	11
MUC02a Jordan Creek and Floodplain (Central North) .....	11
MUC02b Jordan Creek and Floodplain (Central South) .....	11
MUC03a Hemlock Ravine (Central North) .....	12
MUC03b Hemlock Ravine (Central South) .....	12
MUC04 Maintenance Yard .....	13
MUC05 Working Lands .....	13
MUC06 North Woods.....	14
MUC07 The West Meadows .....	14
South Range .....	14
MUS01a South Range West (Agricultural) .....	14
MUS01b South Range West (Forest) .....	15
MUS01c South Range West (Forest Outlier).....	15
MUS02a Jordan Creek and Floodplain .....	16
MUS02b Jordan Creek and Floodplain (Outlier Parcel) .....	16
MUS03a Hemlock Ravine (South West).....	16
MUS03b Hemlock Ravine (South East) .....	17
MUS04a South Range East (Agriculture) .....	17
MUS04b South Range East (Forest) .....	17
MUS04c South Range East (Agricultural Outlier).....	18
Discussion and Management Recommendations.....	18
Universal Recommendations .....	18



Recommendations Matrix for Trexler Nature Preserve ..... 19

Proposed 10 Year Phasing of Ecological Projects at TNP..... 20

Executive Summary

A robust rapid inventory was conducted of the 1,108-acre Trexler Nature Preserve in support of a Site Master Plan in 2020. Results include 84 bird species, 8 amphibians, 3 reptiles, 13 mammal species, and hundreds of plant and insect species. Habitat types include hemlock ravines, mesophytic hardwood forests, stream-associated palustrine emergent wetlands and palustrine forested wetlands, fallow pasture lands, planted shrub monocultures, and areas in active conversion to grasslands from the former. The area showcases spectacular insular views of the Jordan Creek system as well as strategic overlooks of the rolling hill topography that dominates the region.

Surveys this year support the significant potential for increasing both abundance and diversity of biota to enhance the overall user experience and contribute to outstanding stewardship of Pennsylvania’s great natural resources.

Acknowledgement

We would like to thank the many amazing people who support this effort, especially the steering committee members, County land management staff, the Wildlands Conservancy, the Simone Collins design team, the PA Game Commission, and citizen scientists for sharing qualified observations from many regular visits to the site all year.

Introduction

Applied Ecological Services (AES) was hired to conduct an ecological assessment of Trexler Nature Preserve, a 1,108-acre property located in Lehigh County, PA. The area was originally purchased by local industrialist General Harry Clay Trexler with the intention of stocking the property with big game and preserving North American Bison. Lehigh County assumed the title to the property in 1935 after Trexler’s death and has managed it ever since. The preserve was largely closed to the public until 2006 when the entire property was opened to public. The preserve is divided into different ranges defined by distinct topography and habitat: North Range, Central Range, and South Range. For ease of assessment and to account for variability, the ranges have been further categorized into management units that will be described further along in this report. Jordan Creek and its associated tributaries and wetlands create beneficial habitat throughout the preserve and help to shape many features and habitats. The preserve contains large tracts of grassland which is unique for Pennsylvania and present some creative management ideas. As with many natural areas enjoyed by humans, the area suffers from many invasive species, especially Autumn Olive (*Elaeagnus umbellata*). In order to adequately manage the site in a manner that protects existing natural heritage, restores degraded areas, and provides safe access for the public, a rapid assessment of the existing ecological conditions has been compiled.



Using a variety of peer-reviewed and standardized methods, AES (in concert with other project team members and key project stakeholders) has developed a custom study of this site to establish a baseline data set of wildlife, plants, water and wetland resources, upland habitat types, and other important variables. The following report details our selected methods, results, and a set of ecological recommendations for thoughtful management of wildlife populations, botanical diversity, and the creation, stewardship, and protection of a mosaic of habitat types to support these biotic elements at Trexler Nature Preserve.

## Materials and Methods

The site has been the focus of a variety of interested parties over the past few years which has resulted in the collection of a variety of data sets that can support this ecological assessment. Various natural history data have been collected prior to our assessment that can aid in understanding the site and save time when analyzing the site. These data sets are referred to as secondary data (pre-existing information). Our collected data in support of this project is referred to as primary data. Secondary data sets include e-Bird records, plant lists, and other previously collected data sets. We would like to thank all contributors and compilers of pre-existing data in support of this project (see acknowledgments section). Primary data include the following onsite methodologies.

### Rapid Ecological Assessment

A team of AES ecologists visited the site in the summer and fall months to walk the site in its entirety in search of indication of various ecological stressors and examples of intact habitat types. ArcCollector was used to spatially align observations throughout the site for aid in mapping and location-specific recommendations. Some of the primary goals of this rapid assessment included:

- Searching for combinations of abiotic and biotic features that might serve as critical habitat for rare, threatened and/or endangered species known to the region
- Locating any intact habitat locations that are free of invasive plant and/or animal pressure
- Locating any representation of forest ecosystems that have all strata present (canopy, understory, and groundstory) and evidence of forest regeneration
- Finding locations that show physical evidence of erosion within the drainage systems on site
- Finding locations of any impediments to drainage/flow or faunal migration within the stream systems
- Identifying sections of forested landscape with need for thinning, clearing, or other timber management needs/opportunities for ecological enhancement
- Documenting invasive plant species populations for development of an invasive species management plan

For succinct alignment of various data sets and recommendations, the site has been separated into distinct Management Units (MUs). All forested MUs are aligned with the forestry report for ease of comparison.



## Plants

Timed meanders were the primary method used for botanical data collection within each of the identified MUs on site. This involved setting a fixed time and walking through each polygon collecting notes of species presence and relative abundance per species.

Primary goals for plant surveys were to characterize vegetation communities, locate any rare plants/rare plant habitats, and to document invasive species throughout the preserve.

## Birds

AES conducted point counts at 16 locations on site to systematically collect avifaunal data using Unlimited Distance, Single-Observer Point Counts at Trexler Nature Preserve. Point count locations were selected to represent particular habitat types. Bird diversity, abundance, and activity are invaluable to track ecosystem function in the various onsite habitat types.

## Herpetofauna

A robust survey for documenting reptiles and amphibians (collectively, herpetofauna) often requires multiple survey methods and significant effort through spring, summer, and fall months. These faunal assemblages have very low detection probabilities and, as ectotherms, are heavily reliant on external variables for metabolic function and life history activities. For this reason, a variety of systematic trapping is often required to confirm presence/absence. While this level of detail is not required for supporting this design, understanding the herpetofaunal community at Trexler Nature Preserve as best possible allows us to minimize impacts to existing populations and maximize the integration of critical habitats and safe mobility between these critical habitats by frogs, toads, salamanders, snakes, turtles, and lizards on site. AES has enacted two survey methods on site that do not require scientific collection permits, labor-intensive survey methods, or trapping and tracking infrastructure (ex. pitfall traps, hoop nets, radiotelemetry, etc.). The combination of these survey methods has proven to result in a near-comprehensive (~75% of all species detected) inventory of herpetofaunal assemblage in the region. These methods are described below.

## Time (and Area) Constrained Searches (TCS)

TCS involves visiting the site at the proper times of day in spring, summer, and fall months when weather conditions are suitable for reptiles and amphibians to be surface active or concealed on the surface (rather than being underwater, buried in soil, or in burrows). Areas are delineated by the Management Units (and sub-units). Optimal conditions usually involve temperatures between 60- and 85-degrees Fahrenheit with some cloud cover and low to no wind. Precipitation (or recent rain) can be a valuable factor for certain species, with recent rain being ideal. These searches include using binoculars and spotting telescopes to search for basking turtles and snakes in water bodies, carefully searching under cover objects (logs, stones, and debris piles) for concealed snakes, salamanders, and anurans, and carefully searching for active/moving reptiles and amphibians in various habitats. Strict conservation etiquette is enacted when searching, making sure to replace logs and stones as found and carefully removing any found animals prior to replacing these objects to prevent injury of the animals. All found animals are released unharmed at the location where found.



### Random Opportunistic Sampling

While on site conducting other data gathering exercises, our lead field biologist would pause to search locations for herpetofauna when conditions (weather, time of day, season, etc.) were appropriate. This involves similar search methods to the TCS methodology but in an opportunistic nature.

### Mammals

With a diverse mosaic of habitat types, geology, soils, and other environmental factors, the site has potential to support a wide array of mammal species. Similar to the herpetofaunal approach, we've enacted low-cost and efficient methods to develop a general understanding of the mammal communities on site without completing a comprehensive assessment using random opportunistic sampling and scat and track analysis.

### Scat and Track Analysis

AES biologists and ecologists targeted stream margins, wet soil on trails, and other suitable locations on site to review tracks left by mammals traversing the site. Additionally, any encountered scat, hair, bones, or evidence in the landscape (buck rub, burrows, nests, cavities, etc.) were documented as evidence of mammal presence and, whenever possible, identified to the species level.

## Results

### Plants and Animals

An ongoing species list is being compiled for the site for vascular plants, reptiles, amphibians, mammals, and birds. Please refer to the appendices for these lists. These lists are the result of site visits in the summer and fall of 2020.

### Plants

A total of 197 plant species have been identified representing 9 different natural communities and 3 man-made communities. Invasive species are represented by 23 species (4 vines, 6 shrubs, 5 grasses, and 8 forbs) but many of these are dominants (most dense within communities as well as most widely distributed in some instances). A few lithophilic plant communities (within intact sloping mesic hardwood forests and hemlock ravines) are supporting regionally rare fern allies. Please see management unit descriptions for more on plant communities. A full species list will be provided as an appendix.

### Birds

The site was visited during the breeding and fall migration seasons in 2020. A total of 84 species were observed. Of these, 52 were confirmed or probable breeders per the PA Breeding Bird Survey behavior codes. The most common species on site are associated with small woodlots and field edges, such as American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), and American goldfinch (*Spinus tristis*). Interior breeding birds such as wood thrush (*Hylocichla mustelina*) and ovenbird (*Seiurus aurocapillus*) were



found in three forested sections during the breeding season. Alder flycatcher (*Empidonax virescens*) and willow flycatcher (*Empidonax traillii*) were defending territories in suitable habitat along Jordan Creek floodplain in the forest and shrubby wetland area, respectively. Some of the regionally rare species that are breeding on site include savanna sparrow (*Passerculus sandwichensis*) in the North Range meadows and one territorial hooded warbler (*Setophaga citrina*) on a forested slope near the elk enclosure. Fall migration is protracted and difficult to fully capture in one season. That said, we documented a great diversity of fall passerine (songbirds) and raptors at TNP. Highlights include 18 warbler species, Lincoln's sparrows (*Melospiza lincolni*), vesper sparrow (*Poocetes gramineus*), and white-crowned sparrow (*Zonotrichia albicollis*). An adult bald eagle (*Haliaeetus leucocephalus*) was observed carrying nesting material over the western portion of the Central Range (flying west) in late fall (early nesting season). A full species list will be provided as an appendix.

### Herpetofauna

Aquatic resources are critical for the life history of most reptiles and all amphibians in our region. Therefore, targeted search efforts for herpetofauna we centered around wetlands and Jordan Creek. Upland searches were conducted (primarily for snakes) as well. A total of 9 amphibian species were documented on site during our study (Table 1).

Table 1. Observed Amphibians at Trexler Nature Preserve

Common name	Scientific Name	Notes
American toad	<i>Anaxyrus americanus</i>	Most common anuran on site
spring peeper	<i>Pseudacris c. crucifer</i>	In wetlands and woods
pickerel frog	<i>Lithobates palustris</i>	Found in Jordan Creek
wood frog	<i>Lithobates sylvatica</i>	Found in woods
northern green frog	<i>Lithobates clamitans melanota</i>	Common/Found throughout
bullfrog	<i>Lithobates catesbeiana</i>	In Jordan Creek
northern gray treefrog	<i>Hyla versicolor</i>	Calling from woods
eastern redback salamander	<i>Plethodon cinereus</i>	Found in healthy forests and seepage wetlands
northern two-lined salamander	<i>Eurycea bislineata</i>	Within the tributary streams and Jordan Creek

It is likely that at least 5 other species are present on site based on biogeography and habitat types present.

A total of 4 reptiles have been observed on the site (Table 2). We anticipate up to 10 additional species may occur within preserve. Due to the secretive nature of reptiles, more intensive survey methods are typically needed to approach a comprehensive inventory. Since that is not required for master planning, we recognize the likelihood of occurrence for certain species and document which were encountered. Species that likely occur onsite but weren't observed include eastern milk snake (*Lampropeltis t. triangulum*), northern brown snake (*Storeria dekayi*), eastern ratsnake (*Pantherophis alleghaniensis*), and wood turtle (*Glyptemys insculpta*).



Common Name	Scientific Name	Notes
common snapping turtle	<i>Chelydra serpentina</i>	In Jordan creek
eastern garter snake	<i>Thamnophis s. sirtalis</i>	Common
northern ringneck snake	<i>Diadophis punctatus edwardsii</i>	Upland slopes under rocks
northern water snake	<i>Nerodia s. sipedon</i>	Common in and around Jordan Creek

### Mammals

Mammals were assessed on site using time and area constrained search methods, searched for tracks and scat, and other signs of mammals. Small mammals were located while flipping cover objects. A total of 13 species were observed (Table 3).

Common Name	Scientific Name	Notes
white-footed mouse	<i>Peromyscus leucopus</i>	Under cover in woods
short-tailed shrew	<i>Blarina brevicauda</i>	In trash pile
Eastern red bat	<i>Lasiurus borealis</i>	Observed three times in breeding season
eastern chipmunk	<i>Tamias striatus</i>	Common
eastern gray squirrel	<i>Sciurus carolinensis</i>	Common
eastern cottontail	<i>Sylvilagus floridanus</i>	Common
groundhog	<i>Marmota monax</i>	Common
Virginia opossum	<i>Didelphis virginiana</i>	Central range
striped skunk	<i>Mephitis mephitis</i>	South range
raccoon	<i>Procyon lotor</i>	Common
red fox	<i>Vulpes vulpes</i>	Multiple dens, tracks, scat, adults
eastern coyote	<i>Canis latrans</i>	Scat and tracks
white-tailed deer	<i>Odocoileus virginianus</i>	Overpopulations

At least 9 other mammal species likely occur on site, including 3-5 additional bat species

### Management Units

The site was separated into three primary units (North, Central, and South) following pre-existing nomenclature. Each primary unit was separated into a series of sub-units defined by natural breaks, community types and access. Please see the Management Unit map for spatial correlation to these recommendations per unit. A matrix of management recommendations can be found in the next section that corresponds to each of these MUs.



## North Range

### MUN01 The North Flats

#### *Description*

This unit includes the highest elevation areas within the North Range. Here, the topography flattens out, resulting in a plateau surrounded by steep slopes and drainage associated wetlands (mostly ash-maple PFO with dead ash trees). In direct coordination with the PA Game Commission, the North Range is undergoing active conversion to a grassland community. The site was previously dominated by autumn olive. Management techniques to eradicate the olive (and other undesirable plants) include prescribed fire, brush saws/chainsaws, chemical termination, and seeding and planting of native plants to combat re-establishment. We've separated the flat areas from the steeper slopes due to performance/results of ongoing efforts. In the flat areas where all-terrain vehicles and humans can more easily access/navigate the conversion to native grasses and wildflowers is far more successful (compared to the steep slopes).

#### *Recommendations*

Maintain an upland meadow habitat by controlling invasives through controlled burning, winter brushing, and selective herbicide treatment. Hand distribute a native seed-mix with wildflowers to promote native insect proliferation. Encourage American kestrel foraging habitat.

### MUN02 Jordan Creek and Floodplains

#### *Description*

Jordan Creek courses through each Range and, therefore, at least one MU per range is dedicated to the creek and any associated floodplain or wetland habitats. This unit contains the uppermost portion of the Creek at the Preserve. Offsite invasive plant species travel along the creek corridor and establish along the banks of the Jordan wherever possible. Active removal of invasive plant colonies and plantings of native perennial grasses, forbs, shrubs, and trees is the best way to create/maintain native stream-associated habitats, support stream-associated breeding birds (such as Louisiana waterthrush and Acadian flycatcher) and combat invasive plants.

One of the best ways to manage and protect waterways is to improve and manage the vegetation in the upper reaches of the watershed to minimize sediment and nutrient inputs at unnatural rates. Therefore, the buffering and protection of the degraded ephemeral tributaries found within MUN03 are just as critical to this MU as the comments herein.

#### *Recommendations*

Control invasive plants, especially Japanese knotweed (*Fallopia japonica*). Create and enhance riparian buffers by planting native riparian plants such as willows (*Salix spp.*) and viburnum (*Viburnum spp.*) species. Establish stormwater best management practices where possible.



## MUN03 The North Slopes

### Description

This MU is nearly identical to MUN01 except the topography is steep. In these areas the active and ongoing conversion from an invasive shrub community to a native grassland condition proves more challenging, with limited access by ATV and even by person. Efforts must be made to give specific attention to these slopes to ensure effective eradication of autumn olive and associated (invasive) shrubs, such as Japanese barberry (*Berberis thunbergii*).

### Recommendations

Establish early- to mid- successional habitat with herbivory control to encourage breeding bird occupation especially by blue-winged warbler, golden-winged warbler, blue grosbeak, and yellow-breasted chat. Protect drainage ways, associated wetlands, and Jordan creek by controlling reed canary grass (*Phalarus arundinaceae*) and other invasive flora. Allow dead-standing ash trees to remain for wildlife habitat. Hand distribute a native seed mix in bare areas to maintain an upland meadow habitat.

## Central Range

### MUC01a Environmental Education Center (Central East)

#### Description

The meadows currently surrounding the education center are simple, consisting of 2 primary plants (grasses) and about 5 forb species. The lower elevations are still dominated by autumn olive. These meadows have the potential to provide more ecosystem function by enhancing them with some diverse plantings. This will also improve the aesthetic value of visiting the center and walking the trails in this meadow. A native demonstration garden is present (with signage) along the path to the center. This needs to be maintained and planted with more native plants (currently dominated by mugwort and foxtail grasses).

#### Recommendations

Autumn Olive and other non-native woody plants need to be controlled and then native shrubs can be planted into the swale and margin to increase breeding bird habitat diversity, provide ecosystem services related to water conveyance and cleansing (uptake, slow, remove total suspended solids, lower conductivity, etc.), and shade. Additionally, the native garden acts as a showcase garden and contains signage about native diversity so it needs to be maintained by hand-pulling all invasives and then adding more native plants to create a more functional display. To enhance the surrounding meadows, they should be cut very low then drill-seeded in with a native mix (1:1 forb to graminoid). Locations along the trail and with visible sight lines from the overlook should be plugged with native wildflowers in clusters 12" apart.



### MUC01b Environmental Education Center (North East)

#### *Description*

The meadow to the northeast of the center slopes away towards the elk enclosure. There is a spring house that was constructed atop a natural spring in this valley. The spring-fed wetland downslope of the springhouse outfall is currently degraded. Primary degradation is from a de-watering process (swale cut to channel water under road via a pipe). Secondly, the de-watering has resulted in a reed canary grass monoculture. The remainder of this MU is in upland meadow with grazing history. There is a small forested section that is invaded by non-native plants but still has some intact native plants. This should be enhanced via invasive species removal and native plantings.

#### *Recommendations*

Restore the spring-fed wetland around the springhouse in the eastern part of this MU. Remove invasives and rethink the road and water conveyance to restore this degraded seepage wetland. This area also needs enhancement of the meadow and forested areas following similar recommendations to other MU's, invasive control is the primary recommendation throughout the site.

### MUC02a Jordan Creek and Floodplain (Central North)

#### *Description*

This area is the location of dynamic convergences between water and land, nature and humans, domestic animals and wildlife, roads and trails.... Interestingly, the sloped forests on either side of the Creek in this section are in relatively good condition and are supporting a nice diversity of breeding songbirds as well as passerine in migration. Inputs from the zoo should be further studied to determine if there are any opportunities to improve water quality coming from the zoo before entering the Creek. Access to the creek for fishing for youth and disabled persons is present in the southernmost part of this MU just above the Ford. There are opportunities to naturalize some of the lawn and buffer spaces to the parking area to offer educational signage on native plantings and improve stormwater runoff control here.

#### *Recommendations*

Remove some sections of the ford or create structures to enable safe passage for fish and other aquatic life above and below this feature. As elsewhere, invasives should be controlled and eradicated. Conduct invasives species control along the banks of the Jordan. Investigate the water outfalls from the zoo to locate opportunities for water quality improvements prior to reaching Jordan Creek.

### MUC02b Jordan Creek and Floodplain (Central South)

#### *Description*

This reach of stream experiences the most human interaction of all Jordan Creek MUs on site (from the Ford down to the covered bridge). It also has one the largest floodplain sections, with stream-associated wetlands present along the eastern banks and steep forested slopes on the west bank. The wetlands and creek are separated by a well-constructed ADA trail. The natural levee/shoreline of the creek (natural area between trail and creek) is comprised of mostly native plants but is thin and invaded by non-native plants in some sections. This bank is critical



nesting habitat for turtles, critical basking locations for snakes, provides important hunting areas for dragonflies and damselflies, and provides many other important wildlife benefits. Maintaining a diversity of open sandy areas, well-vegetated grassy areas, and forested sections is important. In addition, there are some emergent wetland plant colonies within the eastern side of the creek where the energy level is lower. These play an extremely important role and should be stewarded/protected.

#### *Recommendations*

Similar recommendation to the ford, the natural levees and creek banks should provide mobility for aquatic life. The toe of slope and floodplain wetlands occur in the riparian zone of Jordan Creek, they should be enhanced through controlling invasive forbs and shrubs and protecting from the human influence occurring from the trail.

#### MUC03a Hemlock Ravine (Central North)

##### *Description*

The hemlock ravines on site are iconic steep slope hemlock ravines. Hemlock woolly adelgid is a pest insect that is killing eastern hemlocks in our region. Due to the steepness, when hemlocks die they often result in erosion and the proliferation of invasive shrubs and herbaceous plants. To combat the erosion concern, dead standing hemlocks on steep slopes should be cut at about 10' above the ground to prevent upheaving. Each hemlock grove should be carefully assessed to identify specific trees that are worth treating for hemlock woolly adelgid. Also, any sapling or seedling hemlocks should be caged/protected from herbivory.

##### *Recommendations*

Conserve the regionally significant hemlock population by treating the largest and healthiest specimens to prevent death by hemlock woolly adelgid. Consider cutting any dead or dying trees that could pose safety risks or erosion issues, cut the crown and leave at least a 10' dead snag when possible for wildlife habitat.

#### MUC03b Hemlock Ravine (Central South)

##### *Description*

The hemlock ravines on site are iconic steep slope hemlock ravines. Hemlock woolly adelgid is a pest insect that is killing eastern hemlocks in our region. Due to the steepness, when hemlocks die they often result in erosion and the proliferation of invasive shrubs and herbaceous plants. To combat the erosion concern, dead standing hemlocks on steep slopes should be cut at about 5-15' above the ground to prevent upheaving. Each hemlock grove should be carefully assessed to identify specific trees that are worth treating for hemlock woolly adelgid. Also, any sapling or seedling hemlocks should be caged/protected from herbivory.

##### *Recommendations*

Same recommendations as the Central North Hemlock Ravine (MUC03a)



## MUC04 Maintenance Yard

### *Description*

This 51-acre space has been recently included as part of the preserve and offers great potential for restoration, interpretation, and education within a highly designed space. With little to no natural topography or vegetation, the site is comprised of gravel and asphalt parking areas, spoil piles, and eroded slopes. Despite it being in poor condition, its recent transition from an active maintenance yard leaves the site in an early succession state with limited establishment by difficult to manage plant species.

### *Recommendations*

Regrade to create more natural topography and establish demonstration gardens and reflection areas. Plant and seed with native grasses and wildflowers to create rain gardens (for stormwater management) and butterfly gardens. One idea is showing an interpretative example of a residential yard using native plants that can be created at people's homes. We recommend taking on the parking, vegetation, and re-grading all as one project/design effort.

## MUC05 Working Lands

### *Description*

This area contains the grazing pastures for buffalo and elk (historical and currently used). Evidence of over-grazing and concentrated waste, such as erosion, soil compaction, stream elevation drops, loss of organic layers in the soil, and invasive species prevalence are all present. Small copses of native woodland communities persist here and can be improved upon.

### *Recommendations*

For the buffalo, set up smaller paddocks in existing pastures. Use temporary lines to restrict and control movement and create a 60-90-day relief with a move every 30 days. Construct herding pathways to additional pasture areas for inclusion in the buffalo cycling. Allow elk to age out and do not add new individuals as this is not optimal habitat for their health or the health of the ecosystem. Install bird boxes on the fence posts. Enact stream restoration in the reach between the buffalo and elk, incorporate the associated wetlands including from MUC02. Autumn olive and other invasives need to be eradicate and controlled within this area. Consider allowing for grazing and soil health research to occur here.

There is a tributary to Jordan Creek that is impaired by the grazing practices and resultant secondary effects. Once the elk enclosure is retired, conduct a full design/build stream restoration project through federal and state grants to stabilize the stream banks, raise the elevation of the stream to restore hydrology to the emergent wetland within the elk enclosure, and decommission the elk enclosure entirely. This project should also include modifications to the road (ex. open span bridge versus cut culvert) and restoration of the spring fed wetland that connects with the stream in the elk enclosure.



## MUC06 North Woods

### *Description*

This section of forest is currently one of the best, intact forest communities on the site. Emerging olive invasion is evident and is a high priority for removal before advanced establishment simplifies the shrub and groundstory layers.

### *Recommendations*

As with other areas, eradicate invasives and enhance the natural community.

## MUC07 The West Meadows

### *Description*

The management of these meadows is currently a mowing regime to keep open areas free of woody plant establishment. The diversity of graminoids and forbs is low, with a high presence of non-native plants. Existing hedgerows and treelines are a mix of native and invasive species.

### *Recommendations*

Promote a savanna condition and enhance breeding, migratory, and wintering bird species occupancy by clearing certain areas and removing invasives. Plant shrub clusters and immediately enhance with native seed. This can be achieved via a “quick and dirty” restoration plan that identifies selective thinning of hedgerows and treelines and the inclusion of new woody clusters to allow a more contiguous grassland and savanna mosaic. Over-seeding with perennial grasses and wildflowers and the proactive spot treatment of emerging invasive plants will allow for a rapid increase in ecological function and wildlife value here. Mowing regime should be reduced to once every two years and coincide with bird life histories (mow in early spring every other year) for the expressed purpose of suppressing woody plant establishment.

## South Range

### MUS01a South Range West (Agricultural)

### *Description*

This is a very interesting location. The northern and western sections consist of a planted black walnut grove with a mix of invasive shrub establishment (planted autumn olive) and a degraded, but largely native herb layer. There is a seepage wetland in the west as well. The central, eastern, and southern sections are a mix of linear food plots for hunting and perennial strips, some of which boast nice populations of native wildflowers (planted?). An opportunity exists to greatly reduce the food plot/row cropping activity while designing and installing a native savanna community that will allow for continued hunting and food sources for game animals as a substitute attractant to food plots.



### *Recommendations*

This area has potential to harvest black walnut to pay for other areas of restoration while improving ecosystem health. Autumn olive and other invasives need to be eradicated. With these openings, savanna and meadow communities can be created through planting of native species. The intentional establishment of native hawthorns, crabapples, pap-paw, serviceberry, and other fruit-bearing trees and shrubs in concert with robust warm season grass meadow strips will allow for conversion to a native system while maintaining the hunting value of this MU. Mowing of warm season meadows should occur once every two years (in early spring) to maintain hunting sight lines and keep these strips free of woody plants. The sloping muck wetland community can be enhanced using native plants following removal of autumn olive. Hunting should be continued here to relieve herbivory pressure by white-tailed deer.

### MUS01b South Range West (Forest)

#### *Description*

This oak-hickory mesophytic woodland is supporting a nice diversity of native plants and breeding birds. The shrub understory is heavily invaded by multiflora rose, Japanese barberry, and autumn olive. The diversity of native trees suggests a great potential for volunteer trees to establish if winter deer herbivory is suppressed.

#### *Recommendations*

Eradication of multiflora rose, Japanese barberry, and autumn olive will greatly improve this space. Hand-seed and straw-mulch all bare areas following shrub removal with a partial shade mix (1:1 forb to graminoid ratio). Consider planting native shrubs and protecting native volunteer trees.

### MUS01c South Range West (Forest Outlier)

#### *Description*

This oak-hickory mesophytic woodland is supporting a nice diversity of native plants and breeding birds. The shrub understory is heavily invaded by multiflora rose, Japanese barberry, and autumn olive. The diversity of native trees suggests a great potential for volunteer trees to establish if winter deer herbivory is suppressed.

#### *Recommendations*

Eradication of multiflora rose, Japanese barberry, and autumn olive will greatly improve this space. Hand-seed and straw-mulch all bare areas following shrub removal with a partial shade mix (1:1 forb to graminoid ratio). Consider planting native shrubs and protecting native volunteer trees. Because this site is disjunct the priority level is lower. Consider enacting restoration activities after other locations are under control.



### MUS02a Jordan Creek and Floodplain

#### *Description*

The steep slopes along the west bank of Jordan Creek give way to “hidden” vernal pools at the stream elevation that are difficult to access. These are providing critical habitat for a variety of amphibians, insects, and other invertebrates. Ensure no trail connections or disturbance to the buffer around these wetlands occurs. Surgical management on non-natives in this area is recommended, but only via foot traffic and low-impact solutions (i.e., mechanical removal of invasive herbs, hand-seeding, and stump treating of invasive shrubs).

#### *Recommendations*

Remove all invasives as a buffer to the vernal pools and ensure that no trails or any new access are constructed.

### MUS02b Jordan Creek and Floodplain (Outlier Parcel)

#### *Description*

The Creek is exposed to agricultural practices with just a narrow buffer in this section. In-stream structure appears good, but water quality may be impaired. Similar to other reaches, maximizing the natural buffer to impervious surfaces and agricultural practices is recommended as well as improving the quality of buffers by surgical removal on invasive plants from the otherwise native plant community along the streambanks.

#### *Recommendations*

Consider improvements to the stream margin and riparian buffer via the existing trail connection project. Convert agriculture between the trail and the Creek into forested riparian buffer (young trees, shrubs, and native herbs/forbs providing successional habitat for the next 20-30 years prior to a shaded forest condition).

### MUS03a Hemlock Ravine (South West)

#### *Description*

The hemlock ravines on site are iconic steep slope hemlock ravines. Hemlock woolly adelgid is a pest insect that is killing eastern hemlocks in our region. Due to the steepness, when hemlocks die they often result in erosion and the proliferation of invasive shrubs and herbaceous plants. To combat the erosion concern, dead standing hemlocks on steep slopes should be cut at about 10' above the ground to prevent upheaving. Each hemlock grove should be carefully assessed to identify specific trees that are worth treating for hemlock woolly adelgid. Also, any sapling or seedling hemlocks should be caged/protected from herbivory.

#### *Recommendations*

Same recommendations as the Central North Hemlock Ravine (MUC03a)



### MUS03b Hemlock Ravine (South East)

#### *Description*

The hemlock ravines on site are iconic steep slope hemlock ravines. Hemlock woolly adelgid is a pest insect that is killing eastern hemlocks in our region. Due to the steepness, when hemlocks die they often result in erosion and the proliferation of invasive shrubs and herbaceous plants. To combat the erosion concern, dead standing hemlocks on steep slopes should be cut at about 10' above the ground to prevent upheaving. Each hemlock grove should be carefully assessed to identify specific trees that are worth treating for hemlock woolly adelgid. Also, any sapling or seedling hemlocks should be caged/protected from herbivory.

#### *Recommendations*

Same recommendations as the Central North Hemlock Ravine (MUC03a)

### MUS04a South Range East (Agriculture)

#### *Description*

The rolling hills in this section make for this section to appear “hidden” within the landscape. The site itself has very similar invasive species and erosion issues that are found across the street in the Central Range (mature autumn olive, planted walnuts, and a simplified herb/grass layer). No wetlands are found in this MU.

#### *Recommendations*

This is a prime location to enact large scale bird habitat restoration. With limited trail connectivity/current human use and no wetlands present, this site offers strong potential for a robust and “heavy-handed” approach to ecological restoration. Cut, stump treat, and remove all non-native woody plants using methods described in the matrix. Follow-up with broadcast foliar herbicide to prep the site for large scale seeding effort. Using a tractor-led native Truax no-till seed drill, sow native meadow mix and cover crop in to establish a native grassland habitat across the entirety of the site. Follow up spot treatments for emerging invasive shrubs will need to occur for the first 3-5 years following meadow establishment. After year 5 mow meadow once every 2 years (or burn) in early spring to prevent woody plant colonization. Strategic establishment of shrub and tree clusters could be established if the performance/faunal response does not suggest high value for grassland birds (determine this via breeding bird surveys).

### MUS04b South Range East (Forest)

#### *Description*

This oak-hickory mesophytic woodland is supporting a nice diversity of native plants and breeding birds. The shrub understory is heavily invaded by multiflora rose, Japanese barberry, and autumn olive. The diversity of native trees suggests a great potential for volunteer trees to establish if winter deer herbivory is suppressed.



### *Recommendations*

Eradication of multiflora rose, Japanese barberry, and autumn olive will greatly improve this space. Hand-seed and straw-mulch all bare areas following shrub removal with a partial shade mix (1:1 forb to graminoid ratio). Consider planting native shrubs and protecting native volunteer trees. Because this site is disjunct the priority level is lower. Consider enacting restoration activities after other locations are under control.

### MUS04c South Range East (Agricultural Outlier)

#### *Description*

The site has recently been farmed. Convert to native meadows above current proposed trail and riparian buffer below trail (between trail and Jordan Creek).

#### *Recommendations*

Install high quality meadow on either side of new trail. Seed and plug hotspots along the trail and viewsheds. Plant trees and sow partial shade wildflower mix in the riparian zone.

## Discussion and Management Recommendations

### Universal Recommendations

As evidenced in this document, there is a significant amount of ecological restoration opportunities to maximize the functionality of the site. In the process, the Trexler vision of creating a space for wildlife is realized alongside the improved stormwater management, natural heritage stewardship, conservation for regional plants and animals in decline, and myriad amazing human passive recreational and therapeutic benefits. This commitment to ecological restoration, preservation, and stewardship comes at a cost. Significant person hours must be support in the form of a network of volunteers, professionals, and hard-working county staff. Further, adequate funding will be critical to ensure positive returns on investment. Luckily, our state and federal regulatory agencies are well-aware of the benefits to nature and humans and have multiple financial and technical support pathways to aid landowners in being good stewards of the land. Please see the grant matrix for suggested grants and programs to support initial restoration projects, such as the tributary stream restoration design/build project through the elk enclosure or the savannah habitat enhancement project in the Central Range meadows. In some cases these grants may even provide some maintenance support.

***“Restoration is not an event; it is a process”.***

All restoration actions that occur on the site will require some level of monitoring and adaptive management and maintenance to ensure successful establishment of native plant communities with, in turn, support native wildlife populations in a balanced fashion. The County has a dedicated and qualified natural areas maintenance staff. This group will need to be supported in a variety of ways to realize this vision of a



functional Trexler Nature Preserve. To this extent, we recommend the following universal recommendations as related to the functional expression of this plan.

- Phase restoration work in a manner that allows for manageable workloads for existing staff coupled with support from outside professionals
- Phase restoration to meet budgetary parameters for County staff
- Develop a clear grant application schedule to align major grant-supported projects concurrent with County workloads (ex. professional restoration contractors can complete major projects and complete the first few years of maintenance but cascading maintenance responsibilities thereafter must be phased to be manageable by County staff OR set aside funding to have ecological contractors hired to continue maintenance).
- Consider hiring a full-time TNP Natural Areas Manager (via increase in County Parks budget to support this hire) to implement sections of the master plan, oversee performance by contractors, and integrate County staff into projects as learning opportunities to ensure effective management moving forward.
- Increase budget of County Parks ensure stores of natural areas management infrastructure materials, such as tree cages/tubes, brush saws, backpack sprayers, specialized planting equipment, meadow seed mixes, cover crop seed, and straw mulch.
- Ensure annual certified herbicide applicator license training for all county parks staff (including aquatic applicator licenses)
- Fund training and other seminars for natural areas management for dedicated County staff working in natural areas (especially TNP)
- Use fire as a management tool as often as possible! This is an extremely effective method for reducing woody debris and organic matter, combatting invasive plants, and promoting healthy native herbaceous plant communities. This is the ideal management tool for meadow and grassland management and could be a great tool for converting shrub dominated areas into robust meadows.

### Recommendations Matrix for Trexler Nature Preserve

Below is a series of recommendations for each management unit. General priority of the action and crude cost estimates are provided.

Priorities are aligned as follows:

- Most ecologically urgent projects (ex. front lines of invasive plant establishment, erosion control issues, and safety concerns)
- Projects that have the best return on investment (ex. a low-cost meadow enhancement project in a highly visible area is high priority. Similar efforts in a less accessible location is of equal ecological value but of a lower priority due to lack of visibility/human experience impact)
- Projects that are eligible for grant support are ranked higher in priority, but may be in later phases due to grant schedules and County staff workload for maintenance thereafter



Assumptions for cost estimates are as follows:

- Costs assume a professional ecological contractor is hired to do the work. Any efforts enacted by the County grounds maintenance staff can be considered savings in comparison
- Mobilization is factored in at an average distance from the site of 50 miles
- Prevailing wage is not accounted for

See matrix

Proposed 10 Year Phasing of Ecological Projects at TNP

See annual phasing in matrix





---

## BRAINSTORMING SESSION

### GOALS:

- Master Site Plan
- Water Resource Protection
- Create Restoration Plan
- Management of North Range Trails
- Connect to the Jordan Creek Greenway
- Commitment to keeping Trexler focused on nature, ecology, habitat
- Find a balance between use for people and viable ecological habitat
- Access for all ages, abilities
- Engage and interact with students
- Engage citizens and hear voices from all backgrounds. Focus on inclusivity
- Preserve TNP for present and future generations
- A Trexler for All
- Jordan Creek is a Trout Stocked Stream
- Restoration plots were put in with the cooperation of DCNR Forestry Division
- The Ford is beloved by man
- The Ford impacts water quality and habitat,
- The Ford has safety issues: conflict between vehicles pedestrians
- Jordan Greenway is 12' wide (typically)
- General Trexler left the Preserve to the citizens of Lehigh County
- North Range grassland restoration project
- Use of Controlled Burns in North Range grassland restoration project
- Preserve not a Park

### Facts:

- 1108 acres
- 400 additional acres
- Estimated 19-20 miles total trails
- Habitat loss
- Hawks and Bald Eagles are present in the preserve
- Autumn Olive is a major invasive problem
- Spot treatment with herbicides and controlled burns have been used for the North Range hillsides management
- The site is an existing American Kestrel habitat
- Habitat restoration is a process, not an event
- Bow Hunting in North Range
- Bow hunting for whitetail deer

### Concepts:

- Control invasives (mile-a-minute)
- Add additional habitat
- Warm-season grass plantings
- Think of additional ways to cross the Ford that are more sensitive
- Protect springs
- Potential for conflict between user groups (hunters, trail users, etc.)
- Continued use of fire as a tool for ecosystem restoration
- Work closely with DCNR Forestry on restoration plots
- Student cooperation with bird counts
- Engage students, volunteers, and civic groups with ecological counts
- Not allowing hunting = negative impact on habitat
- Hunting/fishing access
- Improve key access points for fishing



- Engage the community for stewardship/maintenance
- Trail maintenance (North Range)
- Wider trails – 2 abreast
- Improved access to the North Range Trails
- Improve sightlines (trails)
- Terrain warnings for user groups (difficulty)
- Additional paths that separate pedestrians from vehicular traffic
- Improved parking
- Improved ADA Access
- Sensory Garden
- Resting locations along trails
- Dog waste dispenser stations on trail
- Drinking fountains/water for users
- Make Trexler more visible to the public
- Bring individuals who might not otherwise have access to natural areas to Trexler Nature Preserve
- Bring People of Color/Black community into Trexler Nature Preserve – bring in a group/partner to represent

## Partners:

- DCNR
- Lehigh Valley Road Runners
- Wildlands Conservancy
- Lowhill Township
- PA Game Commission
- North Whitehall Township
- Miracle League
- Valley Mountain Bikers
- Lehigh Valley Planning
- Discover Lehigh
- Lehigh Valley Audubon
- Allentown Hiking Club
- Lehigh Carbon Community College
- Trexler Game Preserve Trail Runners
- Fish and Boat Commission
- Lehigh Valley Greenways
- DCNR Bur. Of Forestry
- *The Color of Nature Initiative* at Lehigh Gap Nature Center





**SIMONE COLLINS**  
**LANDSCAPE ARCHITECTURE**  
119 EAST LAFAYETTE STREET NORRISTOWN, PA 19401  
PHONE: 610.239.7601 FAX: 610.239.7606  
WWW.SIMONECOLLINS.COM

---

## MEETING NOTES

---

Project:	<b>Trexler Nature Preserve Master Site Plan Update</b>	Project No.:	<b>20012.00</b>
Location:	<b>Teams Meeting</b>	Meeting Date/Time:	<b>06/09/2020 4:00pm – 5:30pm</b>
Re:	<b>Committee Meeting 1 Notes</b>	Issue Date:	<b>07/09/2020</b>

---

### ATTENDEES:

Michelle Armour - Simone Collins (SC)	Edward Eppler - SCM	Holly Morris - SCM
Jana Brown – Steering Committee Member (SCM)	Kristie Fach - WC	Tim Nash - SCM
Jessie Buckner - Applied Ecological Services (ASE)	Steve Ferreri, SCM	Marty Nothstein - SCM
Bill Carr - SCM	Chris Garges - SCM	Geoff Reese - SCM
Kevin Clouser - SCM	Marc Grammes - SCM	Janet Roth - SCM
William Collins - SC	Rick Hughes - SCM	Bob Stiffler - LC
Randy Dietrich - Lehigh County	Sarah Leeper - SC	Lloyd Trego - SCM
Kate Ebel - Wildlands Conservancy (WC)	Louis Mazzante – SCM	Joseph Wallace – SC
	Michael McGraw – ASE	
	Rick Molchany -LC	

### NOTES:

1. Sarah Leeper began the meeting with a presentation, by reviewing the Master Plan and public outreach processes, site background, and photo tour. She reviewed the 'Card Technique' brainstorming activity, noting that the public meeting would be run in a similar manner. The meeting was opened to committee feedback and brainstorming.
2. Tim N. expressed concern about having management of the current trail system. Tim N. noted that the North Range trails can get overgrown quickly during summer months due to the invasive plants such as mile a minute
3. Marty N. asked how many miles of trails are in the preserve; Bob S. answered approximately **20 miles**.  
Marty N. expressed concern about increased trail use and loss of habitat over the past couple



of decades. He stated that more people are using the park, but habitat is not being re-established. He suggested that controlled burns are a good landscape management strategy, even though some people get upset by the idea. He stated that invasive Autumn Olive species was removed in some places but is growing back, along with Mile-a-minute species. He said that the preserve needs a balance between trails and habitat. He suggested bringing in warm season grasses.

4. Lloyd T. suggested creating wider running trails - especially if/as the South Range is developed – so that two people can run abreast. He also pointed out that drinking water access on the site is limited/nonexistent and suggested that it be provided throughout the preserve.
5. Louis M. discussed trail maintenance, stating that volunteers have been discussing how to keep on top of it. He said his two main concerns are safety and access.
  1. Safety:
    - unsustainable slopes that are the result of legacy trail development
    - sight lines
    - erosion
    - signage
  2. Access
    - addressing density in parking areas
    - trail headsHe also brought up the Jordan Creek Greenway connection, and asked “How can we welcome in new users?” Considering bikes, strollers, runners, dog-walkers. He would like to see consistency between the Greenway and the Preserve regarding trail widths, materials, and design standards.
6. Sarah L. asked what the current design standards for the JC Greenway are. It was confirmed that it is typically 12 feet wide and paved asphalt.
7. Janet R. liked the idea of terrain warnings which indicate difficulty level of trails to users. Regarding the perimeter trail, she stated that Bob and team does a great job (with maintenance. Janet seconded the notion that trails could be widened to accommodate running two abreast. She stated the importance of keeping areas mowed and user-friendly.
8. Jana B. mentioned concerns for people with disabilities having access to the preserve. She would like to see more diverse facilities within the preserve providing for a wider range of abilities to “get that community out” to the preserve. Jana suggested the addition of a sensory garden and mentioned providing opportunities for people on the Autism spectrum. Regarding wheelchair accessibility, Jana suggested providing resting areas for people in wheelchairs when there are trails with steep slopes; these areas could include benches for people accompanying people in wheelchairs. Jana brought up service dogs (and dogs in general), stating that people do not always clean up after their pets; adding dog waste station with bag dispensers could reduce this issue.
9. Holly M. stated that students conduct work on the site and could be more involved (bird counts, etc.). Holly cited John Loft from Princeton University, who has installed bird boxes and performed counts in another area park, as a potential resource. She noted that students walk into and out of the preserve along the road and suggested the addition of a walking path alongside the road to reduce the need for students to be on the watch for approaching cars.
10. Kristie F. suggested accommodating all needs (parking, ADA), and making Trexler a place for all visitors (sensory garden, trail level indicators, birding improvements). Kristie posed a question regarding restoration: In the next 10-15 years, with passive recreational use up, how can natural areas be protected? Kristie stated that the Ford crossing is a beloved feature, but that it poses several challenges:



- Safety – potential conflict between children and vehicles on the crossing
- Water quality – degraded by oil from tires/cars
- Fish passage – limitation

Kristie went on to mention the importance of addressing invasive species and protecting springs on site.

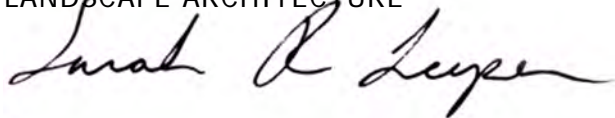
11. Marty N. stated the importance of finding balance between people and habitat. Marty emphasized that Trexler is not a park, it is a preserve. He worries that it is starting to look like “a people preserve instead of a nature preserve.” Marty stated that habitat preservation and restoration should be a priority.
12. Marc G. stated that the connections with the Hunting/Archery communities are good partnerships – they can be counted on to help. Marc mentioned the fact that the preserve opens a portion of the creek only to children and people with disabilities in the spring for fishing., and that it would be beneficial to involve ‘Fish & Boat’ in possibly creating ‘fishing only’ areas of the creek.  
Marc also mentioned that Dan Kunkle Lehigh Gap Nature Center would be a good resource for grasslands development.
13. Steve F. recounted some of the site history and the grassland restoration process that the PA Game Commission (PGC) has been undertaking in the last three years. :  
Hunting is a big part of this land, and it leads to restoration efforts. While working on the North Range, the Commission has seen “trophy class” Autumn Olive. The Commission has used mechanical treatment and plans to let the wood break down. The presence of mile-a-minute has been noted and they plan to use it as a key fuel during their next controlled burn. Steve noted that the side slopes and lower areas of the site, do have more issues with invasive plants in that the initial grassland restorations have been focused on the flat tops. Steve suggested looking at the flat areas at the tops of the hills for examples of restoration done in the preserve. He noted that the restoration grassland seed mix was focused on pollinators and to offer seasonal color throughout the year for preserve visitors.  
Steve explained that hillside management presents challenges to the use of equipment, but they have used spot treatments and prescribed fires, and are now waiting for the wood to break down, at which point a seed mix will be planted. The PGC has been conducting pre- and post- treatment bird surveys, using breeding bird survey methods; the land is an American Kestrel “hot spot” for nesting. He stated that the PGC has already moved from planning into implementation for the Northern Range but are open to coordinating efforts going forward. Steve stressed that hunting should be maintained, or the site will become a deer sanctuary, which would have detrimental effects on habitat and restoration.
14. Michael M. agreed with what Steve said, and he took a moment to commend the Commission. Michael stated that there is now less hunting in PA than previously, and that hunting is not only recreation, but also a duty. He said he loves that the PGC can put fire down and mentioned that the use of the Game Commission’s two management strategies - cutting Autumn Olive and treating the stumps, and use of fire on grass areas - could be beneficial if implemented in other ranges of the preserve. Michael stated that he would like to discuss further with the PGC their current restoration plans.
15. In a discussion regarding fishing for children and people with disabilities only, it was stated that a fishing permit lasts for approximately 6 weeks ( and that special permits are obtained for this event from Fish and Boat Commission. The event happens every year the first two weeks that fishing season is open and is held in the portion of the creek near the Ford. The County and Fish & Boat stock the creek with Trout.
16. Rick M. stated that he is from the County, and noted that in this project, which he calls “Trexler 20K + 20”, “balance” is key. Some issues of importance:



1. Maintenance (Parks and Recreation has been talking about this for 10 years) – moving forward more resources will need to be devoted to address the need properly.
  2. Open Trexler to people who may not have the opportunity to experience nature otherwise
  3. Visitors must be conscientious of each other and of the natural inhabitants
  4. “Bang the conservation drum” while providing opportunities for people
  5. Trexler is a Nature Preserve, first and foremost: “The wonder of nature”
17. Janet R. stated, as a reminder, that General Trexler left the land as a public preserve for use by the citizens of Lehigh County. Rick G. echoed this sentiment, saying that the preserve is for citizens of Lehigh County, and is not a tourist attraction. Trexler is not a State Park, it is “The General’s Legacy.”
18. Geoffrey R. said that education is necessary and appropriate to teach people how to conduct themselves when in the preserve and about how to preserve the land.
19. Michael M. asked about the existing experimental plots, to which Bob S. answered that they were a project by the DCNR Forestry Division, which has offices in the environmental center. Michael McGraw suggested making them a partner. He expressed his thought that there is much potential for these plots – though smaller than surrounding areas, the bird densities in the plots are superior. Michael asked if DCNR has a plan for the plots?
20. Louis M. expressed the importance of bringing in individuals who may not have access to the preserve – specifically people of color and black communities. He suggested that a group and/or partner could be brought in to represent those communities, and that inclusivity would be good in the long-term. Janet Roth recommended involving the *Color of Nature Initiative* run by Dan Kunkle from Lehigh Gap Nature Center. **SC is will follow up with the County to see if we should reach out to the Lehigh Gap Nature Center to see if any of their Color of Nature Initiative members would be interested in serving on the committee.**
21. Tim N. thanked Steve of the PGC for the useful information that he provided the committee. He also thanked Marty, expressing his appreciation for the notion of “balance.”

This report represents the Professional’s summation of the proceedings and is not a transcript. Unless written notice of any correction or clarification is received by the Professional within ten days of issue, the report shall be considered factually correct and shall become part of the official project record.

Sincerely,  
SIMONE COLLINS, INC.  
LANDSCAPE ARCHITECTURE



Sarah Leeper, RLA  
Project Manager





**SIMONE COLLINS**  
**LANDSCAPE ARCHITECTURE**  
119 EAST LAFAYETTE STREET NORRISTOWN, PA 19401  
PHONE: 610.239.7601 FAX: 610.239.7606  
WWW.SIMONECOLLINS.COM

---

## MEETING NOTES

---

**Project:** Trexler Nature Preserve  
Master Site Plan Update

**Project**  
**No.:** 20012.00

**Location:** Teams Meeting

**Meeting**  
**Date/** 09/07/2020  
**Time:** 7:00pm – 8:30pm

**Re:** Public Meeting 1 Notes

**Issue**  
**Date:** 12/22/2020

---

### ATTENDEES:

Sarah Leeper - Simone Collins (SC)

Kristie Fach – SCM, Wildlands Conservancy

Joseph Wallace – SC

Bradley Petrohoy (LC)

Michelle Armour - SC

James Kerchner

William Collins – SC

Nicholas Beers

Michael McGraw – Applied Ecological Services  
(AES)

John Buerkle

Bob Stiffler – Lehigh County (LC)

Paula Uhrin

William Car – LC

Steve (last name unknown)

Lloyd Trego – Steering Committee Member  
(SCM)

Anonymous Attendees (approximately 10-20)

### NOTES:

1. William Collins opened the meeting with Project Team introductions.
2. Sarah Leeper reviewed the list of Steering Committee Members, the Master Plan Process, the Project Schedule, and SC Project Scope of Work.
3. Michael McGraw discussed AES' role, process, and subconsultant Scope of Work.
4. Michelle Armour reviewed the Background and History of Trexler Nature Preserve, important points from the 2006 Master Plan, Site Context, and Inventory and Analysis.
5. Sarah Leeper presented the Site Base Map created by SC and discussed notable existing features of the North, Central, and South Ranges, including: on site-uses, adjacent land use, trails, parking, amenities, and hydrology.
6. Joseph Wallace introduced the brainstorming Card Technique, asking participants to provide ideas for Goals, Facts, Concepts, and Partners. Attendee comments/questions include:
  - a. Please note Camping is for scouting groups only.
  - b. Will this plan cover the Jordan Creek Greenway plans in the hopes of it eventually connecting to what has been started at the Covered Bridge Park?  
SC: Yes, connections with areas outside of the Preserve are part of the scope of this project.
  - c. The roadway running through the South Range is Old Packhouse Road until it becomes Jordan Road, not Game Preserve. Game Preserve only appears between the North and Central Ranges
  - d. Parking is becoming a problem. The users are starting to destroy natural areas because there are times when no spots remain. The new Central Range parking lot off Old Packhouse Road is huge, but very few users are parking there.
  - e. Goal - Access, including ease of difficulty.



- f. I agree with the previous comment... this the first I'm hearing of the new parking off Old Packhouse Road. Please do advertise that! I lead hikes for the Allentown Hiking Club and would happily take advantage of that large lot.
- g. I am unfamiliar with the Central Range and the new bathroom facilities, but I do use the North Range. Are there any plans to put bathroom facilities in the North Range? It's becoming a bit of an issue with the popularity of that area.  
SC: There are restrooms at the Education Center. Looking at possibilities for new facilities to accommodate user needs will be part of this process.
- h. Goal - Maintenance, reduced degree and difficulty of maintenance to the trail systems.
- i. Fact - The Border trail is not an easy trail to navigate and its design has significant erosion issues.
- j. The Ford over the Jordan along the paved roadway is a popular spot. Unfortunately, this is becoming a place where patrons are enjoying the water while vehicles are moving just feet away. Vehicles have slid off the concrete ford before, and this is a tragedy waiting to happen. A designated area for this water activity away from the vehicle roadway would help address the issue.
- k. Mile markers along border trail are a bit off given the many minor changes in the trail.
- l. Kudos to the maintenance group for fixing all the erosion after the last tropical storm.
- m. The facility has active community of avid trail hikers and trail runners. Maintenance staff is doing a fantastic job keeping the site clean and even the most challenging trails clear. Please maintain the rustic appeal of these trails.
- n. The Valley Mountain Bikers have stewarded the bike trails in the North Range. It would be nice to acknowledge their efforts as well as any other partner groups.  
SC: We are happy to have them represented on the steering committee and know that their contributions are highly valuable.
- o. PARTNERS - Valley Mountain Bikers, currently the VMB logs hundreds of hours maintaining the North Range trails.
- p. Goal - North Range access road parking lot, increased parking. the lot is packed on weekends and they park along the access road. NOTE: An additional two miles of MTB trail is slated to be built in the North Range.
- q. Parking along the trail along the Jordan is a real problem. I counted 52 cars 2 Sundays ago and had to use the grass for the majority of the trail. And speed bumps on an ADA trail?
- r. Partnering with the Lehigh Valley Zoo should be considered for both educational and conservation opportunities
- s. Goals - Nighttime activities.
- t. I don't see Valley Mountain Bikers as a Partner. Have you spoken with them? It's my understanding they maintain the mountain bike trails in the North Range.  
SC: We're happy to have them represented on the steering committee and acknowledge all of the valuable work that they do for the preserve.
- u. The one-lane road leading to the North Range parking lot is challenging. Many horse trailers access the lot, and there are conflicts with two-way traffic. Perhaps the Hunsicker Valley Trail could be improved and used as an exit from the lot so both roads can be maintained as one-way.
- v. The biking and hiking trails intersect in the North Range and ways to help avoid collisions could be a plus. Not sure what exactly that is but encouraging bikers to announce their presence as they approach hikers plus making hikers aware that they are on or near biking trails will help with that awareness.
- w. I'm with VMB. Regarding info about trail usage and avoiding trail conflicts -I think that signage in the parking lots, regarding who should yield to who, and simple information to help with trail courtesy would go a long way. Not everybody knows, especially someone is just starting to get into a sport like biking or trail running.  
SC: Part of our charge is thinking about signage, trail delineation, and how education can be part of that.
- x. It is the Lehigh Valley Zoo, no longer the County Zoo, run by a separate nonprofit entity. :)
- y. Not sure what can be done, but many dog walkers do not pick-up feces and about 20% do not leash. Limit dogs to certain areas?  
SC: This may fit within in the educational aspect of this plan. Maybe facilities such as "doggie disposal" stations should be considered.
- z. The ERL markers for giving to 9-1-1 in case of emergencies conflict with the kiosk numbering. This is an opportunity to standardize to one single system. You already have wayfinding on the concept list, so I strongly support that need.
- aa. What can be done about entering park after hours? To clarify, people are entering park after hours, how can we eliminate the issue?  
SC: Maybe a Goal is clarifying the hours of access. Signage, education, access (staying within hours of the preserve)
- bb. The former compost facility off of Old Packhouse Road would make an excellent disc golf course. It is heavily modified from nature but adding plantings and trees would be a way to restore it somewhat.



- cc. Goal - develop standard for communication to the public regarding park closure(s) that affect access.
- 7. Joseph Wallace shared Next Steps and ways that the public can continue to engage with this planning process:
  - a. Online Public Opinion Survey: [www.surveymonkey.com/r/Trexler](http://www.surveymonkey.com/r/Trexler)
  - b. WikiMapping: [www.wikimapping.com/TrexlerNaturePreserve.html](http://www.wikimapping.com/TrexlerNaturePreserve.html)
  - c. iNaturalist (mobile app)
  - d. Upcoming Meetings:
    - i. Public Meeting 2 – Draft Plan Presentation – December 3, 2020
    - ii. Public Meeting 3 – Final Plan Presentation – February 11, 2021
  - e. Team Contact Information:
    - i. Sarah Leeper, RLA, ASLA [sleeper@simonecollins.com](mailto:sleeper@simonecollins.com)
    - ii. Joseph Wallace, ASLA [jwallace@simonecollins.com](mailto:jwallace@simonecollins.com)

## BRAINSTORMING CARDS:

### Goals:

- Master Site Plan Update
- Improve Public Access
- Restoration Plan
- Better Access
- Simplify Trail Maintenance
- Nighttime Activities
- Engage Site Year Long - Day & Night

### Facts:

- 1108 acres
- Three Ranges

#### Access

- Old Packhouse Road turns into Jordan Road
- Rogue parking taking place
- Old Packhouse Road parking not well known
- Vehicles have slid off of Ford
- Vehicular / pedestrian conflicts at Ford
- North Range lot packed on weekends
- New Trails planned in North Range
- Speed bumps on Jordan Creek Trail
- Horse trailers use North Range
- North Range one-way difficult
- 52 cars parked along Jordan

#### Trails

- Border Trail is difficult to use - erosion
- Maintenance team working hard to fix storm damage
- VMB help maintain the trails
- ERL # conflict with kiosks

#### Facilities / Programs

- Lehigh County Zoo run by a private entity
- Dog walkers not picking up
- Dogs off leash
- Unauthorized after hours use
- Camping for Scouts Groups only

### Concepts:

#### Access

- Provide adequate parking
- Use Hunsicker Trail to exit North Range
- Separate and define uses at the Ford
- Address parking at Jordan Creek
- Better wayfinding for parking
- Old Packhouse Road parking – better advertise
- More parking in North Range



#### Trails

- Connect into Jordan Greenway
- Best management practices for trail design
- Improve trail wayfinding
- Clearly define ease of use of trails
- Keep rustic appeal of trails
- Trail user education - Horse, Bike, Walkers
- Simplify and coordinate wayfinding
- Update mile markers on Border Trail
- Trail yield signage education

#### Facilities / Programs

- Restroom facility in the North Range
- Limit dogs to certain areas?
- Create educational & conservational opportunities
- Disc Golf at old Compost Facility
- Secure Site at Night

#### Partners:

- Allentown Hiking Club
- DCNR
- Lehigh County Zoo
- Lowhill & North Whitehall Townships
- State Game Commission
- Valley Mountain Bikers (VMB)
- Wildlands Conservancy

This report represents the Professional's summation of the proceedings and is not a transcript. Unless written notice of any correction or clarification is received by the Professional within ten days of issue, the report shall be considered factually correct and shall become part of the official project record.

Sincerely,  
SIMONE COLLINS, INC.  
LANDSCAPE ARCHITECTURE



Michelle Armour  
Staff Landscape Architect





**SIMONE COLLINS**  
**LANDSCAPE ARCHITECTURE**  
119 EAST LAFAYETTE STREET NORRISTOWN, PA 19401  
PHONE: 610.239.7601 FAX: 610.239.7606  
WWW.SIMONECOLLINS.COM

---

## MEETING NOTES

---

Project:	Trexler Nature Preserve Master Site Plan Update 2020	Project No.:	20012.10
Location:	Microsoft Teams Meeting	Meeting Date/Time:	09/10/2020 4:00pm – 5:30pm
Re:	Committee Meeting 2 Notes	Issue Date:	09/22/2020

---

### ATTENDEES:

Randy Dietrich - **Lehigh County**

Robert Stiffler – **Lehigh County**

Rick Molchany -**Lehigh County**

Jana Brown – **Steering Committee Member (SCM)**

Bill Carr - **SCM**

Kevin Clouser - **SCM**

Edward Eppler - **SCM**

Steve Ferreri - **SCM**

Chris Garges - **SCM**

Marc Grammes - **SCM**

Rick Hughes - **SCM**

Louis Mazzante – **SCM**

Holly Morris - **SCM**

Tim Nash - **SCM**

Marty Nothstein - **SCM**

Geoff Reese - **SCM**

Janet Roth - **SCM**

Lloyd Trego – **SCM**

Kristie Fach – **Wildlands Conservancy**

Kate Ebel - **Wildlands Conservancy**

Sarah Leeper – **Simone Collins**

Joseph Wallace – **Simone Collins**

William Collins – **Simone Collins**

Jessie Buckner – **Applied Ecological Services**

### NOTES:

- Sarah Leeper and Joe Wallace of Simone Collins (SC) led the Committee Meeting #2 presentation which included: team introductions, review of previous committee and public meetings, preliminary public opinion survey and Wikimapping results, natural resources inventory, preliminary Trexler range concepts, and preliminary logo and branding concepts.

#### Committee Presentation Questions & Comments

- Natural Resource Inventory
  - A member of the committee asked if the SC team has compared existing and historical Trexler Nature Preserve data against current data collected? **Sarah L. and Jessie**



**Buckner of Applied Ecological Services (AES) noted that AES is in the process of collecting data and has not yet completed the comparative data analysis.**

- North Range Preliminary Concepts

- A member of the committee noted that improved access to existing central range parking should be considered.
- It was noted that if a pump track is considered, a macadam track is preferred for ease of maintenance.
- Several members of committee questioned whether a pump track would be an appropriate use within the Preserve.
- Sarah L. asked the committee if users utilize Lehigh Valley Zoo parking when accessing mountain biking trails? **Members of the committee noted that the Zoo is not used for parking as much as nearby adjacent Preserve parking areas.**
- A member of the committee noted that at certain times of the day / week / season, the Lehigh Valley Zoo parking area is underutilized. Perhaps there is some 'shared parking' solution to be found here.
- A member of the committee noted that several trail modifications proposed under preliminary concepts would improve access to existing parking facilities.
- A member of the committee was surprised to see additional trails proposed under preliminary concepts and asked the consultant team to focus on improving existing trails.
- One committee member explained that no further mountain bike trails or pump track improvements are necessary within the Preserve, and that consultant focus should be on modifications to existing trails and preserving and improving existing ecological areas.
- Improved trail user education should be part of master plan recommendations (share the trail, yielding to horses, etc.)
- A committee member noted that there must always be a balance between active / passive recreation areas and important ecological areas of the Preserve.
- A member of the committee noted that improved and expanded areas for ADA (Americans With Disabilities Act) trails is important and should be further explored.
- ***\*Sarah L. noted that some preliminary concepts were generated from public feedback (opinion survey, Wikimapping). These responded to the SC promise to hear and vet all ideas with the Committee. As noted by committee members, some raw ideas may or may not be suitable within Trexler Preserve. Sarah L. thanked the Committee for the clear guidance on preferred direction. All ideas that emerged during the public involvement process will be acknowledged in the draft plan with reasons why they did not advance as preferred alternatives.***



- Central Range Preliminary Concepts
  - One committee member asked what is being proposed in the central range (and the rest of the Preserve) for wildlife and habitat improvements? There should be a focus on ecology rather than new or improved facilities (trails, pavilions, rest areas, etc.) **Sarah L noted that Applied Ecological Services currently preparing preliminary ecological and habitat improvement concepts.**
  - One member of the committee asked the consultant team to consider new and improved sensory trails within the Preserve.
  - Water fountains should only be considered near existing facilities, and not all throughout the Preserve. **Sarah L. noted that fountains will be considered where it is feasible to tie into existing utilities (i.e. Lehigh Valley Zoo)**
  - Several members of the committee questioned whether active uses, such as disc golf proposed near the former compost facility, are appropriate within Trexler Nature Preserve.
  - One member noted that it is a great idea to improve parking and consider restrooms at the former compost facility.
- South Range
  - A committee member noted that the south range is an important ecological area, and it is important to have minimal infrastructure improvements in this area.
- Herd Animal Management
  - Sarah L. explained the concept of Adaptive Multi Paddock Grazing for the Preserve bison, as a system that can mimic the natural grazing habits of herd animals, where a herd is used to intensely graze an area for 1 week and then is cycled on to a new paddock space.
  - A member of the committee asked if this will this work within proposed area?
    - **Sarah L. noted that this system can be tested in a small area first to rate effectiveness before expanding. Costs for this program as well as all other proposed improvements will be provided in the report.**
- Additional Questions
  - One member of the committee asked if Wikimapping comments can be shared with the committee? **Sarah L. noted the consultant team can export mapping comments into an excel format and share with the committee.**

### Next Steps

- Sarah L. noted that **the next Trexler Nature Preserve committee meeting will take place virtually Thursday October 29, 2020 from 4:00pm to 5:30pm.**
- **The next public meeting will take place virtually Thursday December 3, 2020 from 7:00pm to 9:00pm.**
- Sarah L. thanked the committee for their thoughtful dialogue and direction on preliminary concepts, and encouraged all members review this evening's presentation and send questions and comments via email to ([sleeper@simonecollins.com](mailto:sleeper@simonecollins.com) & [jwallace@simonecollins.com](mailto:jwallace@simonecollins.com))



This report represents the Professional's summation of the proceedings and is not a transcript. Unless written notice of any correction or clarification is received by the Professional within ten days of issue, the report shall be considered factually correct and shall become part of the official project record.

Sincerely,  
SIMONE COLLINS, INC.  
LANDSCAPE ARCHITECTURE

A handwritten signature in blue ink, appearing to read "JP Wallace", is centered below the company name. The signature is fluid and cursive.

Joseph P. Wallace





**SIMONE COLLINS**  
**LANDSCAPE ARCHITECTURE**  
119 EAST LAFAYETTE STREET NORRISTOWN, PA 19401  
PHONE: 610.239.7601 FAX: 610.239.7606  
WWW.SIMONECOLLINS.COM

---

## MEETING NOTES

---

Project:	<b>Trexler Nature Preserve Master Site Plan Update 2020</b>	Project No.:	<b>20012.10</b>
Location:	<b>Microsoft Teams Meeting</b>	Meeting Date/ Time:	<b>10/29/2020 4:00pm – 5:30pm</b>
Re:	<b>Committee Meeting 3 Notes</b>	Issue Date:	<b>11.9.2020</b>

---

### ATTENDEES:

Robert Stiffler – **Lehigh County**

Randy Dietrich - **Lehigh County**

Kristie Fach – **Wildlands Conservancy**

Kate Ebel - **Wildlands Conservancy**

Jana Brown – **Steering Committee Member (SCM)**

Bill Carr - **SCM**

Chris Garges - **SCM**

Louis Mazzante – **SCM**

Holly Morris - **SCM**

Geoff Reese - **SCM**

Janet Roth - **SCM**

Lloyd Trego – **SCM**

Sarah Leeper – **Simone Collins**

Joseph Wallace – **Simone Collins**

William Collins – **Simone Collins**

Michelle Armour – **Simone Collins**

Michael McGraw – **Applied Ecological Services**

Jessie Buckner – **Applied Ecological Services**

### NOTES:

- Sarah Leeper and Joe Wallace of Simone Collins (SC) and Michael McGraw and Jessie Buckner of Applied Ecological Services (AES) led the Committee Meeting #3 presentation which included: team introductions, review of previous committee and public meetings, update of public opinion survey and Wikimapping results, and draft recommendations: ecological stewardship recommendations, trail recommendations, facility recommendations, and wayfinding signage & interpretation recommendations.

#### **Committee Presentation Questions & Comments**

- Ecological Stewardship Recommendations
  - A member of the committee noted that the native garden by the education center was a master gardener project that became a victim of COVID – it was established last year, but master gardeners have not been able to tend to it, which is why invasive



plants have encroached upon it. **Michael McGraw suggested that perhaps it is worth "deepening the bench" and finding contingency plans to respond to these obstacles.**

- Trail Recommendations

- A member of the committee thought that some of the proposed trail reroutes are fantastic. This member asked, regarding steep slopes, what grades are being using as a reference? **Sarah L. noted that DCNR standards are being used.** This committee member asked, with widening trails (especially multi-use trails), if there is a consideration for **adaptive cycling** or adaptive uses, which may be require trails wider than 3 feet - this is something that has been looked at with some other trails in the North Range. **Sarah responded that, on a related note, clarifying which trails are open to which user groups will be something that will be addressed in the final recommendations.**
- Another committee member suggested that SC may want to revisit the Border crossing at Hunsicker Valley, as the Game Commission has made improvements there to the stream crossing, working towards providing equipment access for controlled burns. They plan to do more improvements going forward. **Sarah L. noted that it seems to the approaches to the crossing that present challenges, and that SC will make sure to discuss this with the Commission in their Key Person Interview. Michael M. added that the Game Commission burns are a great resource, and that it would be worthwhile to explore the possibility of expanding the footprint where appropriate, seeing if the Commission would be interested and willing to do so in future planning.**
- A committee member expressed the Game Commission's concern regarding fragmentation of habitat as a result of trail reroutes/expansion. Putting wildlife first, as trails are rerouted, the old routes need to be truly abandoned and allowed to revegetate. **Sarah L. replied that the recommendations for each trail reroute will specify that the former alignment should be stabilized, and that there be a clear demarcation of which trails are on or offline.**
- The committee member continued, stating that the burn plan is in the last stages of the approval process, to be completed in November. There is an area in the north-west portion of the site where the Commission will need to cut back vegetation and regrade to open the trail up and make it accessible for their equipment. The concern is that there is adjacent landownership, so they will need enhanced holding capabilities to ensure that there is no chance of fire crossing the property line. This needs to happen soon, as they are looking to apply fire to the landscape when conditions are right - sometime between November and Spring. **Sarah L. asked for a map with a markup of the specific trail area in question. The Committee member agreed to get that over next week. Michael M. expressed the value of fire as a management tool, and that whatever temporary disturbances needed to prevent an escape of fire are worth it.** The member discussed the invasives management approach taken by the Commission; with mile-a-minute so thick this year, they did more of a blanket killing to see what native seed may be present and gauge what they may expect post-fire.

- Facilities Recommendations

- One committee member suggested that some of the shelters/overlooks in the North Range, given the high volume of bikers, could accommodate bikes and be placed in locations that are conveniently accessed with a bike (e.g. a place to lean a bike). **Sarah L. agreed that there are currently few places for this.**



### Additional Comments/Feedback

- Sarah L. opened the meeting up to any additional comments and feedback.
  - Bob S. of Lehigh County noted concern at recommending the current picnic area as all ADA parking. They do get ADA usage there, but other people will end up using ADA spots. The consultant team should look more critically at this area, perhaps additional parking along the unimproved road along the whole picnic area vs. only the designated paved parking. **Sarah noted that one of the biggest concerns expressed about this area is the illegal parking.** The existing parking is not adequate, and that a solution for more parking is needed. **Sarah L. suggested that the additional parking at the compost center may be the easiest solution; perhaps the parking in the picnic area does not change initially, but as new visitor use patterns are developed and people realize that parking in the compost site exists, parking in the picnic area can be reassessed.** Bob S. expressed that the appeal of the parking in the picnic area is the convenience of being right at stream's edge. **Sarah L. and team will take a closer look at the picnic area.**
  - A member of the committee explained that permits have been approved for for 2+ miles of biking trails in the North Range (north of the existing parking area), pointed out that those plans are not reflected in the maps in this presentation, and suggested that they should be on the plan, as those trails are close to approval and implementation. **Sarah L. asked Bob S. if there is a point person for this; Bob S. noted that he has the plan and will send it over.**
  - One committee member expressed appreciation for many of the recommendations, especially from an ecological standpoint, and, recognizing that there many complex project recommendations that will need ongoing maintenance, asked if a long-term maintenance plan will be included and how we can ensure success? **Michael M. agreed; "Restoration is not an event, it's a process." It will be important to prioritize and phase these recommendations. Typically, in ecological restoration, there is a greater effort up front, and after 5 or so years that will reduce greatly as invasive plants are under control and native vegetation has established. A plan will be laid out regarding what to anticipate from year zero to year five or ten. The maintenance will never necessarily end, but once the cycle has gone through about 10 years, the work will reduce to proactive maintenance and spot checking for invasive species. Michael expressed the hope that this project will further the culture of restoration in parks.**
  - A committee member informed the consultants that demolition of the former Winchester Road bridge was just completed this month, and the Game Commission has plans to put in abutments and new bridge and remove barricades that restrict access. This will give connectivity to Trexler Nature Preserve, which will most likely attract more users (picnicking, biking, etc.) and likely result in some unauthorized trail opening up. **Sarah L. asked if that road within state game lands or if it is public, and the member answered that the road will not be open – wildlife has started using the corridor. A bridge and a parking lot across from the bridge will be constructed, with completion anticipated by late spring.**



### Next Steps

- Sarah L. noted that the consultant team's next steps are to put together a draft plan presentation and report for the next public meeting, finalize recommendations, and conduct key person interviews.
- SC will provide copies of the finalized draft plan to the committee for review and comments, leading up to the next committee meeting.
- **The next Trexler Nature Preserve public meeting will take place virtually Thursday, December 3<sup>rd</sup>, 2020 from 7:00pm to 9:00pm.**
- **The next committee meeting will take place virtually Thursday January 21<sup>st</sup>, 2021 from 4:00pm to 5:30pm.**
- Sarah L. thanked the committee for their time, and noted the SC team will send the committee members: a recording of this presentation, meeting minutes, and a pdf of the presentation.
- Send questions and comments via email to (sleeper@simonecollins.com & jwallace@simonecollins.com)

This report represents the Professional's summation of the proceedings and is not a transcript. Unless written notice of any correction or clarification is received by the Professional within ten days of issue, the report shall be considered factually correct and shall become part of the official project record.

Sincerely,  
SIMONE COLLINS, INC.  
LANDSCAPE ARCHITECTURE

A handwritten signature in black ink, appearing to read "Michelle Armour", is displayed on a light gray rectangular background.

Michelle Armour





**SIMONE COLLINS**  
**LANDSCAPE ARCHITECTURE**  
119 EAST LAFAYETTE STREET NORRISTOWN, PA 19401  
PHONE: 610.239.7601 FAX: 610.239.7606  
WWW.SIMONECOLLINS.COM

---

## MEETING NOTES

---

Project: **Trexler Nature Preserve  
Master Site Plan Update**

Project No.: **20012.00**

Location: **Teams Meeting**

Meeting Date/  
Time: **12/03/2020  
7:00pm – 8:30pm**

Re: **Public Meeting 2 Notes**

Issue Date: **12/22/2020**

---

### ATTENDEES:

Sarah Leeper – Simone Collins (SC)

Bradley Petrohoy (LC)

Joseph Wallace – SC

James Kerchner

Michelle Armour - SC

Bill Smiley

William Collins - SC

David Campaign

Michael McGraw – Applied Ecological Services  
(AES)

Jason Shivok

William Car – Lehigh County (LC)

Barbara Nicholas

Lloyd Trego – Steering Committee Member  
(SCM)

Michael Drabenstott

Nelson Fogle

Louis Mazzante (SCM)

Robert Ryan

Anonymous Attendees (approximately 10-20)

### NOTES:

1. Sarah Leeper opened the meeting with the Meeting Agenda, Project Team introductions.
2. Joseph Wallace went over the list of Steering Committee Members, the Project Schedule, Brainstorming Feedback from Public Meeting 1, and Public Opinion Survey and WikiMapping results to date.
3. Michael McGraw went over the Draft Ecological Stewardship Plan Recommendations, discussing the Site Management Units, Recommendation Goals, and some examples of recommendations for specific areas of the preserve.
4. Joseph Wallace and Sarah Leeper discussed the Draft Trail Recommendations, including trail difficulty, suggested uses, and some examples of recommendations for specific areas.
5. Sarah Leeper and Michelle Armour presented Draft Facilities Recommendations for each range, including concept diagrams and example images for some of the recommendations.
6. Joseph Wallace went over the Draft Signage Recommendations, which included Trails, Wayfinding, Interpretive signage concepts and recommended locations.
7. Michael McGraw discussed Preserve-Wide Stewardship/Ecological Costs.
8. William Collins gave a breakdown on the Draft Capital Improvement Costs for each range, that may extend over a 5-10-year horizon, as well as possible Phasing and Potential Funding Sources, including regional, state, and federal grants.
9. Sarah Leeper and Joseph Wallace addressed questions submitted by the public:
  - a. What will be done to contain nighttime activities (noise, traffic, light pollution, etc.) and limit the potentially negative impact on the residential areas adjacent to the Preserve?  
SC: In areas where trails come close to neighboring residences, we recommend buffering.  
Addressing nighttime activity is an issue of policy. We recommend gates at all trail heads to gate



parking facilities when the preserve is closed. We have also discussed adding Rangers to the County's system for daytime and nighttime surveillance, since this is such a large area.

- b. The Border Trail in the South Range crosses a vehicular road/bridge. Is there any plan to provide a creek crossing without necessitating using the roadway? Taking horses over the bridge is not the safest.

SC: We recommend a pedestrian bridge that is separate from the road bridge for both the Greenway and the Border Trail.

- c. Will the QR code load an interactive map to show the user their location along the trail?

SC: Yes, ideally. It may start as a "flat" map and upgrade it to an interactive map moving forward.

- d. Why are there so many trails with proposed for "Bike"? Today, there are numerous bikes on many of the trails and that has already had a negative impact on hiking/walking on the trails.

SC: We went by what the current published use currently is for each trail. The few changes we did propose were in the North Range. We thought it was important to allow equestrians to use the Teardrop Trail, because it acts as a parallel trail to the Border Trail in the case that they do not want to do the whole loop. Also, there are some technical bike trails that we felt were not appropriate for hiking due to the high potential for conflict between downhill bikers and hikers coming uphill. Aside from these changes, bike use recommendations are the same as they stand today. If there are areas that you feel bikes should not be permitted, we do invite you to provide comments to specific areas.

- e. Labor Day weekend a car turned from the Ford and drove up the double red covered bridge trail despite the signage of no motor vehicles, and a flexible barrier post that they were able to go around. When they reached the covered bridge, they were unable to back their car back out and called 911. Are there improvements to the Ford area to prevent this from happening?

SC: We are proposing a pedestrian vehicular gate there, and at other locations where we have roads interacting with trails. We want to provide a gate that allows users to move through unobstructed and prevents cars from getting through but is also easily opened in case of emergencies.

- f. Will there be birding stations in varied habitat locations for ADA compatible use?

SC: Our biggest recommendations for birding platforms are in the North Range, and they would be accessible. There are some old bird blinds within the forest in the Central Range, and we are recommending that they be removed. Due to the difficulty of getting truly accessible trails in the North Range, we would focus truly accessible locations along the Covered Bridge Trail and the Birding Trail.

AES: Agreed – forest birding is best done open to the canopy, not from behind a bird blind. Blinds are typically used in open water situations. In the woods, it's best to be navigating the trail slowly and stopping frequently. The overlook platform in the North Range could potentially serve as a good hawk watch. We will be cognizant of the placement to make sure that it is not affecting breeding behaviors of kestrel and grassland birds.

- g. Are there ways for the County to implement some of these suggestions as part of routine maintenance to help spread the costs?

AES: We are hoping to provide a clear roadmap of these costs. Some work can be done in house, some by professional contractors, and some by volunteers. We will look closely at these things, and work with the County to understand their budget capacity to maximize value and utilize that pathway for restoration and maintenance of the site.

- h. How does the zoo integrate into the overall plan?

SC: It is on County property but leased and operated by a private entity. It is out of the purview of this plan. Regarding the long-term vision for the site, the zoo is there as long as it is operation, but the County does maintain facilities such as water and sewer. So, long term, even if the zoo is no longer there, the facilities and infrastructure will still exist to serve the Preserve.

- i. I may have missed it but are there planned improvements to the North Range parking lot access road?

SC: We are looking at defining the parking within the parking lot, but we are keeping the road itself a single lane road with pull-offs. We are also looking at the bottom to realign the Border Trail so that it crosses the road at a safer location. We are also looking to add about 16 spaces at the Northern end of Game Preserve Road and improve connections between the North and Central Range.

- j. Is there a way to limit organized bike races in north range in the future? These functions do not seem consistent with the purpose of the preserve and interfere with hikers.

SC: At this point, there is one organized bike race, Trex Fest, in the fall. It serves as a way for the local mountain bike group to get people involved in the group so that they can dedicate hours of maintenance to the trails. The group really does a lot of work to maintain the trails – they're some of the better facilities in the region. If there are other races happening, they are unofficial and not permitted, and we should notify the County about them.

- k. Are there any plans to reforest any grass land areas?

AES: There are areas, especially in the North Range, where we are focusing on creating contiguous areas of open grassland. However, we will be opening the canopy in areas where we



will be removing invasive autumn olive and taking out black walnut. In these areas, we will initially establish grassland in the first few years, but we will be planting trees here and taking advantage of the first 20-30 years of teenage forest that is critical for many bird species and are in decline. So, the short answer is yes, but we will do so by resetting the clock in areas dominated by invasive species now – set them back to a grassland condition, and control the succession moving forward to create functional habitat that transitions into forest. However, I would expect the North range to be managed as open grassland moving forward. It is an exciting opportunity to provide habitat for many species of sparrows and other open grassland species.

- l. Are there any suggestions for restoring the damage from the compost activities? There is a large amount of refuse left from the contractor.

SC: Yes, those areas are addressed in the report.

AES: This is the concept phase, but once the County find the funding and decides to move forward, we can think in more detail about the space. We want that to be an exciting, inviting, educational, and inspiring place to arrive and depart from the site.

SC: The next phase is design and engineering, once funding is secured for the project.

- m. The mountain bikers do a significant amount of the trail maintenance on the property. They should not be pushed out. :). There is also a running race annually. (Quadzilla in July)

SC: The Preserve is a special place for so many groups, and it has the carrying capacity to serve these groups. Long-term, we want to look at stewardship of the ecological environment. It is not the use by people that is harming the ecology, but it is the way that invasive species have moved in and dominated the landscape. Erosion is not caused by people walking the trails as much as the lack of an understory caused by deer browse and invasive dominance.

10. Joseph shared Next Steps and ways that the public can continue to engage with this planning process:

- a. Draft Plan will be available December 10<sup>th</sup> for public review and comment at [www.lehighcounty.org/Departments/Parks-And-Recreation](http://www.lehighcounty.org/Departments/Parks-And-Recreation)
- b. Online Public Opinion Survey: [www.surveymonkey.com/r/Trexler](http://www.surveymonkey.com/r/Trexler)
- c. WikiMapping: [www.wikimapping.com/TrexlerNaturePreserve.html](http://www.wikimapping.com/TrexlerNaturePreserve.html)
- d. iNaturalist (mobile app)
- e. Upcoming Meetings:
  - i. Public Meeting 3 – Final Plan Presentation – February 11, 2021
- f. Team Contact Information:
  - i. Sarah Leeper, RLA, ASLA [sleeper@simonecollins.com](mailto:sleeper@simonecollins.com)
  - ii. Joseph Wallace, ASLA [jwallace@simonecollins.com](mailto:jwallace@simonecollins.com)

This report represents the Professional's summation of the proceedings and is not a transcript. Unless written notice of any correction or clarification is received by the Professional within ten days of issue, the report shall be considered factually correct and shall become part of the official project record.

Sincerely,  
SIMONE COLLINS, INC.  
LANDSCAPE ARCHITECTURE



Michelle Armour  
Staff Landscape Architect



**FOR IMMEDIATE RELEASE**

**[INSERT DATE], 2020**

**Public Meetings announced for Trexler Nature Preserve**

**Lehigh County announces public meetings to be held concerning the master plan update for the Trexler Nature Preserve. The first meeting will be held virtually Thursday, September 3<sup>rd</sup>, 2020 from 7:00 PM to 9:00 PM.**

The 1,108-acre Trexler Nature Preserve is in the northwest portion of Lehigh County, in the Townships of North Whitehall and Lowhill, eight miles northwest of Allentown. Owned and maintained by Lehigh County, the preserve is named for prominent Lehigh citizen Harry C. Trexler (1854-1933), who initially established the preserve to stock big game animals such as elk and deer, with the goal of saving the North American Bison.

Today, the Trexler Nature Preserve provides opportunities for mountain biking, hiking, walking, horseback riding, birdwatching, and wildlife observation. The Jordan Creek offers fishing and picnic opportunities and archery hunting is permitted in the Preserve's north and south ranges. The Preserve is home to a complex network of flora and fauna, which include plants, mammals, birds, insects, amphibians, and more.

Lehigh County is updating the 2006 Trexler Nature Preserve Master Plan and seeks to work with County residents to evaluate existing conditions and envision future improvements within the Preserve.

The County has retained the firms of Simone Collins Landscape Architecture of Norristown, PA, along with Applied Ecological Services to assist in updating the Trexler Nature Preserve Master Plan.

There will be a series of three (3) public meetings and an online public opinion survey for interested residents to work with Lehigh County to envision improvements to Trexler Nature Preserve.

Public Meeting #1 will take place virtually on Thursday September 3<sup>rd</sup>, 2020 from 7:00 PM to 9:00 PM. This meeting can be accessed online via the following link:

[\[INSERT MICROSOFT TEAMS LIVE EVENT LINK\]](#)

Public Meeting #2 is scheduled as a virtual meeting for Thursday December 3<sup>rd</sup>, 2020 from 7:00 PM to 9:00 PM.

Public Meeting #3 is scheduled as a virtual meeting for Thursday February 11<sup>th</sup>, 2021 from 7:00 PM to 9:00 PM.



The online public opinion survey will be open from August 14<sup>th</sup> and be open through the draft plan presentation on December 3<sup>rd</sup>, 2020. The survey can be accessed online via the following link:

[HTTPS://WWW.SURVEYMONKEY.COM/R/TREXLER](https://www.surveymonkey.com/r/trexler)

**For additional information contact:**

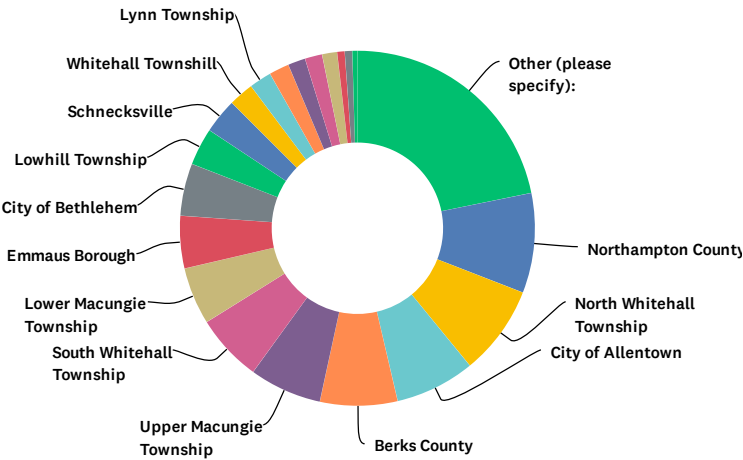
Sarah R. Leeper, RLA, ASLA  
sleeper@simonecollins.com  
Simone Collins, Inc.  
Landscape Architecture  
119 East Lafayette Street  
Norristown, PA 19401  
p: 610.239.7601 x 14

###



Q1 What is the name of the municipality you live in?

Answered: 440 Skipped: 23



ANSWER CHOICES	RESPONSES	
Other (please specify):	22%	96
Northampton County	9%	40
North Whitehall Township	8%	36
City of Allentown	7%	32
Berks County	7%	31
Upper Macungie Township	7%	29
South Whitehall Township	6%	27
Lower Macungie Township	5%	23
Emmaus Borough	5%	21
City of Bethlehem	5%	21
Lowhill Township	3%	15
Schnecksville	3%	14
Whitehall Townshill	2%	10
Lynn Township	2%	9
Weisenberg Township	2%	8
Heidelberg Township	2%	7
Carbon County	2%	7
Washington Township	1%	6
Alburtis Borough	1%	3
Macungie Borough	1%	3
Slatington Borough	0%	2
TOTAL		440



# Trexler Nature Preserve Public Opinion Survey

#	OTHER (PLEASE SPECIFY):	DATE
1	Catasauqua	11/23/2020 12:10 PM
2	Landsdale	11/14/2020 10:43 PM
3	Northampton county	11/10/2020 8:49 PM
4	salisbury	10/19/2020 2:03 PM
5	New Britain Township, Bucks County	10/12/2020 1:43 PM
6	Upper Saucon Township	10/11/2020 1:51 PM
7	Upper Saucon Townsip	10/5/2020 8:43 AM
8	Montgomery County	10/2/2020 4:51 PM
9	Dowingtown	9/27/2020 9:13 AM
10	West Chester	9/26/2020 9:14 AM
11	Northampton borough	9/24/2020 8:40 PM
12	Perkasie borough	9/12/2020 3:38 PM
13	Ardmore, PA	9/12/2020 12:57 PM
14	Catasauqua	9/10/2020 8:54 AM
15	Upper Saucon Township	9/8/2020 3:30 PM
16	Salisbury	9/6/2020 3:53 PM
17	Upper Milford	9/5/2020 2:21 PM
18	Salisbury Township	9/4/2020 12:48 PM
19	Upper Saucon- Lehigh County	9/4/2020 10:09 AM
20	Upper saucon	9/2/2020 9:08 PM
21	Perkasie	9/2/2020 7:54 PM
22	Upper milford township	9/1/2020 9:55 PM
23	Franconia	9/1/2020 4:38 PM
24	Montgomery	9/1/2020 4:20 PM
25	Perkasie Boro , Bucks Co	9/1/2020 3:07 PM
26	Milford Township, PA	8/31/2020 10:19 AM
27	Upper Saucon Township	8/30/2020 8:23 AM
28	Upper Saucon Township	8/29/2020 9:35 PM
29	Upper Saucon Township	8/28/2020 10:09 PM
30	Lower Salford	8/28/2020 9:59 PM
31	Monroe County - Chestnut Hill Township	8/28/2020 3:50 PM
32	Montgomery County	8/28/2020 3:20 PM
33	Palmerton	8/26/2020 11:37 PM
34	Upper Gwynedd Township	8/26/2020 10:35 AM
35	Catasauqua	8/26/2020 10:18 AM
36	Salisbury Township	8/25/2020 10:37 PM
37	Bucks county	8/25/2020 10:29 PM
38	Kingston, Pa	8/25/2020 9:44 PM
39	Tinicum Township, Bucks County	8/25/2020 9:36 PM
40	visiter from NJ	8/25/2020 9:24 PM
41	Union	8/25/2020 8:56 PM
42	Montgomery county	8/25/2020 8:46 PM
43	Philadelphia	8/25/2020 8:33 PM
44	Salisbury Township, Lehigh County	8/25/2020 7:24 PM
45	Montgomery County	8/25/2020 7:11 PM
46	East Stroudsburg Monroe county	8/25/2020 7:05 PM
47	Quakertown	8/25/2020 6:55 PM
48	Wilmington DE	8/25/2020 6:52 PM
49	Bangor township	8/25/2020 6:44 PM
50	Upper Milford Township	8/25/2020 6:29 PM
51	Upper milford	8/25/2020 6:14 PM
52	Hellertown	8/25/2020 6:11 PM
53	Lansdale Borough	8/25/2020 6:04 PM
54	Bucks County, Popersville	8/25/2020 5:58 PM



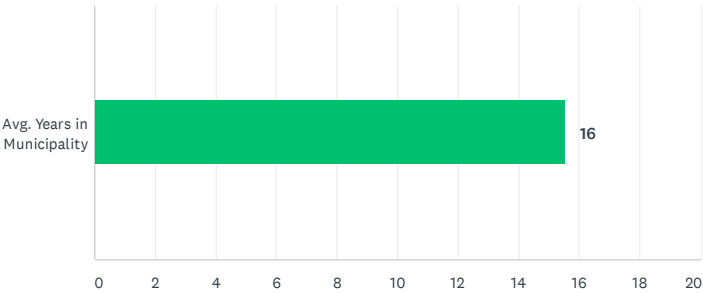
## Trexler Nature Preserve Public Opinion Survey

55	Coopersbhr	8/25/2020 5:53 PM
56	Monroe County	8/25/2020 5:42 PM
57	Upper Saucon	8/25/2020 5:41 PM
58	East Allen township	8/25/2020 5:27 PM
59	Schuylkill County	8/25/2020 5:27 PM
60	Salisbury township	8/25/2020 5:22 PM
61	Horsham, PA	8/25/2020 4:58 PM
62	Bucks County	8/25/2020 4:58 PM
63	Upper Saucon Township	8/25/2020 4:56 PM
64	Bucks County	8/25/2020 4:52 PM
65	Montgomery County	8/25/2020 4:51 PM
66	Lower Saucon	8/25/2020 4:36 PM
67	New Jersey	8/25/2020 4:34 PM
68	Schuylkill county	8/25/2020 4:30 PM
69	Falls Township	8/25/2020 4:26 PM
70	Salisbury Twp	8/25/2020 4:24 PM
71	Bucks County	8/25/2020 4:19 PM
72	Upper Saucon	8/25/2020 4:05 PM
73	Easton	8/25/2020 4:03 PM
74	upper merion	8/25/2020 12:25 PM
75	White twp nj	8/23/2020 10:39 AM
76	Upper Moreland - Montgomery county	8/22/2020 8:35 PM
77	Whitehall Township	8/20/2020 7:57 PM
78	Springfield Twsp/Flourtown	8/20/2020 1:24 PM
79	Schuylkill county	8/20/2020 8:34 AM
80	Montgomery County	8/20/2020 7:57 AM
81	NJ but live in Schnecksville seasonally	8/19/2020 12:34 PM
82	Hatfield PA	8/18/2020 11:53 AM
83	Bethlehem Township	8/17/2020 12:01 PM
84	Lower Milford	8/17/2020 10:57 AM
85	Upper Saucon	8/16/2020 4:33 PM
86	Philadelphia	8/16/2020 4:19 PM
87	Quakertown	8/16/2020 3:37 PM
88	West Chester PA	8/16/2020 2:53 PM
89	Oxford, Nj	8/16/2020 2:30 PM
90	Schuylkill County	8/16/2020 2:22 PM
91	Barto,PA	8/16/2020 2:19 PM
92	Salisbury township	8/16/2020 2:05 PM
93	Bucks	8/16/2020 2:05 PM
94	Franconia	8/16/2020 1:55 PM
95	Bucks county, langhorne	8/16/2020 1:27 PM
96	Salisbury	8/14/2020 8:10 PM



Q2 How many years have you lived in your current municipality?

Answered: 459    Skipped: 4

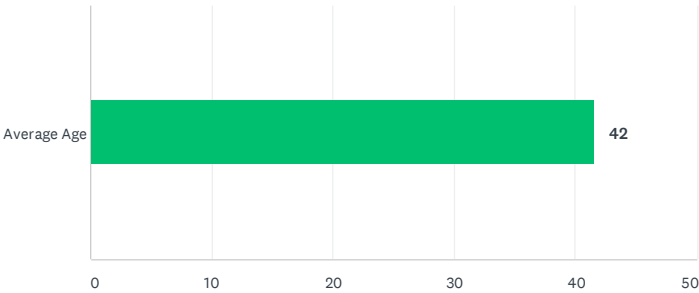


	0-5	6-10	11-29	30+	TOTAL	WEIGHTED AVERAGE
Avg. Years in Municipality	22.66% 104	17.86% 82	44.23% 203	15.25% 70	459	15.53



Q3 What is your age?

Answered: 457    Skipped: 6

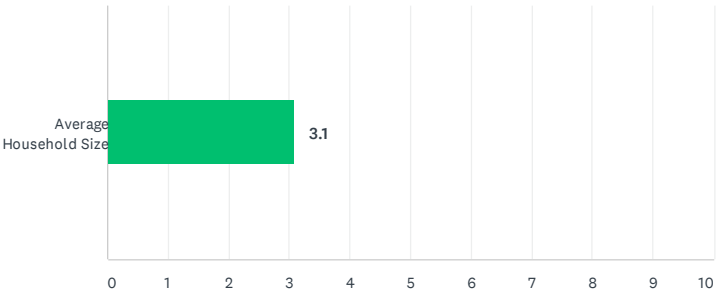


	<12	13-18	19-24	25-44	45-65	65+	TOTAL	WEIGHTED AVERAGE
Average Age	0.00% 0	1.75% 8	6.35% 29	46.39% 212	40.92% 187	4.60% 21	457	41.53



Q4 How many people currently live in your household?

Answered: 458 Skipped: 5



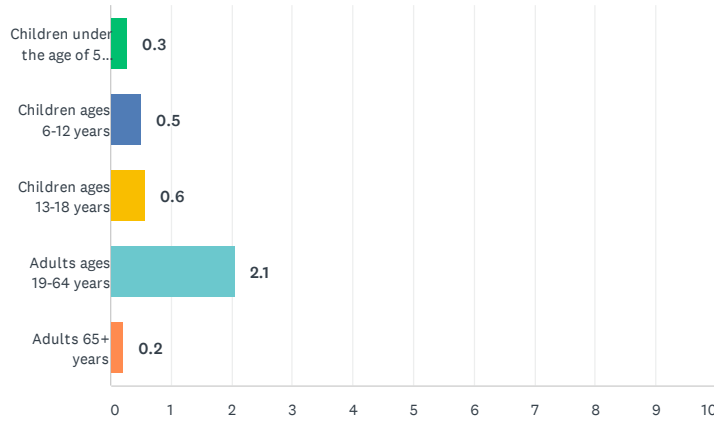
	1	2	3	4	5	6+	TOTAL	WEIGHTED AVERAGE
Average Household Size	7.21% 33	33.19% 152	20.09% 92	27.95% 128	7.86% 36	3.71% 17	458	3.07



# Trexler Nature Preserve Public Opinion Survey

## Q5 Please indicate how many people of each age group currently live in your household?

Answered: 455 Skipped: 8

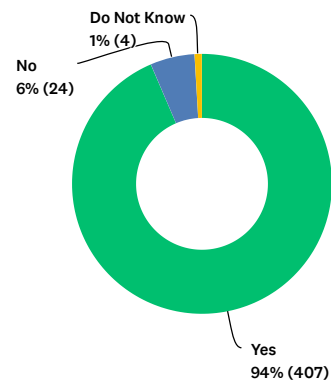


	1	2	3	4+	NA	TOTAL	WEIGHTED AVERAGE
Children under the age of 5 years	10.87% 35	6.21% 20	0.31% 1	0.93% 3	81.68% 263	322	0.28
Children ages 6-12 years	20.61% 68	12.73% 42	0.91% 3	0.30% 1	65.45% 216	330	0.50
Children ages 13-18 years	23.93% 78	13.19% 43	0.61% 2	0.92% 3	61.35% 200	326	0.56
Adults ages 19-64 years	15.80% 70	62.08% 275	11.74% 52	7.45% 33	2.93% 13	443	2.05
Adults 65+ years	8.20% 20	6.15% 15	0.00% 0	0.00% 0	85.66% 209	244	0.20



Q6 In the past 12 months, has any member of your household participated in any activities Trexler Nature Preserve?

Answered: 435 Skipped: 28



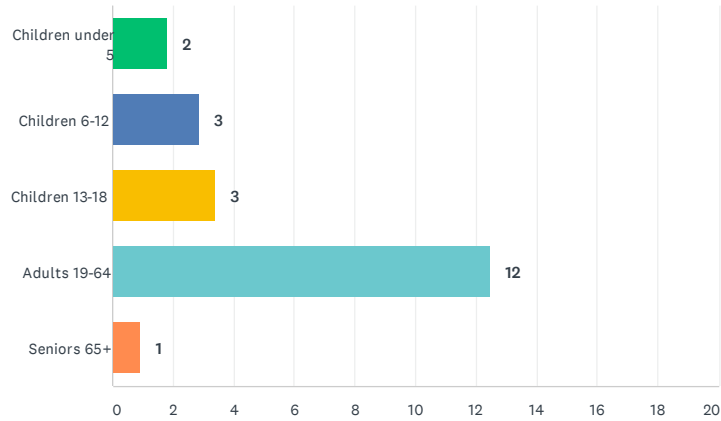
ANSWER CHOICES	RESPONSES	
Yes	94%	407
No	6%	24
Do Not Know	1%	4
TOTAL		435



## Trexler Nature Preserve Public Opinion Survey

Q7 Thinking about members of your household who are in the age groups below, how many trips in total have the members of your household made to Trexler Nature Preserve in the past 12 months? Note, If you and your 10 year old son visited that is one check in in Children 6-12 row and a second check adults 19-64 row.

Answered: 429 Skipped: 34

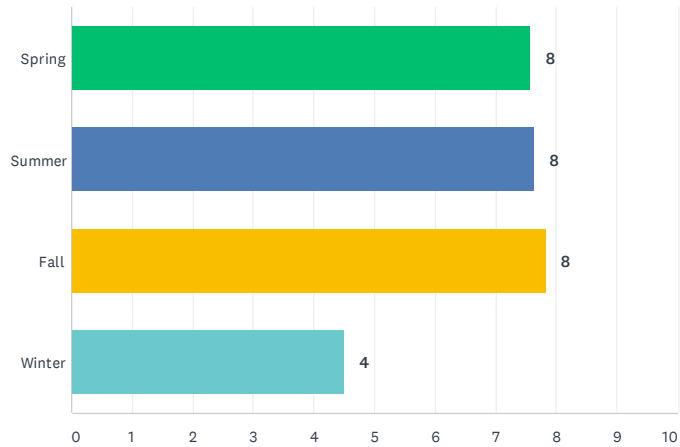


	1-5	6-10	11-20	20 OR MORE	N/A	TOTAL	WEIGHTED AVERAGE
Children under 5	7.96% 23	3.11% 9	3.81% 11	3.81% 11	81.31% 235	289	1.79
Children 6-12	13.78% 39	8.83% 25	4.59% 13	5.65% 16	67.14% 190	283	2.85
Children 13-18	13.89% 40	5.21% 15	6.25% 18	8.33% 24	66.32% 191	288	3.39
Adults 19-64	22.36% 93	15.63% 65	18.51% 77	39.66% 165	3.85% 16	416	12.47
Seniors 65+	3.54% 8	2.21% 5	3.10% 7	0.88% 2	90.27% 204	226	0.90



Q8 How often and during what seasons do you use the facilities at Trexler Nature Preserve?

Answered: 434 Skipped: 29

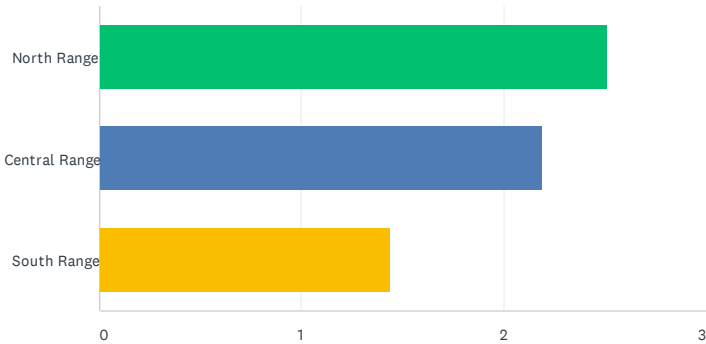


	FREQUENTLY (1X / WEEK)	OCCASIONALLY (1X / MONTH)	RARELY (1X / SEASON)	NEVER	TOTAL	WEIGHTED AVERAGE
Spring	48.60% 208	38.32% 164	10.98% 47	2.10% 9	428	7.58
Summer	49.42% 212	36.13% 155	12.59% 54	1.86% 8	429	7.63
Fall	51.04% 220	35.96% 155	10.21% 44	2.78% 12	431	7.82
Winter	24.21% 99	35.21% 144	28.61% 117	11.98% 49	409	4.49



Q9 The Preserve is divided into the three areas. The North Range is the area north of Game Preserve Road. The Central Range is the area between Game Preserve Road and Old Packhouse Road. The South Range is the area south of Old Packhouse Road. Please rank the three ranges in order of which you visit the most with one (1) being the highest or most visited.

Answered: 377   Skipped: 86

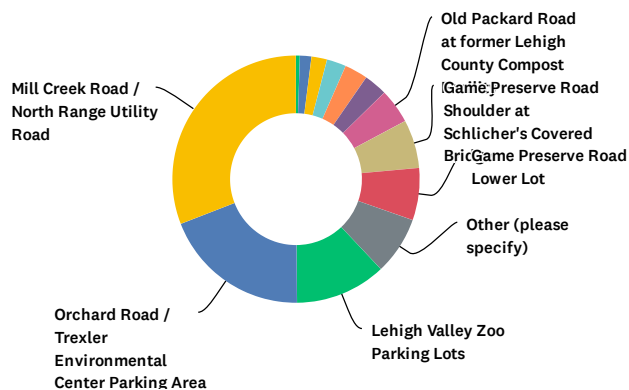


	1	2	3	N/A	TOTAL	SCORE
North Range	60.61% 220	18.73% 68	13.50% 49	7.16% 26	363	2.51
Central Range	26.94% 97	50.56% 182	10.00% 36	12.50% 45	360	2.19
South Range	10.51% 39	15.90% 59	57.14% 212	16.44% 61	371	1.44



## Q10 When you visit Trexler Preserve where do you typically park?

Answered: 395 Skipped: 68



ANSWER CHOICES	RESPONSES	
Old Packard Road at Geiger's Bridge (ADA only)	0.51%	2
Jordan Road / South Range Parking Area	1.52%	6
Jordan Creek Ford (east bank)	2.03%	8
Central Range Overlook Pull-off (Before Zoo)	2.53%	10
Jordan Creek Ford (west bank)	3.04%	12
Not Applicable	3.04%	12
Old Packard Road at former Lehigh County Compost Facility	4.56%	18
Game Preserve Road Shoulder at Schlicher's Covered Bridge	6.33%	25
Game Preserve Road Lower Lot	6.84%	27
Other (please specify)	7.59%	30
Lehigh Valley Zoo Parking Lots	11.90%	47
Orchard Road / Trexler Environmental Center Parking Area	19.24%	76
Mill Creek Road / North Range Utility Road	30.89%	122
<b>TOTAL</b>		<b>395</b>



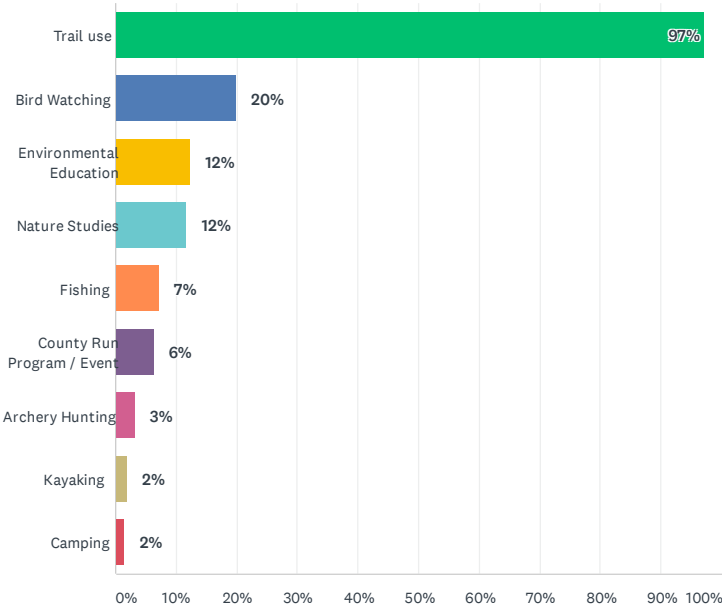
## Trexler Nature Preserve Public Opinion Survey

#	OTHER (PLEASE SPECIFY)	DATE
1	On the side of Game Preserve Road at Kiosk #8.	1/4/2021 3:14 PM
2	Near the bison area	11/23/2020 12:15 PM
3	North Range Parking Lot	9/28/2020 3:34 PM
4	Depends what I am there to do (trail ride, hike, walk with dogs, etc.)	9/9/2020 4:40 PM
5	Road through Preserve by Chestnut Orchard	9/7/2020 10:54 PM
6	Local residence	9/7/2020 8:14 AM
7	Mill Creek Rd and Orchard Rd.	9/4/2020 12:20 PM
8	Varied locations: Orchard Road / Trexler Environmental Center Parking Area Jordan Creek Ford (west bank) Old Packard Road at Geiger's Bridge (ADA only) Game Preserve Road by new pedestrian bridge over Jordan Creek	9/4/2020 9:56 AM
9	I park at the covered bridge on game preserve road before the zoo entrance and enter the double blue trail by the usgs station. 2nd choice is at the new lot at the compost facility.	9/4/2020 8:48 AM
10	Depends on where I am going. Not a fan of the new parking at the compost facility	9/3/2020 2:34 PM
11	Parking lot off of 309	9/2/2020 9:10 PM
12	B	9/1/2020 5:40 PM
13	Schlicher's Covered Bridge	8/31/2020 5:20 PM
14	Depends on reason to visit: if biking, Mill Creek Rd lot; if hiking, Jordan Cr ford West OR Lehigh Co former compost facility, OR near the ford	8/30/2020 8:27 AM
15	North Range Lot off Millcreek Rd	8/26/2020 9:48 PM
16	Mill creek parking lot	8/26/2020 6:59 AM
17	Either north range lot or by the covered bridge	8/26/2020 5:04 AM
18	Different spots	8/26/2020 2:12 AM
19	All of the above. It depends on whether I'm running, hiking or biking and if I'm with my running crew, biking crew or family. All of these sites are viable/valuable.	8/25/2020 10:39 PM
20	I	8/25/2020 8:31 PM
21	North Range	8/25/2020 7:46 PM
22	North range parking lot	8/25/2020 7:37 PM
23	Ride bikes to the park	8/25/2020 7:27 PM
24	Small lot on game Preserve rd	8/25/2020 5:16 PM
25	Ride bike in	8/25/2020 5:11 PM
26	A	8/25/2020 4:49 PM
27	Walk from my house. I live on Game Preserve road and my property adjoins the North Range	8/25/2020 4:38 PM
28	MTB Access Lot	8/25/2020 4:32 PM
29	We park at different lots each time we	8/17/2020 11:25 AM
30	Mill Creek / North Range access road, I also utilize parking along Game Preserve rd.	8/16/2020 1:04 PM



Q11 What Activities do you partake in at Trexler Preserve. Please check all that apply.

Answered: 384   Skipped: 79



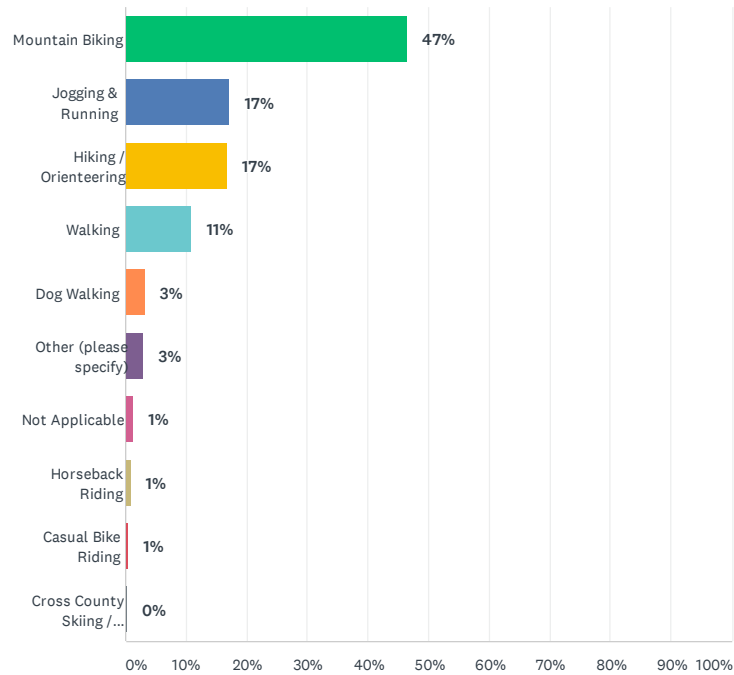
ANSWER CHOICES	RESPONSES	
Trail use	97%	373
Bird Watching	20%	76
Environmental Education	12%	47
Nature Studies	12%	45
Fishing	7%	27
County Run Program / Event	6%	24
Archery Hunting	3%	12
Kayaking	2%	7
Camping	2%	6
Total Respondents: 384		



# Trexler Nature Preserve Public Opinion Survey

Q12 Trails are a big part of the Trexler Nature Preserve. Please select the primary activity you partake in when using the trail network.

Answered: 387 Skipped: 76

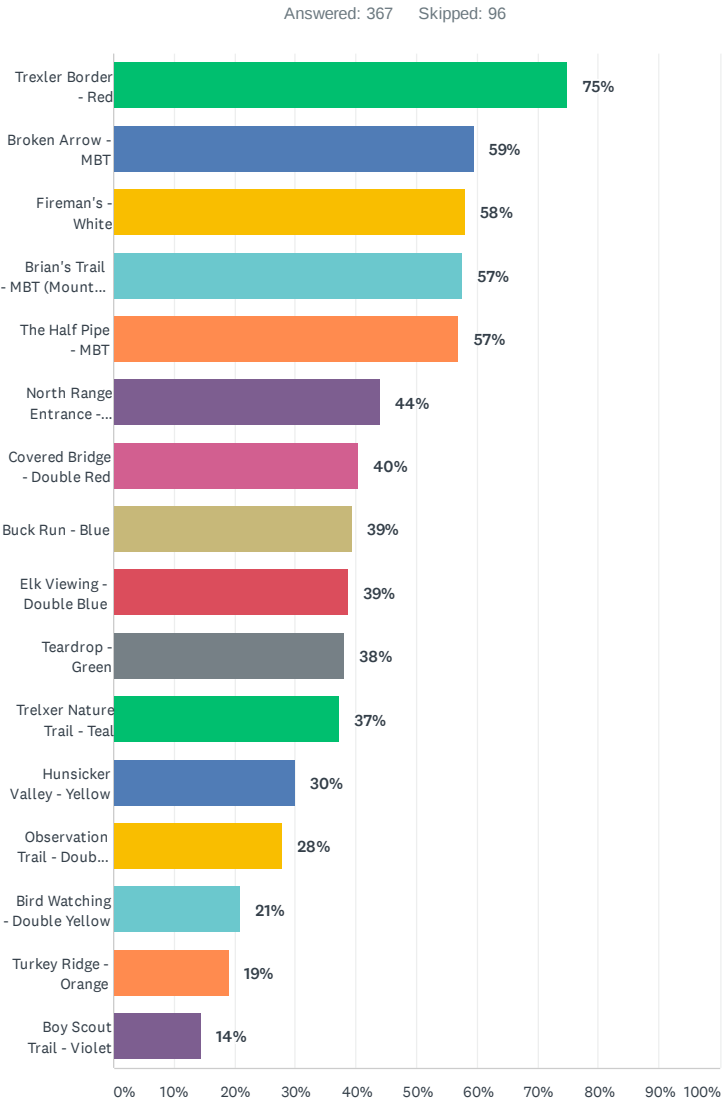


ANSWER CHOICES	RESPONSES	
Mountain Biking	47%	180
Jogging & Running	17%	66
Hiking / Orienteering	17%	65
Walking	11%	42
Dog Walking	3%	12
Other (please specify)	3%	11
Not Applicable	1%	5
Horseback Riding	1%	3
Casual Bike Riding	1%	2
Cross County Skiing / Snowshoeing	0%	1
<b>TOTAL</b>		<b>387</b>

#	OTHER (PLEASE SPECIFY)	DATE
1	Photography	11/23/2020 12:16 PM
2	Photography of nature	11/10/2020 8:52 PM
3	Running, hiking and horseback riding	9/4/2020 1:50 PM
4	Hiking and running equally	9/4/2020 10:01 AM
5	Can't hike :(	9/3/2020 10:39 PM
6	Hiking or mountain biking almost equal reasons to visit, but I've done more hiking than MTB.	8/30/2020 8:36 AM
7	mountain biking! it wont let me select that answer.	8/26/2020 9:00 PM
8	You need to allow multi-use for this question. I run, hike and bike at the Preserve.	8/25/2020 10:40 PM
9	Unable to select multiple- we hike, run and mountain bike	8/25/2020 4:15 PM
10	Mountain unicycling	8/16/2020 4:54 PM
11	I hike and run as well.	8/16/2020 1:06 PM



Q13 Please select all trails that you use a Trexler Nature Preserve.



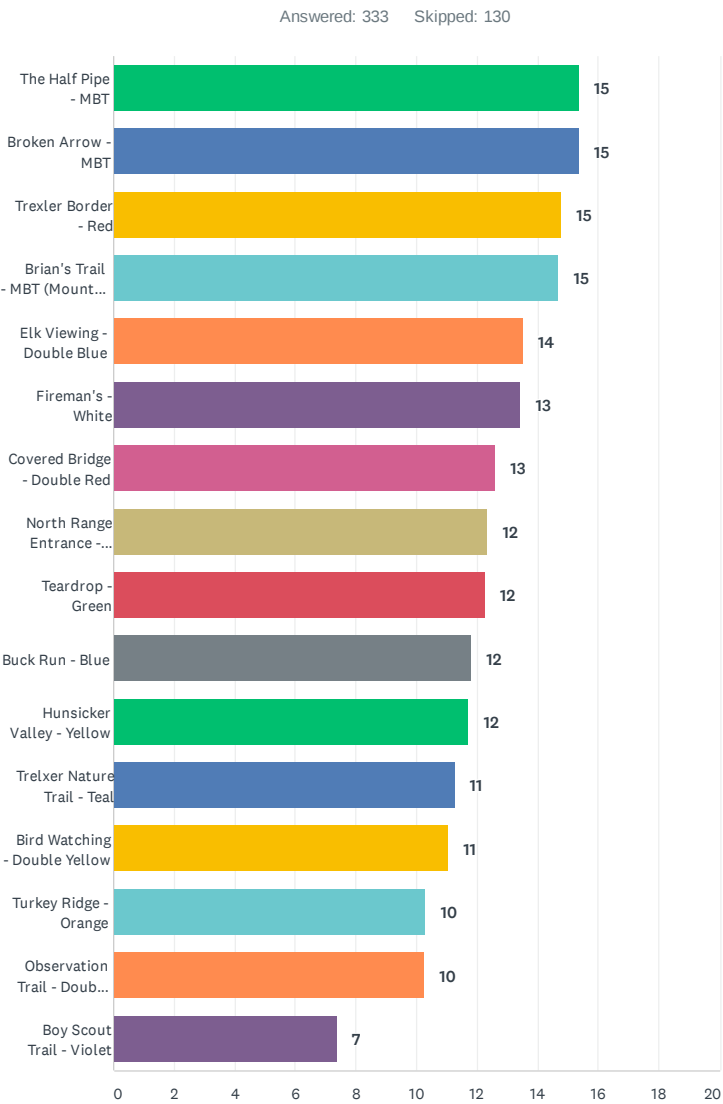


## Trexler Nature Preserve Public Opinion Survey

ANSWER CHOICES	RESPONSES	
Trexler Border - Red	75%	275
Broken Arrow - MBT	59%	218
Fireman's - White	58%	213
Brian's Trail - MBT (Mountain Bike Trail)	57%	211
The Half Pipe - MBT	57%	209
North Range Entrance - Green / White	44%	161
Covered Bridge - Double Red	40%	148
Buck Run - Blue	39%	144
Elk Viewing - Double Blue	39%	142
Teardrop - Green	38%	140
Trexler Nature Trail - Teal	37%	137
Hunsicker Valley - Yellow	30%	110
Observation Trail - Double Teal	28%	102
Bird Watching - Double Yellow	21%	77
Turkey Ridge - Orange	19%	70
Boy Scout Trail - Violet	14%	53
Total Respondents: 367		



Q14 Out of the trails that you use at Trexler Please rank in order the trails that you find most enjoyable, one being the highest or most enjoyable.





# Trexler Nature Preserve Public Opinion Survey

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
The Half Pipe - MBT	30.65% 57	39.25% 73	16.67% 31	1.61% 3	3.76% 7	0.00% 0	1.61% 3	1.08% 2	0.00% 0	0.54% 1	0.54% 1	0.54% 1	0.54% 1	1.08% 2
Broken Arrow - MBT	40.70% 81	24.12% 48	19.60% 39	4.02% 8	1.51% 3	1.51% 3	0.50% 1	1.51% 3	1.01% 2	2.01% 4	0.00% 0	0.00% 0	0.50% 1	0.50% 1
Trexler Border - Red	37.65% 93	7.69% 19	6.48% 16	19.43% 48	16.60% 41	6.07% 15	1.62% 4	1.62% 4	0.00% 0	0.40% 1	0.40% 1	0.00% 0	0.40% 1	0.00% 0
Brian's Trail - MBT (Mountain Bike Trail)	13.51% 25	22.16% 41	42.16% 78	9.19% 17	0.54% 1	2.70% 5	2.16% 4	1.62% 3	1.08% 2	0.00% 0	0.00% 0	0.54% 1	1.08% 2	1.62% 3
Elk Viewing - Double Blue	13.93% 17	24.59% 30	7.38% 9	11.48% 14	9.84% 12	4.92% 6	4.92% 6	10.66% 13	2.46% 3	4.10% 5	0.82% 1	2.46% 3	0.00% 0	0.82% 1
Fireman's - White	2.63% 5	13.16% 25	13.16% 25	30.00% 57	17.37% 33	8.42% 16	6.32% 12	2.11% 4	1.58% 3	1.58% 3	1.05% 2	0.00% 0	1.05% 2	0.00% 0
Covered Bridge - Double Red	19.69% 25	11.81% 15	10.24% 13	4.72% 6	7.09% 9	7.87% 10	8.66% 11	3.94% 5	4.72% 6	7.09% 9	4.72% 6	3.15% 4	1.57% 2	0.79% 1
North Range Entrance - Green / White	2.90% 4	5.80% 8	8.70% 12	17.39% 24	11.59% 16	18.12% 25	9.42% 13	9.42% 13	5.07% 7	2.90% 4	1.45% 2	0.72% 1	0.00% 0	0.72% 1
Teardrop - Green	3.31% 4	4.13% 5	7.44% 9	13.22% 16	14.88% 18	27.27% 33	12.40% 15	6.61% 8	4.13% 5	2.48% 3	0.00% 0	1.65% 2	0.00% 0	0.83% 1
Buck Run - Blue	0.81% 1	8.94% 11	4.88% 6	8.13% 10	19.51% 24	11.38% 14	14.63% 18	10.57% 13	8.13% 10	6.50% 8	2.44% 3	1.63% 2	0.00% 0	0.00% 0
Hunsicker Valley - Yellow	1.08% 1	7.53% 7	8.60% 8	6.45% 6	19.35% 18	11.83% 11	13.98% 13	8.60% 8	9.68% 9	3.23% 3	3.23% 3	0.00% 0	0.00% 0	0.00% 0
Trexler Nature Trail - Teal	4.27% 5	8.55% 10	11.97% 14	11.11% 13	11.11% 13	5.98% 7	5.13% 6	5.13% 6	8.55% 10	4.27% 5	11.11% 13	3.42% 4	1.71% 2	4.27% 5
Bird Watching - Double Yellow	4.84% 3	4.84% 3	12.90% 8	9.68% 6	3.23% 2	12.90% 8	4.84% 3	3.23% 2	14.52% 9	11.29% 7	6.45% 4	3.23% 2	4.84% 3	0.00% 0
Turkey Ridge - Orange	0.00% 0	0.00% 0	5.26% 3	12.28% 7	7.02% 4	3.51% 2	17.54% 10	12.28% 7	19.30% 11	5.26% 3	5.26% 3	3.51% 2	1.75% 1	1.75% 1
Observation Trail - Double Teal	2.35% 2	5.88% 5	9.41% 8	15.29% 13	8.24% 7	4.71% 4	4.71% 4	5.88% 5	3.53% 3	7.06% 6	2.35% 2	12.94% 11	8.24% 7	2.35% 2
Boy Scout Trail - Violet	0.00% 0	2.44% 1	2.44% 1	9.76% 4	7.32% 3	7.32% 3	4.88% 2	0.00% 0	2.44% 1	0.00% 0	2.44% 1	7.32% 3	24.39% 10	2.44% 1



Q15 What makes your topped ranked trail most enjoyable?

Answered: 286 Skipped: 177



## Trexler Nature Preserve Public Opinion Survey

#	RESPONSES	DATE
1	Fast, smooth mountain bike trail with great flow. Unlike any other mountain bike trail in our area.	1/4/2021 3:22 PM
2	close to home	12/30/2020 11:31 AM
3	Changes in elevation and scenery	12/24/2020 9:15 PM
4	It's challenging and one of the most isolated. The views of the Jordan are spectacular.	12/8/2020 10:42 PM
5	Built by mountain bikers for mountain biking	12/3/2020 7:52 PM
6	Not sure. Stay mostly on main road.	11/23/2020 12:16 PM
7	Flow	11/19/2020 9:13 PM
8	Flow and the incredible maintenance	11/14/2020 10:49 PM
9	Archery hunting	11/11/2020 11:28 PM
10	Fewer mountain bikers and horses.	11/10/2020 12:26 PM
11	With the family we do a loop along the Jordan usually. I do not know the trails names	11/5/2020 12:32 PM
12	The changing scenery	11/5/2020 11:54 AM
13	Less traffic	11/4/2020 11:02 AM
14	Easy parking; starts and ends at the ford	10/27/2020 9:14 PM
15	Broken arrow has good flow and a sustained downhill.	10/25/2020 8:42 AM
16	purpose mob	10/19/2020 2:06 PM
17	The terrain and the view	10/13/2020 5:36 PM
18	The flow, speed, and views when stopped.	10/12/2020 1:46 PM
19	Very well designed, fun and fast.	10/5/2020 8:48 AM
20	I like the sights.	10/4/2020 1:30 AM
21	Fun and challenging	10/2/2020 4:54 PM
22	I enjoy the mixture of hills and changing scenery of this trail	10/2/2020 9:46 AM
23	the flow	9/29/2020 1:20 PM
24	The hard work by the current volunteer group keeping the trails safe and enjoyable.	9/28/2020 3:37 PM
25	The opportunity to see the bison	9/28/2020 12:09 PM
26	The flow and the care put into building it	9/27/2020 10:21 PM
27	Less people...more nature...more quiet	9/27/2020 7:07 PM
28	Views	9/27/2020 4:53 PM
29	The flow of the trail	9/27/2020 9:17 AM
30	Good exercise due to elevation changes, not too long, good view at the top and chance to see elk up close.	9/25/2020 7:21 AM
31	I love all the trails, but use the border trail the most because it's challenging. I also like it because it's not as crowded as some of the others.	9/24/2020 8:47 PM
32	Skill level required, conditions, well maintained	9/19/2020 5:38 PM
33	Wide and clean, easy access, walking along the creek.	9/15/2020 12:05 PM
34	Not that many people	9/15/2020 8:17 AM
35	The view from the northern end of the Border Trail is spectacular, and we appreciate the access to the river (for my dogs) toward the southern end of the trail.	9/14/2020 2:16 PM
36	Intensity	9/12/2020 1:17 PM
37	Well built for mtb, fast, fun, scenic, a bit dramatic.	9/12/2020 1:02 PM
38	Fast and flowy. Lots of shade. Lots of table-top jumps. Lots of nature. Perfect trail, aside from the long-haul back up.	9/10/2020 9:10 AM
39	Applicability to activity. Red is only one for horses but is difficult due to steep inclines and descents. Needs to be more level / safer for all riders and athletic abilities of horse. The current hills are tough.	9/9/2020 4:43 PM
40	I hike the trail 30+ times a year. I love it for the exercise! Horses ruin the trail, especially when muddy. Trail needs more maintenance near Kid's Peace, etc to prevent ticks.	9/9/2020 9:58 AM
41	Location and length	9/8/2020 10:36 PM
42	The fact that it's not a dirt trail and is maintained. I want to see more stone/partially paved trails that I can take my young children on. Not everyone is capable of using dirt trails. Not everyone wants to take their dog on a tick-infested dirt trail either. Having trails in more permanent condition would also enable more use during rain, winter, etc. as they would not be as muddy.	9/8/2020 4:46 PM
43	Access to the different mountain bike trails	9/8/2020 4:12 PM
44	Easy navigation through and ample parking	9/8/2020 3:05 PM
45	the beautiful bridges	9/8/2020 5:14 AM
46	Good distance, nice scenic trail, relatively easy and flat	9/7/2020 10:59 PM
47	Lots of features, birds, creek, nice walk w my family, the Ford!	9/7/2020 3:21 PM



## Trexler Nature Preserve Public Opinion Survey

48	It's easily accessible with some great sights. It's not too strenuous while still providing a strong workout. The dirt path works well.	9/6/2020 3:39 PM
49	Easy for the little guy to walk (15 months old)	9/6/2020 11:56 AM
50	Interesting birds and wildflowers	9/4/2020 3:48 PM
51	Challenging uphill hike with nice views at top	9/4/2020 3:33 PM
52	Easy and beautiful	9/4/2020 1:53 PM
53	Flat for running	9/4/2020 1:51 PM
54	Broken arrow trail is definitely the most fun MTB trail, we always save it for the last run of the day.	9/4/2020 1:36 PM
55	Easy trail to enjoy with my children.	9/4/2020 12:23 PM
56	variety, physically more challenging and well maintained	9/4/2020 10:55 AM
57	the length and difficulty make it ideal for training	9/4/2020 10:12 AM
58	longest trail	9/4/2020 10:08 AM
59	length, variety of terrain	9/4/2020 10:04 AM
60	Long trail and easily accessible	9/4/2020 8:55 AM
61	Perfect balance of flat (warm up) then steep uphill, then downhill. 30 min workout.	9/4/2020 8:51 AM
62	The scenery is beautiful!	9/4/2020 8:47 AM
63	Difficulty and views	9/4/2020 8:05 AM
64	Can't hike ;-(	9/3/2020 10:39 PM
65	Variety of terrain, views.	9/3/2020 9:14 PM
66	I like them all, picked order randomly. I like the open vistas and the wooded areas, the ups and downs. Wonderful, scenic park.	9/3/2020 9:06 PM
67	Great hiking, well marked, views, elevation.	9/3/2020 9:03 PM
68	Border trail provides diversity and long length of trail; Covered bridge trail is easily accessible for all ages; north range is unique for wildlife habitat and single track trails for running.	9/3/2020 8:28 PM
69	I've never been there before.	9/3/2020 7:20 PM
70	Nice scenery, shade.	9/3/2020 3:57 PM
71	ease of access, kid friendly, streamside	9/3/2020 3:41 PM
72	Easy	9/3/2020 2:36 PM
73	Distance, steepness, variety of terrain	9/3/2020 12:19 PM
74	The length of it and the wonderful views!	9/3/2020 6:12 AM
75	The length the hillside s	9/2/2020 9:11 PM
76	lengthy, variety, hills	9/2/2020 8:45 PM
77	good for biking	9/2/2020 12:43 PM
78	I like to go for longer walks/hikes and this trail is wider so that if I am walking with a group people can still easily pass us.	9/2/2020 11:52 AM
79	Not so enjoyable anymore, too many people disobeying park rules, more trash And rude people than ever before. WAY TOO MANY TRAILS- trail system is confusing. Sad to see the loss of habitat to build these trails and the unnecessary men. bike/ foot traffic/damage caused by all the additional trails	9/2/2020 8:22 AM
80	It is fun to ride as a mountain bike trail, but is also dual use and is enjoyable to hike. The mature forest is beautiful and provides shade on a hot day	9/1/2020 10:44 PM
81	Fast and flowy single track	9/1/2020 10:43 PM
82	Half pipe is really beginner-friendly and a long fun ride.	9/1/2020 10:00 PM
83	The most amazing parts	9/1/2020 8:52 PM
84	Good terrain and flow for mountain biking.	9/1/2020 8:19 PM
85	The challenge and rawness of the trail	9/1/2020 6:05 PM
86	Trail crews have done a fantastic job building and maintaining jumps and berms in these trails which make them very fun	9/1/2020 4:42 PM
87	The terrain is so different. Of course, it could be a little less steep ...	9/1/2020 3:50 PM
88	Fast, flowy and feature filled	9/1/2020 3:27 PM
89	Well built, sustainable. Makes the most out of the rolling terrain.	9/1/2020 3:11 PM
90	Fun	9/1/2020 3:08 PM
91	Broken Arrow is amazing for mountain biking - best trail in LV area. Extremely well maintained and fun/flowy, I bring many people out to ride it. One of the best in eastern pennsylvania for downhill.	8/31/2020 5:23 PM
92	Berms and features, professionally built for optimal enjoyment, safety and use of terrain	8/31/2020 8:22 AM
93	Jumps! I think I have marked the correct trail as the one with the newer doubles. Good flow trails but need more progressive jumps.	8/31/2020 8:00 AM
94	Not as well-used as others offer silent nature observation, as well as a physical challenge over a shorter distance than some other loops.	8/30/2020 8:38 AM



## Trexler Nature Preserve Public Opinion Survey

95	Well built MTB trail.	8/29/2020 9:44 PM
96	The trail features	8/29/2020 3:31 PM
97	Build for mountain biking and sustainable	8/29/2020 11:45 AM
98	It's fast and flowy!! And it goes down hill.	8/28/2020 11:23 PM
99	The MBT trails and the jumps and berms	8/28/2020 10:05 PM
100	Broken arrow is just extremely fast and fun. The trail is a good length and flows very well.	8/28/2020 5:03 PM
101	flow and jumps	8/28/2020 5:00 PM
102	Great flow, well thought out and executed.	8/28/2020 3:55 PM
103	Great MTB trails with jumps, berms, and challenging features.	8/28/2020 3:25 PM
104	Great mountain bike trail. Good flow.	8/28/2020 2:45 PM
105	Variety of the terrain and the beautiful Vistas.	8/28/2020 1:40 PM
106	The flow and features (level of difficulty) of the trail.	8/28/2020 1:22 PM
107	Tech features, flow	8/28/2020 12:58 PM
108	Most fun to my style of riding	8/28/2020 12:02 PM
109	Nice flow	8/27/2020 7:13 PM
110	Great flow	8/27/2020 7:12 PM
111	It's all about the ride rather than the ride to get to the ride	8/27/2020 3:15 PM
112	Length, views, elevation changes	8/27/2020 7:13 AM
113	Fun and flow	8/26/2020 11:42 PM
114	Twisty banked turns fun for mountain biking	8/26/2020 10:45 PM
115	Well designed single track that's fun to ride	8/26/2020 9:56 PM
116	Mountain biking.	8/26/2020 9:19 PM
117	good flow, well maintained, supportive berms!	8/26/2020 9:01 PM
118	Mountain-bike specific	8/26/2020 7:47 PM
119	Beautiful wild flowers and the section that winds over the creek.	8/26/2020 5:58 PM
120	Variety	8/26/2020 3:01 PM
121	turns	8/26/2020 1:50 PM
122	It is fun to descend, flowy and fast and challenging to climb which I also enjoy	8/26/2020 9:05 AM
123	I like the length, variety of terrain and the magnificent views.	8/26/2020 8:01 AM
124	Great biking trail	8/26/2020 7:20 AM
125	Fast flowing mtn bike ride	8/26/2020 6:45 AM
126	Fast as fuck. Sorry for the language	8/26/2020 5:10 AM
127	Beginning of BA has great flow and fun, climb back to the top however can be long, and grueling especially with the sun exposure	8/26/2020 4:16 AM
128	Lack of violent police officers.	8/26/2020 3:32 AM
129	One of the more skilled MTB trails, maintenance, and best/longest decent.	8/26/2020 2:04 AM
130	The flow! By that I mean it is moderately technical, medium high-speed, well maintained, and appeals to a wide variety of skill levels. It's probably the best trail I've ever ridden anywhere.	8/25/2020 11:01 PM
131	This is a nonsense question. Honestly, I use all of the trails and they each have their own personality, challenges, and benefits. It's the equivalent of picking your favorite child. I'm beginning to think that this survey wasn't designed by a real survey designer/political scientist, which I am.	8/25/2020 10:43 PM
132	can access many trails	8/25/2020 10:10 PM
133	Long, hilly, varied terrain	8/25/2020 10:03 PM
134	Good mountain bike flow	8/25/2020 9:59 PM
135	The steepness and distance	8/25/2020 9:58 PM
136	North range	8/25/2020 9:55 PM
137	Jumps	8/25/2020 9:54 PM
138	The berms and rollers.	8/25/2020 9:48 PM
139	Well maintained	8/25/2020 9:41 PM
140	Mountain bike features	8/25/2020 9:25 PM
141	Super fun, great exercise and enjoyable for all ages and skill levels. Trexler mountain biking trails are top notch in the area!	8/25/2020 9:23 PM
142	The Girl Scouts in my SU (I am SUM for city of Allentown Girl Scouts) have ease of access.	8/25/2020 9:09 PM
143	One of our favorite MTB trails	8/25/2020 9:06 PM
144	Trail features and "flow", and an appreciation for the amount of maintenance required.	8/25/2020 9:01 PM
145	The berms and skinny features.	8/25/2020 8:53 PM



## Trexler Nature Preserve Public Opinion Survey

146	Distance, hills, well marked trail	8/25/2020 8:52 PM
147	The berms, flow, fast, fun. One way. Different then other trails in our area	8/25/2020 8:49 PM
148	Speed and flow	8/25/2020 8:37 PM
149	Flow, features, terrain	8/25/2020 8:13 PM
150	The views	8/25/2020 8:13 PM
151	the flow	8/25/2020 8:08 PM
152	Jumps and berms	8/25/2020 8:06 PM
153	I enjoy a long trail run and the border trail is well marked and easily runnable.	8/25/2020 8:04 PM
154	The hard work put in really pays off. The turns and flow make these types of trails the most fun.	8/25/2020 7:59 PM
155	Great hike with varying scenery.	8/25/2020 7:48 PM
156	it rips on a mountain bike	8/25/2020 7:41 PM
157	Landscape	8/25/2020 7:40 PM
158	All are good	8/25/2020 7:28 PM
159	Just enjoy being there	8/25/2020 7:26 PM
160	Flow	8/25/2020 7:19 PM
161	Great tour of the entire area.	8/25/2020 7:17 PM
162	Broken Arrow - all the work/maintenance has made it super fun and flowy	8/25/2020 7:11 PM
163	High speed more technical small jumps	8/25/2020 7:11 PM
164	It's a nice flowy fast switchback. Wish it had a few more jumps near the bottom	8/25/2020 7:04 PM
165	Well maintained and well designed for biking enjoyment	8/25/2020 7:00 PM
166	Its fun	8/25/2020 6:55 PM
167	The length Varying terrains Good climbs and downhill Scenery	8/25/2020 6:54 PM
168	Flow	8/25/2020 6:51 PM
169	Fast and fun.	8/25/2020 6:44 PM
170	Trail flows very well, makes an enjoyable ride.	8/25/2020 6:41 PM
171	We love to play in the water at the end of our hike.	8/25/2020 6:34 PM
172	The thrill!!! Both my kids love the downhill pump track feel of the trail.	8/25/2020 6:20 PM
173	I love the length and technicality. Its hard to find that in other places in the Lehigh Valley	8/25/2020 6:14 PM
174	It can be enjoyed in any direction. The trail does not exist on a fall line and doesn't need constant maintenance.	8/25/2020 6:10 PM
175	Varied terrain and beautiful views	8/25/2020 6:06 PM
176	Great elevation/ workout for hiking and running	8/25/2020 6:03 PM
177	The berms on half pipe. Fast flowy fun. Brians trails jumps. This system has been much improved in 2020! Great work.	8/25/2020 5:56 PM
178	Fun	8/25/2020 5:55 PM
179	Variety of terrain and elevation.	8/25/2020 5:54 PM
180	The great mountain biking terrain and scenery	8/25/2020 5:49 PM
181	Long sustained downhill mountain bike trail with natural obstacles.	8/25/2020 5:49 PM
182	We hike the border trail weekly	8/25/2020 5:48 PM
183	The smooth flow and design of the trail.	8/25/2020 5:47 PM
184	Convenience to my activity	8/25/2020 5:39 PM
185	Enjoyable to ride	8/25/2020 5:38 PM
186	It's flow. Plus it's well made	8/25/2020 5:34 PM
187	Terrain and length	8/25/2020 5:31 PM
188	It's tough, runnable all year round, beautiful views. It's my mecca, where I run once or twice a week to take the stress off of my 60 to 80 hr weeks machining and running my company.	8/25/2020 5:29 PM
189	Mountain biking on it	8/25/2020 5:26 PM
190	Love the 9 mile border trail. The views and the challenge of running it.	8/25/2020 5:21 PM
191	Less bikers!	8/25/2020 5:20 PM
192	Mtb flow	8/25/2020 5:20 PM
193	Long and turny with minimal jumps	8/25/2020 5:18 PM
194	Technical downhill	8/25/2020 5:02 PM
195	Fast and flows with some jumps	8/25/2020 5:01 PM
196	Trail features	8/25/2020 5:00 PM
197	Love all the MTB trails	8/25/2020 4:58 PM
198	I enjoy the flow and switch backs on the broken arrow.	8/25/2020 4:57 PM



## Trexler Nature Preserve Public Opinion Survey

199	tough, natural terrain. I don't want crushed rock and smooth packed dirt.	8/25/2020 4:51 PM
200	Running or MTB down broken arrow is a blast. Fast and fun. Great job by the LVMTB crew	8/25/2020 4:43 PM
201	The mountain bike trails are purpose built with good flow. Directional trails make them much safer compared to other systems.	8/25/2020 4:41 PM
202	the fun descent and switchbacks	8/25/2020 4:41 PM
203	Mountain bike features.	8/25/2020 4:38 PM
204	Trail maintenance/conditions	8/25/2020 4:37 PM
205	It's the best MTB trail.	8/25/2020 4:34 PM
206	The new upgrades to the MTB trails	8/25/2020 4:29 PM
207	Fun change of elevation	8/25/2020 4:29 PM
208	Flow and features	8/25/2020 4:24 PM
209	Well groomed, berms	8/25/2020 4:23 PM
210	Nothing	8/25/2020 4:19 PM
211	Downhill fun.	8/25/2020 4:19 PM
212	Long downhill in the trees. Fast and flowing. Definitely need more mtb trails like it. Bigger features would also be awesome.	8/25/2020 4:18 PM
213	Multi purpose trail - run/hike/bike. Best trail in the valley!	8/25/2020 4:17 PM
214	It's challenging and has jumps	8/25/2020 4:11 PM
215	Designed for intended use, well-built, appropriate grades, little erosion, well maintained.	8/25/2020 4:09 PM
216	Longest sustained downhill trail in the Valley, and the work that VMB puts into it is exceptional.	8/25/2020 4:08 PM
217	The rebuild is amazing. Well done.	8/25/2020 4:07 PM
218	I enjoy mountain biking as my favorite activity.	8/25/2020 4:07 PM
219	the view	8/23/2020 2:55 PM
220	viewing the elk	8/22/2020 3:58 PM
221	Varying degrees of difficulty, fairly easy to follow	8/22/2020 2:54 PM
222	Great spot for bird watching	8/21/2020 11:07 AM
223	the views and the wildflowers	8/21/2020 6:23 AM
224	Great running loop and well maintained	8/20/2020 8:21 PM
225	It is a pretty easy trail to walk in and there is a lot of beautiful scenery.	8/20/2020 8:02 PM
226	Elk	8/20/2020 1:26 PM
227	I really like bridges	8/20/2020 8:39 AM
228	being able to see the elk	8/20/2020 7:22 AM
229	The border trail is the longest and give a good picture of the whole preserve	8/20/2020 5:46 AM
230	Scenery	8/19/2020 5:08 PM
231	The bridge itself and the water activities	8/19/2020 2:04 PM
232	This is my preferred trail for trail running. I can run different sections of it and the scenery on the different sections varies, but are all beautiful.	8/19/2020 1:55 PM
233	Scenery	8/19/2020 1:50 PM
234	Quartzilla trail race preparation with friends. It is challenging, long enough to hike for a half day or to make a very good run.	8/19/2020 1:48 PM
235	Length, and change in difficulty	8/19/2020 12:47 PM
236	The Border trail is challenge and offers a range of different difficulties and sights	8/19/2020 12:41 PM
237	Nature. Cleanliness.	8/19/2020 12:37 PM
238	They are all great	8/19/2020 11:00 AM
239	Access and park layout	8/19/2020 8:30 AM
240	well maintained, turns, and features	8/18/2020 11:59 AM
241	The trails. Love to run them	8/17/2020 10:12 PM
242	Perfect training run and has the most variety of terrain	8/17/2020 9:28 PM
243	Length and seclusion	8/17/2020 9:16 PM
244	The view	8/17/2020 8:52 PM
245	Long runs	8/17/2020 7:03 PM
246	Miles in one trail	8/17/2020 6:38 PM
247	It is a fast and flowy downhill mountain bike trail.	8/17/2020 5:29 PM
248	The elevation change, fun features, view and switchbacks. It is an all around fun trail offering elements of a well built trail that is fun to ride.	8/17/2020 4:31 PM
249	flowing trail through shade from big hardwood trees.	8/17/2020 2:12 PM
250	it is not enjoyable anymore, too crowded, too difficult to maneuver between bikers and runners.	8/17/2020 1:40 PM



## Trexler Nature Preserve Public Opinion Survey

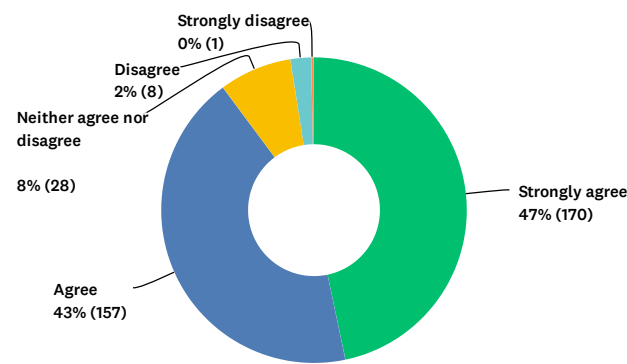
Dogs not on leashes. Garbage everywhere, loud music, cars do not respect pedestrians. Has become an absolute nightmare.

251	It's difficulty. Scenic views.	8/17/2020 12:44 PM
252	Challenging and beautiful.	8/17/2020 11:44 AM
253	It all depends on how long of a hike/walk we want to do that day.	8/17/2020 11:27 AM
254	It is a nice length, had challenging climbs, water crossings and amazing views	8/17/2020 11:08 AM
255	Nature	8/17/2020 11:00 AM
256	Challenging, scenic and long	8/17/2020 10:42 AM
257	fun flow for mountain biking	8/17/2020 10:37 AM
258	It goes through a variety of environmental zones.	8/17/2020 10:33 AM
259	It's the longest and most varied	8/17/2020 9:50 AM
260	Its a good trail to ride	8/17/2020 9:00 AM
261	It's fast, fun and make you appreciate all of the work that is done by the trail builders	8/16/2020 7:24 PM
262	The flow of the mountain biking trail	8/16/2020 5:16 PM
263	Smooth trails	8/16/2020 4:56 PM
264	Dedicated to MTB.	8/16/2020 4:55 PM
265	Fun	8/16/2020 4:37 PM
266	Fun and well made trail	8/16/2020 4:25 PM
267	the flow	8/16/2020 3:40 PM
268	Flow and features	8/16/2020 3:01 PM
269	MTB Flow	8/16/2020 2:59 PM
270	Red loop is a great workout	8/16/2020 2:49 PM
271	Jumps, and flows well	8/16/2020 2:36 PM
272	Great flow and constructions. Easy access	8/16/2020 2:24 PM
273	Best for mountain biking	8/16/2020 2:19 PM
274	Fun , well maintained.	8/16/2020 2:09 PM
275	It's fun as hell	8/16/2020 2:08 PM
276	Hiking; the views	8/16/2020 2:03 PM
277	Specifically designed for mountain bike use. They're well maintained, fast, and fun.	8/16/2020 1:43 PM
278	Fast well designed trail for MTB.	8/16/2020 1:34 PM
279	Excellent mountain biking trails. Always maintained and improved upon	8/16/2020 1:33 PM
280	Technically inclined	8/16/2020 1:33 PM
281	Fast, jumps, berms. Just a lot of fun to ride.	8/16/2020 1:26 PM
282	Well constructed and maintained	8/16/2020 1:15 PM
283	There's no other park in the region that has fast flowy sight track.	8/16/2020 1:08 PM
284	Higher level of difficulty for hiking. One household member mountain bikes there too but not nearly as frequently as we hike.	8/15/2020 11:37 AM
285	Length of trail, varied terrain and scenery	8/14/2020 10:28 PM
286	Distance	8/14/2020 9:45 PM



Q16 In general the preserve trails are well maintained?

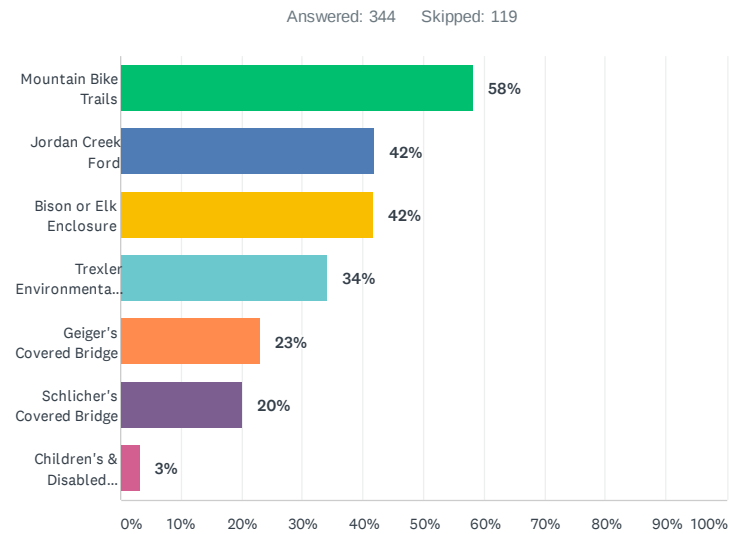
Answered: 364 Skipped: 99



ANSWER CHOICES	RESPONSES	
Strongly agree	47%	170
Agree	43%	157
Neither agree nor disagree	8%	28
Disagree	2%	8
Strongly disagree	0%	1
TOTAL		364



Q17 What destinations do you seek out when you visit Trexler Nature Preserve. Check all that Apply.

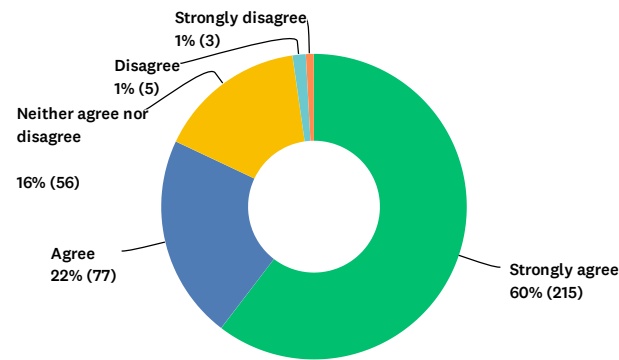


ANSWER CHOICES	RESPONSES	
Mountain Bike Trails	58%	200
Jordan Creek Ford	42%	144
Bison or Elk Enclosure	42%	143
Trexler Environmental Center & Overlook	34%	117
Geiger's Covered Bridge	23%	79
Schlicher's Covered Bridge	20%	69
Children's & Disabled Person's Fishing Area	3%	11
Total Respondents: 344		



Q18 The preservation of the buffalo herd is important for the identity of Trexler Nature Preserve?

Answered: 356   Skipped: 107

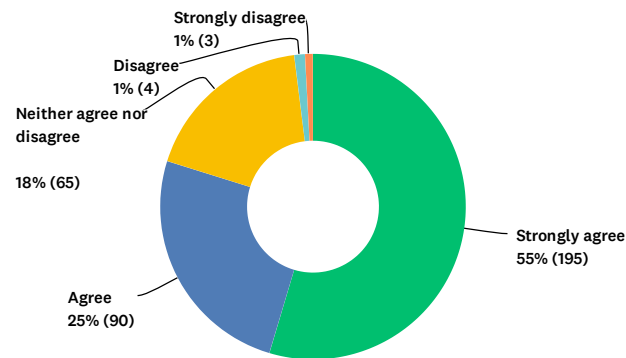


ANSWER CHOICES	RESPONSES	
Strongly agree	60%	215
Agree	22%	77
Neither agree nor disagree	16%	56
Disagree	1%	5
Strongly disagree	1%	3
TOTAL		356



Q19 The preservation of the elk herd is important to the identity of Trexler Nature Preserve?

Answered: 357   Skipped: 106

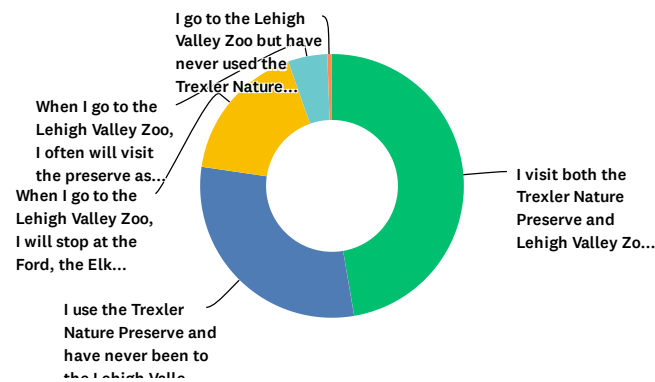


ANSWER CHOICES	RESPONSES	
Strongly agree	55%	195
Agree	25%	90
Neither agree nor disagree	18%	65
Disagree	1%	4
Strongly disagree	1%	3
TOTAL		357



Q20 The Lehigh Valley Zoo is a separately operated entity surrounded by the Trexler Nature Preserve. Please select the phrase that best describes your visits to Trexler Nature Preserve in relation to the Lehigh Valley Zoo.

Answered: 353    Skipped: 110

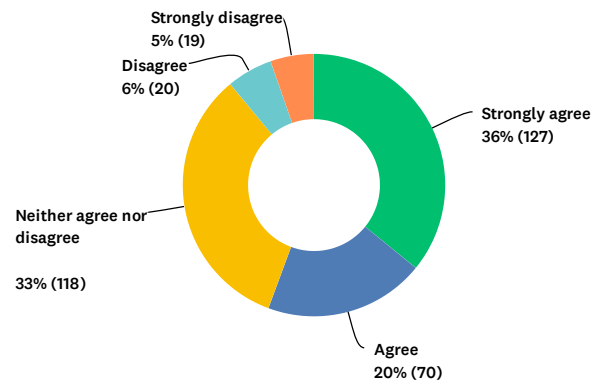


ANSWER CHOICES	RESPONSES	
I visit both the Trexler Nature Preserve and Lehigh Valley Zoo, but not on the same trip.	47%	167
I use the Trexler Nature Preserve and have never been to the Lehigh Valley Zoo.	30%	106
When I go to the Lehigh Valley Zoo, I will stop at the Ford, the Elk enclosure or Bison enclosure when exiting the Zoo.	17%	61
When I go to the Lehigh Valley Zoo, I often will visit the preserve as well.	5%	17
I go to the Lehigh Valley Zoo but have never used the Trexler Nature Preserve facilities.	1%	2
TOTAL		353



Q21 How do you feel about the following statement, I would be upset if the Jordan Creek Ford were to be closed to vehicular use.

Answered: 354 Skipped: 109

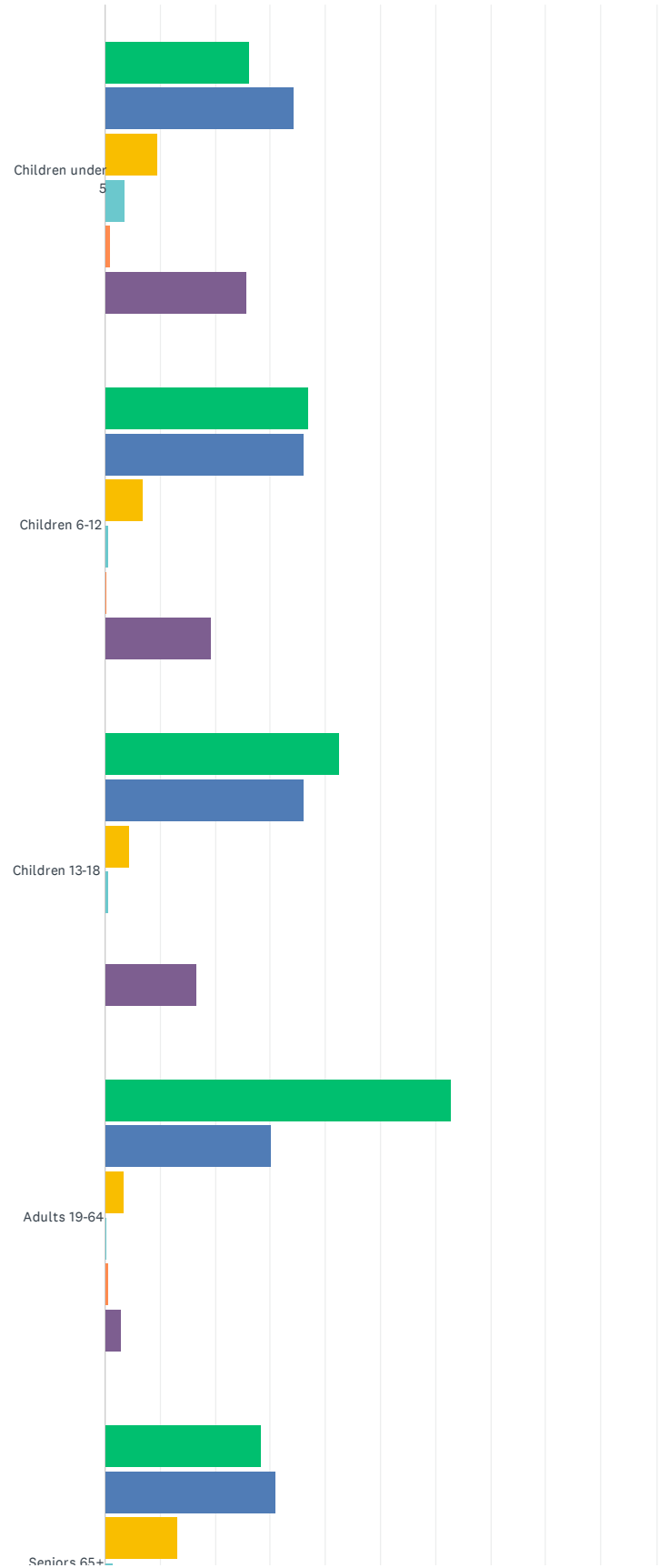


ANSWER CHOICES	RESPONSES	
Strongly agree	36%	127
Agree	20%	70
Neither agree nor disagree	33%	118
Disagree	6%	20
Strongly disagree	5%	19
TOTAL		354



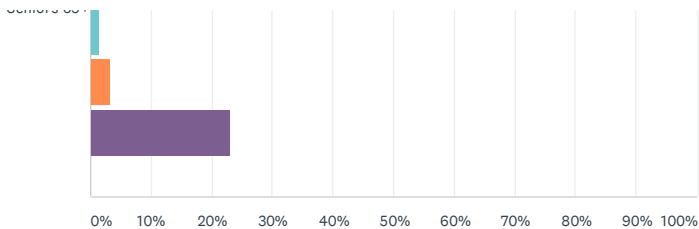
Q22 In general, how well do you think the age groups listed below are served by Trexler Nature Preserve?

Answered: 354 Skipped: 109





Trexler Nature Preserve Public Opinion Survey



Very Well Well Somewhat Well/Poorly Poorly Very Poorly Do Not Know

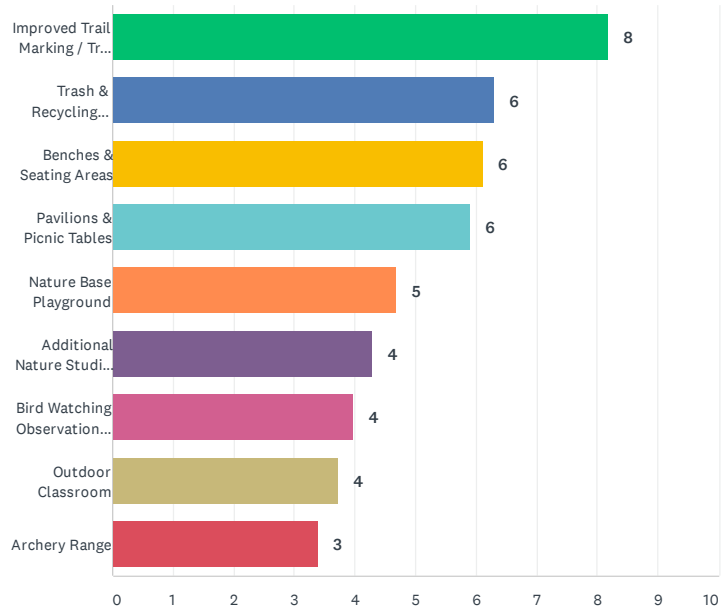
	VERY WELL	WELL	SOMEWHAT WELL/POORLY	POORLY	VERY POORLY	DO NOT KNOW	TOTAL	WEIGHTED AVERAGE
Children under 5	26.24% 90	34.40% 118	9.33% 32	3.50% 12	0.87% 3	25.66% 88	343	77.45
Children 6-12	36.92% 127	36.05% 124	6.98% 24	0.58% 2	0.29% 1	19.19% 66	344	83.63
Children 13-18	42.44% 146	36.05% 124	4.36% 15	0.58% 2	0.00% 0	16.57% 57	344	86.06
Adults 19-64	62.78% 221	30.11% 106	3.41% 12	0.28% 1	0.57% 2	2.84% 10	352	89.69
Seniors 65+	28.24% 96	30.88% 105	13.24% 45	1.47% 5	3.24% 11	22.94% 78	340	75.76



# Trexler Nature Preserve Public Opinion Survey

Q23 Rank these potential new or additional facilities and activities in order of importance, with one (1) being most important to you.

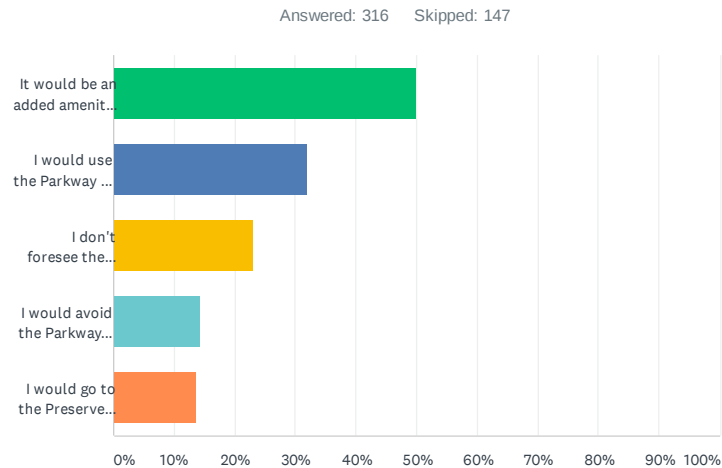
Answered: 328 Skipped: 135



	1	2	3	4	5	6	7	8	9	N/A	TOTAL	SCORE
Improved Trail Marking / Trail Use Hierarchy	67.70% 218	8.07% 26	8.70% 28	5.28% 17	1.55% 5	1.86% 6	1.86% 6	0.31% 1	1.24% 4	3.42% 11	322	8.17
Trash & Recycling Receptacles	10.84% 35	20.12% 65	9.91% 32	28.17% 91	10.84% 35	3.10% 10	4.95% 16	4.02% 13	1.55% 5	6.50% 21	323	6.29
Benches & Seating Areas	4.13% 13	13.02% 41	28.25% 89	17.78% 56	10.79% 34	7.94% 25	4.44% 14	2.86% 9	1.27% 4	9.52% 30	315	6.10
Pavilions & Picnic Tables	4.17% 13	27.88% 87	14.10% 44	10.90% 34	8.97% 28	6.41% 20	3.53% 11	7.37% 23	5.77% 18	10.90% 34	312	5.91
Nature Base Playground	3.49% 11	5.08% 16	8.89% 28	8.25% 26	21.27% 67	11.43% 36	12.06% 38	6.98% 22	6.35% 20	16.19% 51	315	4.68
Additional Nature Studies Programs	1.92% 6	5.11% 16	8.31% 26	7.67% 24	9.58% 30	16.61% 52	20.77% 65	12.78% 40	2.88% 9	14.38% 45	313	4.29
Bird Watching Observation Platform	3.45% 11	8.78% 28	7.21% 23	5.64% 18	11.91% 38	8.15% 26	7.84% 25	11.29% 36	22.88% 73	12.85% 41	319	3.98
Outdoor Classroom	2.21% 7	4.42% 14	5.36% 17	5.36% 17	9.15% 29	11.04% 35	15.46% 49	24.92% 79	7.57% 24	14.51% 46	317	3.73
Archery Range	1.58% 5	5.36% 17	4.42% 14	3.15% 10	5.05% 16	17.67% 56	10.41% 33	8.52% 27	25.87% 82	17.98% 57	317	3.38



Q24 The Jordan Creek Greenway, is a multi-purpose trail system that runs along the Jordan Creek. Future Segments of the trail would run through the Trexler Nature Preserve. Please check any of the statements that qualify how you would interact with the Parkway within the preserve.

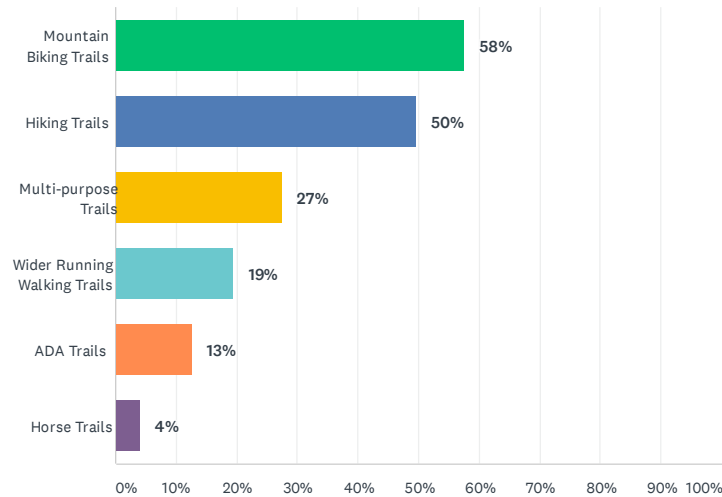


ANSWER CHOICES	RESPONSES	
It would be an added amenity to the Preserve and give me more options when I visit the preserve.	50.00%	158
I would use the Parkway to get to the Preserve	31.96%	101
I don't foresee the addition of the Parkway changing how I use the Preserve.	23.10%	73
I would avoid the Parkway section within the Preserve and use the more rustic trails	14.24%	45
I would go to the Preserve more to use that section of the Parkway	13.61%	43
Total Respondents: 316		



Q25 Within the existing trail system, would you want to see more access for any of the below uses. Please check all that apply.

Answered: 304 Skipped: 159



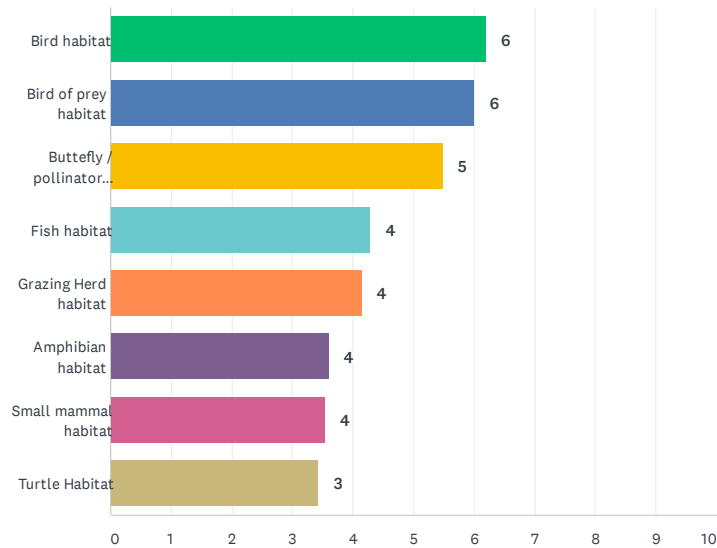
ANSWER CHOICES	RESPONSES	
Mountain Biking Trails	58%	175
Hiking Trails	50%	151
Multi-purpose Trails	27%	83
Wider Running Walking Trails	19%	59
ADA Trails	13%	38
Horse Trails	4%	12
Total Respondents: 304		



## Trexler Nature Preserve Public Opinion Survey

Q26 Trexler Nature Preserve provides habitat for a diverse community of flora and fauna. Rank the type of wildlife / habitat in level of importance, one (1) being most important to you.

Answered: 314 Skipped: 149

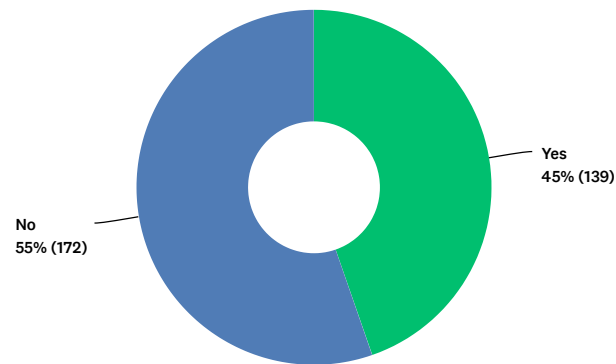


	1	2	3	4	5	6	7	8	DO NOT KNOW	TOTAL	SCORE
Bird habitat	24.59% 75	21.64% 66	12.79% 39	10.16% 31	3.61% 11	4.59% 14	3.28% 10	1.97% 6	17.38% 53	305	6.20
Bird of prey habitat	17.88% 54	23.84% 72	18.87% 57	5.63% 17	6.95% 21	3.31% 10	3.97% 12	2.65% 8	16.89% 51	302	6.01
Butterfly / pollinator habitat	11.22% 34	13.53% 41	21.45% 65	15.84% 48	7.92% 24	5.61% 17	3.96% 12	2.97% 9	17.49% 53	303	5.48
Fish habitat	4.29% 13	5.94% 18	9.57% 29	21.78% 66	13.20% 40	11.55% 35	8.25% 25	8.25% 25	17.16% 52	303	4.28
Grazing Herd habitat	20.65% 64	6.45% 20	4.84% 15	5.81% 18	5.81% 18	4.52% 14	4.84% 15	30.32% 94	16.77% 52	310	4.15
Amphibian habitat	2.32% 7	1.99% 6	5.96% 18	9.27% 28	23.84% 72	15.23% 46	14.90% 45	8.28% 25	18.21% 55	302	3.59
Small mammal habitat	3.63% 11	8.91% 27	5.61% 17	5.94% 18	10.89% 33	9.57% 29	26.07% 79	11.88% 36	17.49% 53	303	3.53
Turtle Habitat	2.65% 8	4.30% 13	5.96% 18	7.62% 23	9.93% 30	26.16% 79	14.57% 44	11.26% 34	17.55% 53	302	3.44



Q27 Should the Preserve explore water quality and habitat improvements that would require the removal of the Ford?

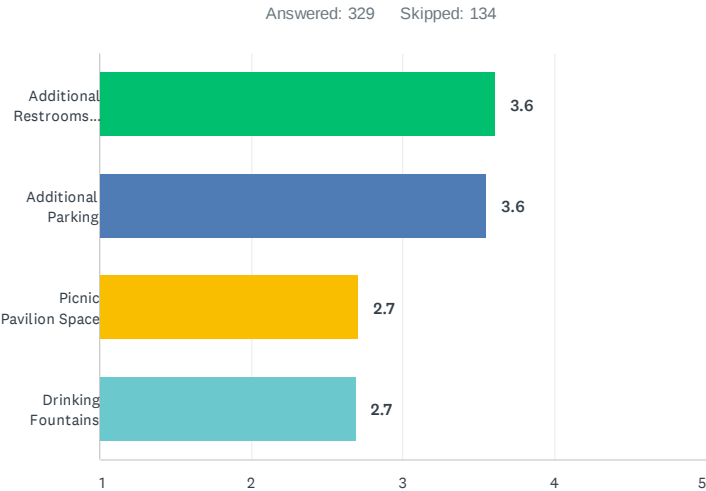
Answered: 311    Skipped: 152



ANSWER CHOICES	RESPONSES	
Yes	45%	139
No	55%	172
TOTAL		311



Q28 In general, how important do you feel the following amenities / facilities are for a better and more comfortable experience at Trexler Nature Preserve?



	VERY IMPORTANT	IMPORTANT	SOMEWHAT IMPORTANT/UNIMPORTANT	UNIMPORTANT	VERY UNIMPORTANT	TOTAL	WEIGHTED AVERAGE
Additional Restrooms Facilities	22.43% 72	35.20% 113	28.66% 92	8.72% 28	4.98% 16	321	3.61
Additional Parking	19.75% 63	36.05% 115	28.84% 92	10.66% 34	4.70% 15	319	3.55
Picnic Pavilion Space	3.53% 11	18.27% 57	40.38% 126	21.47% 67	16.35% 51	312	2.71
Drinking Fountains	4.17% 13	19.87% 62	31.09% 97	30.13% 94	14.74% 46	312	2.69



## Trexler Nature Preserve Public Opinion Survey

#	OTHER (PLEASE SPECIFY)	DATE
1	To answer #26 It is tough to prioritize the importance of one habitat over another	11/19/2020 9:21 PM
2	I wish there were a simple way to get better compliance from fellow dog walkers to keep their pups on leash (though I recognize well-behaved dogs enjoy taking a dip in the water. Doggie waste pickup stations with bags and waste receptacles may help with waste pickup	9/27/2020 7:17 PM
3	We don't need drinking fountains . Spend the money elsewhere. The money saved on drinking can be used on better trail markings. If you really want to give people access to water , put water bottle fillers at the beginning of the trails	9/12/2020 1:41 PM
4	There is no enforcement of designated horse trailer parking. Frequently arrive with trailer(s) to find cars parked in the dedicated spaces. Very frustrating. As often many other normal car spaces are open. Perhaps a dedicated parking space for ONLY trailers that would be gated. Like at Jacobsburg Park. Have to get out of trailer, open gate, drive through with trailer and then close again. Also a turn around / circle and mounting block provided in this same area. Love TNP and would donate and/or fund raise to improve horse trails. Steep hills are very hard on most horses, especially older horse.	9/9/2020 4:54 PM
5	The north range utility lot seems to be reaching capacity during popular times recently. Also, vehicles with low ground clearance can't make it to the lot due to the condition of the unpaved road leading to it.	9/8/2020 4:17 PM
6	- Expansion/Improvement of existing Emergency Locator system: Very Important - Improvement of Emergency Vehicle access: Very Important	9/7/2020 11:17 PM
7	Maybe just a portapotty in the parking areas. No more pavilions/picnic areas.	9/7/2020 3:32 PM
8	I believe that there are plenty of parking spaces and would worry about more parking creating problems with habitats/flooding.	9/6/2020 3:49 PM
9	Improved parking and parking access road for north range	9/4/2020 3:57 PM
10	Pavilions would create noise and attract large groups of people. I go to the preserve with my family to get away from large groups of people.	9/4/2020 12:30 PM
11	Expand the number of hiking trails especially in the South Range	9/4/2020 11:02 AM
12	Better signage, the new lot is an asset but people keep asking what lot? Where? Trash receptical at the top overlook by bison disappeared and now there is a lot of litter there. Also obvi the road that was washed out with the recent flood needs to be fixed. Also I think during peak use, you could collect donations on the way out did you enjoy your time here?! Won't you make a donation to show your appreciation to help keep tnp vibrant. It was really bad during quarantine with litter and drinking and loud music but it's gotten better.	9/4/2020 9:01 AM
13	I was always shocked that vehicles were allowed to ford the river. That has to pollute the stream horribly.	9/4/2020 8:14 AM
14	The parking lot at the environmental center could be bigger.	9/3/2020 4:05 PM
15	The nature preserve is already overcrowded. Too many trails, too much like a public park. This is supposed to be about conservation not destruction.	9/3/2020 4:00 PM
16	I would cut back on amenities, I feel like the park has too many (confusing) trails. I would like to see more work put back into restoration of habitat and trees.	9/3/2020 3:48 PM
17	This is a nature preserve, additional facilities are not needed. They are a nice to do, not a need to do, and they will come at the expense of nature, wildlife, etc	9/3/2020 2:42 PM
18	It is a nature preserve, not a people preserve. Invest in more natural areas, and wildlife sanctuary/recovery areas for the wildlife and nature. Less bikes. It seems like the man bikers have taken over certain parts of the preserve, it creates a dangerous environment and I collisions have happened	9/2/2020 8:35 AM
19	Larger park lot and pavilion at the north range access road parking lot. This has become very popular with mountain bikes so there is not enough space at times and nowhere nearby for overflow parking	9/1/2020 10:55 PM
20	Adding drinking fountains is a crazy idea. Unless you're going to tap into a spring, piping in water? People do and can bring their own and take any trash home with them.	9/1/2020 3:58 PM
21	Nature preserve is not a picnic area. All picnic facilities should be removed in ford area.	8/30/2020 12:18 PM
22	Recycling toilets are probably more earth-friendly than portajohns, and more comfortable to use. The MtB parking area sorely needs something, and a dedicated vault toilet would probably be less subject to vandalism than a portajohn. Old compost facility parking could also use a nicer toilet facility.	8/30/2020 8:50 AM
23	More mountain bike trails Pump track Jumps and drops	8/28/2020 10:12 PM
24	For mountain biking the north range lot has a good amount of space. A pavillion and seating would be nice for some shade. Bathrooms are great but not a must need.	8/28/2020 5:07 PM
25	i think mapping and signage and use of "you are here" maps strategically placed at popular/busy intersections could go along ways, especially for mountain biking. it can be intimidating to experience a new place without someone who knows the trail system very well. having better maps and signage could help.	8/26/2020 9:07 PM
26	Get rid of the invasive JAPANESE KNOTWEED WHILE YOU CAN FOR CRYING OUT LOUD!	8/26/2020 3:36 AM
27	Water bottle filling station is preferable to fountains	8/25/2020 10:20 PM
28	Our Girl Scouts come to the preserve prepared. We bring the necessities and love eating our bagged lunches where we find space in nature. This is a gem to find a preserve so close to Allentown, to give girls who have never hiked or seen a Ford this opportunity. We value tremendously what the Trexler Preserve provides up.	8/25/2020 9:18 PM
29	It's the outside. It's a rustic place for all ages to enjoy. The Ford is not the issue of compromise to the water. The creek has had issues from agrarian to industrial to residential runoff for as long as I've lived in Lehigh County. Would I drink the water? No. But, I honestly	8/25/2020 7:36 PM



## Trexler Nature Preserve Public Opinion Survey

think this is a densely populated region of the world. It's this way and getting more densely populated. It cannot be compared to a stream in a not so densely populated area of the Country.

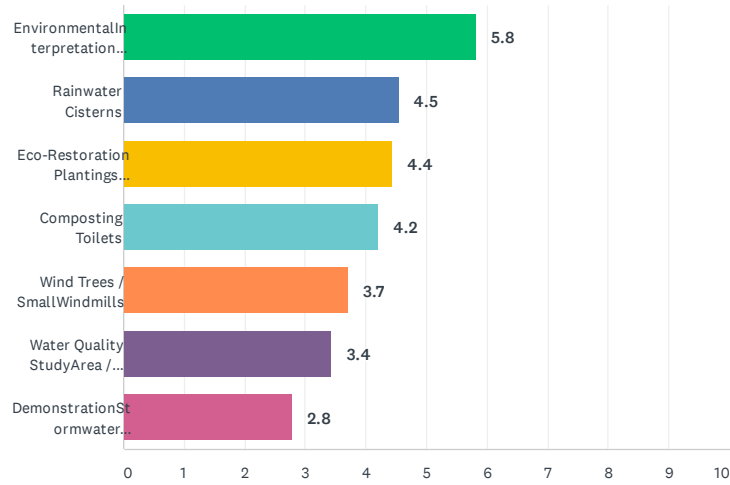
30	I definitely do not want to see more facilities/restrooms/picnic areas/pavilions. The best part of the Nature Preserve is the nature and the rustic atmosphere. I would hate to see this beauty destroyed for more buildings.	8/25/2020 7:30 PM
31	A few spots for water fill up along the border trail would be amazing!	8/25/2020 5:33 PM
32	Better trail marking	8/25/2020 5:31 PM
33	I run the border trail mostly and have my own water pack and snacks so I am not to familiar with the ammedities the park has.	8/25/2020 5:28 PM
34	The flatlands between the bridges should offer complete accessibility for seniors, ADA access and small children. Updated bathrooms and water fountains would be a big improvement. I am against playground facilities. Children should be encouraged to play in nature as it is.	8/25/2020 5:05 PM
35	The trash is a major concern. Visiting the park on a Monday morning after a summer weekend the provided trash cans are usually over flowing. It's a shame how visitors leave the place trashed. I'm glad to see the signs about loud stereos and alcohol.	8/25/2020 4:50 PM
36	I hope that if picnic pavilions, etc, are added, it will not come at the expense of preserving natural habitat. I view the nature preserve as a place to observe nature without disturbing it.	8/21/2020 6:30 AM
37	Porta Potties have been poorly maintained. Please look into other providers.	8/19/2020 2:10 PM
38	compost receptacles for food scraps	8/19/2020 2:04 PM
39	Better signage thorough parking lots to make it clearer that people can drive over the ford/more clearly marked exits	8/19/2020 12:51 PM
40	Stop trying to ruin the preserve. General Trexel left very specific instructions for how the land was to be used. This is a waste of time and money. Adding more amenities will just make people trash it like Beltzville. Give the herds more room to roam and live on their land. You've already built a zoo, LCCC, and other things. Stop already.	8/19/2020 12:06 PM
41	I feel that the Preserve should remain as natural as possible with little to no modernization. It's one thing to add bridges to protect waterways, but picnic areas and drinking fountains are completely unnecessary and defeat the purpose of the Preserve. The most trash can be found at the Ford where people congregate to picnic.	8/17/2020 10:48 AM
42	Regular trail maintenance on border trail badly needed.	8/17/2020 10:45 AM
43	More signage on mountain bike trails. Caution, do not enter, one way, jumps head, etc. Require helmets. Restrict these trails to mountain bikes only. They are designed to be fast and steep with jumps. Running into hikers is scary and unexpected for both parties and can result in injuries. Plenty of options for hikers outside the designated mountain bike trails.	8/16/2020 2:35 PM
44	To each their own, however I tend to notice a lot of trash, charcoal, and other waste debris along the Jordan at the Ford and up through the picnic table areas. Seems the places where people can congregate and "picnic" are the most prone to harmful impact by individuals/groups who don't understand the concept of "leave only footsteps." Not to mention the amount of debris/trash that can be found in the Jordan along that stretch. Therefore, I don't see the creation of pavilions or places where people can remain stationary and comfortable for hours at a time as conducive to wildlife/environmental preservation.	8/16/2020 2:04 PM
45	With the removal of Autumn Olive and the trees dying there is little shade.	8/16/2020 1:14 PM
46	If you are going to add more pavilions you need better supervision. I don't think the preserve is the proper place for parties.	8/14/2020 10:34 PM
47	Please have someone enforce rules against loud music and partying along the water. It is very disruptive to enjoyment of the natural environment. It is why we have not returned recently.	8/14/2020 9:50 PM



# Trexler Nature Preserve Public Opinion Survey

Q29 Rank the priority of ecologically-driven facilities and activities to be considered for the Preserve, with one (1) being most important to you.

Answered: 308 Skipped: 155



	1	2	3	4	5	6	7	DO NOT KNOW	TOTAL	SCORE
Environmental Interpretation (e.g. wetlands; watersheds; plants; nature studying; bird watching)	38.28% 116	21.45% 65	12.21% 37	4.29% 13	3.30% 10	4.29% 13	1.32% 4	14.85% 45	303	5.81
Rainwater Cisterns	13.29% 40	17.61% 53	12.96% 39	13.29% 40	9.63% 29	9.63% 29	5.32% 16	18.27% 55	301	4.53
Eco-Restoration Plantings (e.g. Wildflower Meadows, Invasive Species Removal)	23.36% 71	13.82% 42	8.55% 26	6.58% 20	11.51% 35	15.79% 48	8.22% 25	12.17% 37	304	4.44
Composting Toilets	9.97% 30	12.96% 39	20.27% 61	11.63% 35	7.64% 23	9.63% 29	10.63% 32	17.28% 52	301	4.21
Wind Trees / Small Windmills	2.35% 7	10.07% 30	12.75% 38	22.15% 66	16.11% 48	7.72% 23	11.07% 33	17.79% 53	298	3.70
Water Quality Study Area / Outdoor Lab	4.00% 12	5.33% 16	10.33% 31	15.67% 47	24.33% 73	16.67% 50	7.33% 22	16.33% 49	300	3.44
Demonstration Stormwater Best Management Practices Garden (e.g. rain garden, vegetated swale, porous paving)	2.63% 8	7.89% 24	8.22% 25	10.20% 31	9.54% 29	15.46% 47	32.24% 98	13.82% 42	304	2.78



Q30 What do you like most about Trexler Nature Preserve?

Answered: 273 Skipped: 190



## Trexler Nature Preserve Public Opinion Survey

#	RESPONSES	DATE
1	Unique landscape (rolling hills, grasslands). Great trail system (mountain biking, hiking, multi-use)	1/4/2021 3:38 PM
2	Outdoor exercise and time with nature.	12/24/2020 9:43 PM
3	The variety of activities. It is very nice to be able to enjoy something different with each visit to the Preserve.	12/8/2020 11:07 PM
4	Mountain biking, hiking, beautiful views and forests	12/3/2020 8:04 PM
5	Quiet wilderness	11/23/2020 12:26 PM
6	The amazing views of Eastern Pa	11/19/2020 9:24 PM
7	Views	11/14/2020 10:54 PM
8	Scenery, walking trails	11/10/2020 11:03 AM
9	It is not not overdeveloped into a park. It is intended to be a preserve not a city park.	11/5/2020 12:56 PM
10	Running trails	11/5/2020 12:21 PM
11	Diverse scenery/ terrain secluded trails	11/4/2020 11:09 AM
12	Walking on trails when I know mountain bikers will not be present	10/28/2020 5:35 PM
13	Mountain biking	10/25/2020 8:47 AM
14	Beautiful outdoor space, great for hiking and enjoying nature. Peaceful. Uncrowded.	10/19/2020 2:15 PM
15	Location	10/14/2020 2:20 AM
16	The landscape/scenery is very different than other local mountain bike trails	10/12/2020 1:52 PM
17	It's proximity is so close to a large population, but its overall feel is like you're not in Pennsylvania.	10/5/2020 9:13 AM
18	Respite from the ugly modern/suburban greenless spaces.	10/4/2020 1:43 AM
19	Multi purpose preserve and the closeness to nature	10/2/2020 4:58 PM
20	The open space environment and limited extras that are not needed in such a natural preserve.	10/2/2020 9:56 AM
21	The MTB trails and hiking trails.	9/28/2020 3:45 PM
22	Nature & trails	9/27/2020 7:21 PM
23	Where I go there are few people around. The views are great!	9/27/2020 5:02 PM
24	The mountain bike trails	9/27/2020 9:22 AM
25	Public access to great mountain biking	9/26/2020 9:23 AM
26	Large quantity of trails to choose from	9/25/2020 7:28 AM
27	I love the trails and the fact that it is a Preserve, a space that is intended to be natural. I hike there weekly, covering at least 9 miles. I'd be happy to have more trails to explore and make for more routes to follow. I'm very glad that I live so close to this great place!	9/24/2020 9:08 PM
28	I used to like the tranquility and space to hike, walk, run - however, there are too many mountain bikers on the trails - it has become dangerous for walkers. Horses are ripping up the trails. E&S controls are lacking. We do not support increasing facilities/amenities that encourage more opportunities to be knocked over by a biker again while they ride by laughing. People are leaving trash in various places, including chairs, water floats/toys, clothing The screaming and cursing I have heard over the past few months is alarming. There have been numerous instances of loud music and parties during the day and late in the evening and drivers are routinely speeding on Game Preserve Road at all hours of the day.	9/20/2020 6:22 PM
29	size, maintenance of mtb trails, different geography-open space and views.	9/19/2020 5:46 PM
30	The trail system	9/15/2020 12:34 PM
31	The ability to find seclusion close to the growing population of the Lehigh Valley	9/15/2020 8:33 AM
32	Variety and number of hiking trails	9/14/2020 2:26 PM
33	It's the word preserve	9/12/2020 1:47 PM
34	Mtb trails	9/12/2020 1:11 PM
35	Lots of diversity and lots of nature.	9/10/2020 9:26 AM
36	Being able to ride my horse and feel like I am deep into nature without really being isolated or that far from suburbia.	9/9/2020 4:59 PM
37	The scenery and hiking trails	9/9/2020 10:07 AM
38	The scenery, accessibility	9/8/2020 10:40 PM
39	It's peaceful and pristine.	9/8/2020 4:54 PM
40	Mountain biking	9/8/2020 4:24 PM
41	convenient historic location	9/8/2020 3:11 PM
42	the trails	9/8/2020 5:29 AM
43	The TNP is a great area that remains for current and future generations, to see and appreciate nature and wildlife, in an area that is safe from development.	9/8/2020 12:06 AM
44	Trails, peaceful, beautiful natural surroundings.	9/7/2020 3:36 PM
45	Rustic nature	9/7/2020 8:26 AM
46	Reminds me of how the Lehigh Valley looked years ago	9/6/2020 5:56 PM



## Trexler Nature Preserve Public Opinion Survey

47	I like it's wide footprint and it's ability to surround you with nature and no other human amenities	9/6/2020 3:52 PM
48	Being in nature	9/6/2020 12:04 PM
49	Closeness to nature. Beautiful views, birds, and wildflowers	9/4/2020 3:59 PM
50	Trails, Wildlife	9/4/2020 3:42 PM
51	I absolutely love the trails and how well the preserve drains after a storm	9/4/2020 2:40 PM
52	I like it very much in its current state. While improvements can always be made, don't over do and change too much and over improve.	9/4/2020 2:03 PM
53	Being able to run on it	9/4/2020 1:57 PM
54	Peace and quiet. Natural feel.	9/4/2020 12:30 PM
55	The elk and bison habitats along the trail	9/4/2020 11:30 AM
56	Abundance of hiking trails with connections that allow many different hikes	9/4/2020 11:05 AM
57	Hiking, wading in Jordan Creek, wildlife	9/4/2020 10:24 AM
58	close to home, options for recreation and relaxation	9/4/2020 10:19 AM
59	the rustic trails and being in nature	9/4/2020 10:17 AM
60	Being alone in nature. I run that trail at least 5x a week and it is my sanity.	9/4/2020 9:04 AM
61	The scenery and the trails	9/4/2020 9:01 AM
62	Diverse scenery and challenging trails	9/4/2020 8:58 AM
63	That it exists for hiking trails and preserving forests and open space.	9/4/2020 8:16 AM
64	That such is available to us !	9/3/2020 10:46 PM
65	Variety of terrain for walking. Place to take grandchildren to enjoy nature.	9/3/2020 9:25 PM
66	As a hiker, I love that in a relatively small footprint the Preserve offers miles of hiking with (surprisingly) significant elevation gain.	9/3/2020 9:19 PM
67	It's wonderful trails through open fields, meadows, and forests with amazing vistas.	9/3/2020 9:17 PM
68	It's location, size; variety of opportunities for passive recreation. it's a place to be out in nature to look for birds and pollinators on the North Range, take a long (or short) hike, or enjoy the day with kids exploring the creek or taking an easy hike.	9/3/2020 8:40 PM
69	Hiking along the creeks and up on the ridges.	9/3/2020 4:14 PM
70	conservation, wildlife	9/3/2020 4:04 PM
71	the stream, the ford and the buffalo	9/3/2020 3:52 PM
72	Thousands of acres of open space, adjoining state game lands	9/3/2020 2:46 PM
73	Size of park, abundant wildlife, birds, variety of terrain and ecosystems	9/3/2020 12:29 PM
74	The location - it's closest to where I live, as well as the opportunity to hike, bike, run and/or walk.	9/3/2020 6:39 AM
75	the many connecting trails	9/2/2020 9:23 PM
76	Hiking	9/2/2020 9:17 PM
77	I like that it is not a far drive and is a large enough area that I can be on the trails and feel that I am surrounded by nature and not crowded in with other people (which is especially nice with the whole Covid-19 situation).	9/2/2020 12:13 PM
78	Protected open space	9/2/2020 8:39 AM
79	Good mountain bike trails and multi use trails. Barbecues and picnic tables by the creek below the zoo. Multi use trails for hiking. Views from the tops of the hills. The few healthy areas of Forrest.	9/1/2020 11:04 PM
80	The mtb trails first and foremost and watching the buffalo.	9/1/2020 11:04 PM
81	Mountain bike trailz	9/1/2020 10:07 PM
82	Mountain bike trails	9/1/2020 8:58 PM
83	The mountain biking trails and how well they hold up even after wet weather.	9/1/2020 8:31 PM
84	The Ford!	9/1/2020 6:15 PM
85	I like that it's not overdeveloped. I can enjoy fishing or hiking without interference from people	9/1/2020 5:52 PM
86	The mountain bike trails	9/1/2020 4:48 PM
87	the open space and beauty of nature. It's vast and yet intimate because of nature.	9/1/2020 4:01 PM
88	Mountain Biking & Hiking	9/1/2020 3:31 PM
89	Well maintained trails.	9/1/2020 3:16 PM
90	Beauty	9/1/2020 3:10 PM
91	The mountain biking trails and hiking trails (shared trails). I go to the nature preserve 5 days a week to bike and it is amazing that it is only 5 minutes from my home. I am blessed to have such well maintained trails and a great community nearby. It brings me joy to come daily and I would be lost without the preserve. Great to take people hiking, with nice steep routes as well and just a great place to escape all the trucks/noise in the Lehigh Valley area -- plus if you're lucky you can get a glimpse of a bald eagle!	8/31/2020 5:27 PM
92	Trail systems and rich wildlife, plant, and floral environment.	8/31/2020 8:33 AM



## Trexler Nature Preserve Public Opinion Survey

93	Mountain bike trails	8/31/2020 8:05 AM
94	Nature	8/30/2020 1:03 PM
95	Walking trails	8/30/2020 12:22 PM
96	Hiking trails...a variety of difficulties/sceneries offer many options	8/30/2020 8:53 AM
97	Mountain bike and hiking trails.	8/29/2020 10:00 PM
98	The mtb trail terrain	8/29/2020 3:38 PM
99	The view the dirt is good for biking	8/29/2020 11:49 AM
100	The nice flowy MTB trails	8/28/2020 11:33 PM
101	Mountain bike trails	8/28/2020 10:15 PM
102	The mountain bike trails, it's the reason I go there.	8/28/2020 5:12 PM
103	mountain biking	8/28/2020 5:07 PM
104	The MTB trails	8/28/2020 3:59 PM
105	MTB trails, people I meet here, wildlife.	8/28/2020 3:39 PM
106	I love the views and many of the trails.	8/28/2020 3:31 PM
107	Mountain bike trails	8/28/2020 2:52 PM
108	The zoo and how remote,I feel when running the boarder trail.	8/28/2020 1:49 PM
109	Mt bike trails	8/28/2020 1:23 PM
110	Mtb Trails	8/28/2020 12:08 PM
111	Preserved space to enjoy nature	8/28/2020 10:52 AM
112	The mountain bike trails and the geography.	8/27/2020 7:17 PM
113	enjoying the natural world while getting a good workout	8/27/2020 3:23 PM
114	trails	8/27/2020 7:20 AM
115	Mtb trails, bison.	8/27/2020 5:55 AM
116	It's close by, fun with excellently maintained trails and the wildflowers	8/26/2020 11:48 PM
117	Love the mountain biking trails in the north range. 2nd would be the hiking trails and 3rd would be the ford.	8/26/2020 10:53 PM
118	The fact that it's been open to public use since the County took over. Close to my residence.	8/26/2020 10:15 PM
119	MTB teails	8/26/2020 9:26 PM
120	it feels like a very different ecosystem than the rest of the lehigh valley. its a nice change of scenery from nox/jacobsburg/jordan creek (some of the other most popular mt biking trail systems in the LV)	8/26/2020 9:10 PM
121	The varying terrain and trails.	8/26/2020 6:02 PM
122	Mountain biking trails	8/26/2020 9:11 AM
123	I like the trail system	8/26/2020 8:13 AM
124	Open space, fun MTB trails	8/26/2020 6:55 AM
125	Trails for mountain biking and hiking. Also the zoo is an awesome size for our area	8/26/2020 6:30 AM
126	MTB trails	8/26/2020 4:22 AM
127	Fresh air and feathers on my fingertips and bowstrings	8/26/2020 3:37 AM
128	I love the availability of beautiful nature trails right in our backyard and the diversity of uses throughout all ranges.	8/26/2020 2:28 AM
129	Mountain bike trails	8/25/2020 11:08 PM
130	Its accessibility, beauty, convenience and maintenance.	8/25/2020 10:49 PM
131	Mountain biking trails	8/25/2020 10:22 PM
132	variety of trails. love seeing the buffaloes and elk	8/25/2020 10:18 PM
133	running on trails in nature	8/25/2020 10:09 PM
134	Trails	8/25/2020 10:02 PM
135	Everything	8/25/2020 9:58 PM
136	Running trails and family outings at river crossing	8/25/2020 9:53 PM
137	The mtb trails, duh.	8/25/2020 9:53 PM
138	MTB trails. The openness of the network	8/25/2020 9:46 PM
139	Mountain bike and perimeter trails	8/25/2020 9:32 PM
140	Mountain bike trails...north range wildflowers are amazing!	8/25/2020 9:32 PM
141	The trails	8/25/2020 9:22 PM
142	Ease of access for city of Allentown	8/25/2020 9:20 PM
143	We love the mtb trails but truly enjoy the wildlife and wildflowers in the summer	8/25/2020 9:16 PM
144	Mountain bike trails	8/25/2020 9:07 PM
145	mountain bike trails	8/25/2020 9:07 PM



## Trexler Nature Preserve Public Opinion Survey

146	The wonderful mountain biking	8/25/2020 9:00 PM
147	The natural setting. The mountain bike trails	8/25/2020 8:56 PM
148	Mountain bike trails	8/25/2020 8:43 PM
149	It's amazing variety of plants, Trail conditions and overall beauty!	8/25/2020 8:37 PM
150	Mountain biking trails	8/25/2020 8:19 PM
151	Trails	8/25/2020 8:18 PM
152	That's so close to home with so many activities to do and you forget how close the city is	8/25/2020 8:18 PM
153	trails	8/25/2020 8:12 PM
154	Mtn biking trail system	8/25/2020 8:12 PM
155	Trails	8/25/2020 8:12 PM
156	Hiking and mountain biking trails.	8/25/2020 7:57 PM
157	its really nice and well maintained	8/25/2020 7:51 PM
158	Ability to exercise and enjoy a natural, protected area	8/25/2020 7:37 PM
159	Being outside on beautiful trails where I can be one with nature	8/25/2020 7:31 PM
160	The mountain biking trails.	8/25/2020 7:16 PM
161	Running trails	8/25/2020 7:09 PM
162	Mountain bike trails	8/25/2020 7:07 PM
163	Extensive trail system within a uniquely diverse landscape of flora and fauna	8/25/2020 7:07 PM
164	mountain bike trails.	8/25/2020 6:57 PM
165	The mountain bike trails.	8/25/2020 6:47 PM
166	Mt bike trails	8/25/2020 6:44 PM
167	Trails	8/25/2020 6:42 PM
168	I enjoy the variety of trails to choose from.	8/25/2020 6:41 PM
169	Mountain biking trails. Please dont spen a bunch of money building toilets, pavilions and parking lots. We can park on the side of roads, and we can manage without toilets and facilities. Its nice the preserve is more natural. Id love to see it kept in its natural state and preserved. We can study water and the animals in their natural habitat and preserve their well being. And of course ride awesome mountain biking trails that locals will gladly volunteer to build preserving the trail system and building a community.	8/25/2020 6:33 PM
170	The mountain biking trails	8/25/2020 6:27 PM
171	The close proximity to urban areas.	8/25/2020 6:21 PM
172	Running trails	8/25/2020 6:18 PM
173	Love the hiking Running trails And wildlife and trees and flowers Bison and elk WTer sources Sad to see it get over crowded!	8/25/2020 6:12 PM
174	The views, the fact that the land is preserved	8/25/2020 6:08 PM
175	The open space and seasonal changing environment.	8/25/2020 6:01 PM
176	Mountain bike trails	8/25/2020 5:54 PM
177	The natural space and trail system	8/25/2020 5:53 PM
178	The mountain bike trails and the open space.	8/25/2020 5:53 PM
179	Water ford	8/25/2020 5:52 PM
180	mountain biking	8/25/2020 5:46 PM
181	Beauty, and trail system	8/25/2020 5:45 PM
182	Mountain biking trails	8/25/2020 5:41 PM
183	The location to my house. The varied trails to cover long distances. The amazing animals seen on the run--both wild and from the zoo.	8/25/2020 5:39 PM
184	The outdoor beauty!	8/25/2020 5:38 PM
185	Beautifully maintained and very untouched. Lots of tourist trails especially up by Wilkes Barre have become trash dumps and do not preserve the fauna, wildlife nor rustic trail sections. We frequently go and get lost in new sections and just sit listening to the birds.	8/25/2020 5:36 PM
186	The diversity of ecosystems	8/25/2020 5:32 PM
187	Mainly do the border trail and I have no complaints. Very beautiful running on that trail and a great job was done on the bridge around mile 7.	8/25/2020 5:30 PM
188	Mtn bike trails	8/25/2020 5:26 PM
189	Mountain bike trails	8/25/2020 5:24 PM
190	The natural terrain, water access, and trail system.	8/25/2020 5:09 PM
191	Open nature trails with varying degrees of difficulty. Well maintained trails	8/25/2020 5:06 PM
192	The quality of trail work and maintenance makes Trex my favorite local place to mountain bike!	8/25/2020 5:06 PM
193	the trails to mountain bike and hike	8/25/2020 5:05 PM
194	The ford and the bison	8/25/2020 5:00 PM



## Trexler Nature Preserve Public Opinion Survey

195	The trail systems. We use them 365 days a years	8/25/2020 4:54 PM
196	The recreational opportunities.	8/25/2020 4:47 PM
197	MTB trails	8/25/2020 4:45 PM
198	The mountain bike trails!	8/25/2020 4:45 PM
199	Trails are well kept and marked	8/25/2020 4:40 PM
200	Not crowded	8/25/2020 4:39 PM
201	MTB trails	8/25/2020 4:32 PM
202	Amazing trail system - well maintained.	8/25/2020 4:32 PM
203	Mountain bike trail features	8/25/2020 4:29 PM
204	its a hidden gem for mountain biking in a great area of lehigh Valley.	8/25/2020 4:29 PM
205	The TNP is an beautiful preserve. It is a blessing and privilege to have this wonderful park in the Lehigh County.	8/25/2020 4:29 PM
206	mountain bike trails	8/25/2020 4:23 PM
207	The mountain biking trails.	8/25/2020 4:23 PM
208	Unique environmental setting in the Lehigh Valley with expansive views, unique topography and excellent mountain bike trails	8/25/2020 4:21 PM
209	Visiting the Lehigh Valley Zoo!	8/23/2020 3:28 PM
210	The trails are well maintained. Also, the Lehigh Valley Zoo. Although the zoo is a separate entity from the Preserve, it is the main reason I visit the preserve.	8/22/2020 4:10 PM
211	The Lehigh Valley Zoo	8/22/2020 3:50 PM
212	I like the peace and quiet so I can enjoy the birds and other wildlife.	8/21/2020 5:07 PM
213	Accessibility and the bison and elk herds	8/21/2020 1:52 PM
214	its a quiet haven close to home to get back to nature	8/21/2020 12:06 PM
215	the difficult, hilly terrain with spectacular views, the variety of wildflowers	8/21/2020 6:41 AM
216	The running/hiking trails are fantastic for technical runs. I'm using them for about 1200-1500 mi/yr of running a and enjoy catching with a lot of other "regulars"	8/20/2020 8:46 PM
217	I enojo the variety of activities that can be done on the preserve. I also like the natural scenery.	8/20/2020 8:07 PM
218	It's relatively preserved - not a commercialized area to experience nature with playgrounds and large crowds, but has a diverse trail system that is relatively untouched, which provides for a more connected experience. In addition, the existence of the zoo for a way to experience nature in a structured way is a great option.	8/20/2020 2:46 PM
219	Its wildness	8/20/2020 1:34 PM
220	My favorite thing about the nature preserve is that it reminds me of when I was younger and my parents would take me and we would walk the trails and swim in the creak	8/20/2020 9:03 AM
221	peaceful, diverse trails	8/20/2020 7:25 AM
222	The already very diverse wildlife!	8/20/2020 5:54 AM
223	Public green space for passive recreation	8/19/2020 10:01 PM
224	The nature and animals	8/19/2020 8:05 PM
225	The serene setting and abundance of wildlife	8/19/2020 2:11 PM
226	The various trails available for hiking and running that is close to the Lehigh Valley Zoo.	8/19/2020 2:06 PM
227	Being able to often get away from other people and be surrounded by nature.	8/19/2020 2:03 PM
228	Diversity activities and landscape	8/19/2020 1:56 PM
229	I love the way the community uses it and loves going there to get away from more urban areas. It is hidden yet when you are in it there are times you cannot see other people, buildings, roads, etc.	8/19/2020 1:54 PM
230	I love that the zoo is in the center of it and you can spend a whole day being in nature and then seeing the animals that live there. Great opportunity to educate the youth about being responsible humans.	8/19/2020 1:41 PM
231	The trails are interesting and allow for a lot of different views and terrains. The zoo is lovely.	8/19/2020 12:53 PM
232	Zoo. Nature trails (promoting exercise) and the overall setting.	8/19/2020 12:48 PM
233	It's a picturesque hidden gem in the Valley.	8/19/2020 12:45 PM
234	The bison	8/19/2020 12:08 PM
235	Vast types of terrain/habitat in a relatively small area....	8/19/2020 8:38 AM
236	The view and peacefulness; nature.	8/18/2020 1:46 PM
237	Beauty, access, and MTB terrain	8/18/2020 12:08 PM
238	Hiking trails. Not the rocky AT.	8/17/2020 9:23 PM
239	The history and the location	8/17/2020 9:07 PM
240	Trails and connection to wildlife for all ages	8/17/2020 6:44 PM
241	The mountain biking trails, open space and views	8/17/2020 5:36 PM



## Trexler Nature Preserve Public Opinion Survey

242	The unique environment and trail system is not like many others I'm aware of in PA.	8/17/2020 4:48 PM
243	That most of the preserve has had minimal improvement and remains wild and is not like a park.	8/17/2020 2:23 PM
244	The natural aspects that are readily accessible	8/17/2020 12:50 PM
245	How easy it is to jump on a trail. Close to home!	8/17/2020 11:33 AM
246	I love the ability to be so close to animals while running next to them. I love the beautiful views and the trails	8/17/2020 11:18 AM
247	The natural area which is preserved for public use. Please don't pave trails and create more facilities to invite public that don't respect the trails.	8/17/2020 10:50 AM
248	Scenic views, many running trails	8/17/2020 10:46 AM
249	the beautiful natural terrain which should not be developed except with bike trails which are by nature low impact	8/17/2020 10:46 AM
250	The trails	8/17/2020 9:56 AM
251	Large open multi use space	8/17/2020 7:59 AM
252	The mountain bike trails	8/16/2020 7:28 PM
253	Mountain bike trail flow and the great views.	8/16/2020 5:24 PM
254	Trails and scenery	8/16/2020 5:03 PM
255	Accessible MTB trails and good features	8/16/2020 5:00 PM
256	Trails	8/16/2020 4:44 PM
257	It is beautiful and well maintained	8/16/2020 4:30 PM
258	MTB trails	8/16/2020 3:07 PM
259	MTB Trails	8/16/2020 3:07 PM
260	Mountain bike trails	8/16/2020 2:39 PM
261	Trails are well maintained	8/16/2020 2:37 PM
262	Mountain biking trails	8/16/2020 2:22 PM
263	Access to safe hiking trails and mountain biking trails	8/16/2020 2:14 PM
264	MTB trail	8/16/2020 2:11 PM
265	The level of care and commitment to arguably the best mountain bike trails in Eastern PA. Overall the care and commitment to maintaining the entire preserve.	8/16/2020 2:09 PM
266	Work by volunteers to maintain and develop the mountain bike trails.	8/16/2020 1:42 PM
267	Peace and quiet	8/16/2020 1:42 PM
268	MTB trails	8/16/2020 1:40 PM
269	Trails	8/16/2020 1:31 PM
270	Elevation! The MTB trails are wonderful.	8/16/2020 1:19 PM
271	Beautiful place to hike, run, & mountain bike that is close to home.	8/15/2020 12:00 PM
272	Trail system with the opportunity to see wildlife	8/14/2020 10:36 PM
273	Varied environment	8/14/2020 9:51 PM



Q31 What would you like to see improved in Trexler Nature Preserve?

Answered: 257 Skipped: 206



## Trexler Nature Preserve Public Opinion Survey

#	RESPONSES	DATE
1	More parking at other areas of the Preserve to access the Border Trail.	1/4/2021 3:38 PM
2	Removal of invasive species and planting of native species (woodland, meadow, etc.)	12/24/2020 9:43 PM
3	Parking is becoming a large problem. Also, some visitors have neglected to "preserve" the Preserve by leaving trash and damaging grasses and other foliage. It's great to see so many people enjoy time in nature, but bathrooms and protection for the environment should be considered. While the Ford is iconic, it should be closed to routine traffic. This would restrict access to the eastern bank, but this area has seen some of the worst abuse and could benefit from more controlled vehicular access.	12/8/2020 11:07 PM
4	Prioritize ecological restoration. Trail building and maintenance Parking and trailhead facilities	12/3/2020 8:04 PM
5	More I disturbed space	11/23/2020 12:26 PM
6	Major improvement to the Border Trail/ multi use trails.	11/19/2020 9:24 PM
7	Trails to make it a mountain bike destination on the east coast	11/14/2020 10:54 PM
8	Mountain bikers and horses should be restricted from hiking trails. They have caused significant erosion and pollution.	11/10/2020 12:30 PM
9	Invasive species removal/habitat diversity. trails more ecologically suitable- less prone to erosion/rutting	11/10/2020 11:55 AM
10	Consequences for those not taking care of the area	11/10/2020 11:03 AM
11	The trails can get a bit rough. Less mountain bike trails would be better. Mountain bikes cause erosion, the club is making dirt mounds and valleys. They yell to move aside. I feel like the nature part of preserve is lost on the mountain bike side. I also have kids which I am afraid they will run into. I am ok with a trail but it should be one loop limiting the harm they do especially on steeper locations. Ecologically they really do damage and it is unsightly.	11/5/2020 12:56 PM
12	Cleaner trails	11/5/2020 12:21 PM
13	Additional protected land	11/4/2020 11:09 AM
14	Reduce picnic tables and places to park near ford, way too crowded with loud music, trash, grills and litter. Not a nature preserve activity. Christmas lights should not be permitted in the preserve. It is a zoo activity and should be restricted to their property.	10/28/2020 5:35 PM
15	More bike trails	10/25/2020 8:47 AM
16	it would be nice if the creek was more usable for tubing or kayaking.	10/19/2020 2:15 PM
17	better parking	10/14/2020 2:20 AM
18	n/z	10/12/2020 1:52 PM
19	Additional mountain biking trails.	10/5/2020 9:13 AM
20	Less invasive species/ more eco-restoration projects because the american chestnut orchard is really cool. I've seen many a shitty paper towels on the trails so more waste disposal or bathrooms would be cool.	10/4/2020 1:43 AM
21	More trash receptacles	10/2/2020 4:58 PM
22	More MTB trails.	9/28/2020 3:45 PM
23	Feels like in recent years greater use by more people results in trash, damage and overcrowding in central range—I worry about negative impact on water, wildlife, environment.	9/27/2020 7:21 PM
24	I like it as is.	9/27/2020 5:02 PM
25	More trails added	9/27/2020 9:22 AM
26	Seeing the increased use of the park, especially around the creek this year, I see a need for more education on leave no trace ethics. It's sad to see people disturbing the creek, moving rocks, creating dams, or piling rocks. A LNT campaign is much needed!	9/24/2020 9:08 PM
27	See item 29. Limit motorized vehicles.	9/20/2020 6:22 PM
28	hmmm, it is pretty good.	9/19/2020 5:46 PM
29	More parking, trail markers, and trash cans	9/15/2020 12:34 PM
30	Better trail management due to overuse. Possibly close higher traffic trails or reroute due to erosion and biking	9/15/2020 8:33 AM
31	a little more parking (particularly for the northern border trail) and a few more toilet facilities	9/14/2020 2:26 PM
32	Better trail markings if it ain't broke don't fix it	9/12/2020 1:47 PM
33	More mtb trails. There is an opportunity to be a regional attraction, encouraging a modest uptick in business opportunities for the surrounding towns.	9/12/2020 1:11 PM
34	A bathroom on the north range and more trails for mountain biking and for hiking!	9/10/2020 9:26 AM
35	Better grading / leveling of horse trails.	9/9/2020 4:59 PM
36	The improvements made so far are awesome, but we could use more trail maintenance: wider trails where over grown, mowing grassing areas (Kids Peace area), trail erosion area improvements	9/9/2020 10:07 AM
37	I do not want to see if get overrun with crowds and trash from people who are not locals	9/8/2020 10:40 PM
38	More stone/paved, wider walking trails accessible to young children, the elderly, and people uninterested in walking in dirt and tick-infested trails.	9/8/2020 4:54 PM
39	More mountain biking trails and improved road leading to the north range utility lot. Also, somewhere to park on Game Preserve Road near 309 where it intersects with the trails.	9/8/2020 4:24 PM
40	i would like to see the trails extended at either ends of both covered bridges so you could	9/8/2020 5:29 AM



# Trexler Nature Preserve Public Opinion Survey

	run/walk from mill creek bridge to Jordon rd.	
41	- Addition of a Nature Discovery area for children, such as is found at Nescopeck State Park - Educational programs for children and adults of all ages - Area with night access for stargazing/astronomy - Improved access road to North Range parking lot (2 lane, paved) - Access lane from LCCC - improve Emergency Vehicle access (road is rough) -New parking lot and trail head for walking access to Elk and Bison areas (at or near LCCC access road) - Name the main road through Preserve, identify with mile-markers, improve signage (one-way, do not enter, etc.), add pull-off parking - Signage at Main entrance from Game Preserve Road indicating if Zoo is open, and if Ford crossing is open. - Create an area for Palomino horses, as Gen. Trexler did. - Improve the new parking lot/trail head at the former Compost Facility (pavilions, bathrooms, etc.) - Addition of a monument for Gen. Trexler (such as at Trexler Park), flag pole, etc. - The intersection of Game Preserve Road at Rt. 309 is very dangerous, work with PennDOT, NWT, LCCC, etc. to relocate the road through the area behind Slider's Pub to meet up with Orchard Road - Additional work with other agencies such as LV Audobon for additional projects such as Purple Martin and Chimney Swift houses, LV Nest Box Trail System, etc.	9/8/2020 12:06 AM
42	Rural trails a little wider, more oversight w overuse of out of town/state people, more trails. More bird signs showing birds.	9/7/2020 3:36 PM
43	Nothing.	9/7/2020 8:26 AM
44	Invasive plant removal	9/6/2020 5:56 PM
45	I would like the nature preserve to have better markings on trails and one or two map posts around each trail for navigation.	9/6/2020 3:52 PM
46	More trails with stroller access	9/6/2020 12:04 PM
47	get an elephant	9/4/2020 5:18 PM
48	North range parking and access road to parking	9/4/2020 3:59 PM
49	Better signage and directions for Trails. Don't like how Trail runs along road. Would like more tree coverage.	9/4/2020 3:42 PM
50	I have zero complaints about the preserve, it's a beautiful piece of land that I love	9/4/2020 2:40 PM
51	More restrooms.	9/4/2020 2:03 PM
52	More bathrooms	9/4/2020 1:57 PM
53	Not much.	9/4/2020 12:30 PM
54	More opportunities for safer parking and more mapped out trails to accommodate all ages. Also need double fencing around bison to protect/limit people from trying to touch or feed the bison.	9/4/2020 11:30 AM
55	More restrooms - possibly composting style	9/4/2020 11:05 AM
56	addition of one or two trails, especially connecting violet trail to border trail so one doesn't have to hike on the road; trail from Geiger Cover Bridge south along Jordan creeks east bank with connection to Border Trail; expanding the area of the Preserve by acquiring nearby farms, as well as areas long Jordan Creek; Connecting trail to Covered Bridge Park would also be a great addition and one of my top priorities	9/4/2020 10:24 AM
57	removal of invasive species, holding visitors accountable for cleaning up after themselves.	9/4/2020 10:19 AM
58	continue to support the ecosystem	9/4/2020 10:17 AM
59	More trash recepticals. The road that was washed away. Better signage.	9/4/2020 9:04 AM
60	Trash collection	9/4/2020 9:01 AM
61	Larger parking areas and more multi use trails Thorn bush removal around trails	9/4/2020 8:58 AM
62	The only thing I dislike is that it's not convenient to get to from my home in Bethlehem. We'd love to live closer to an area like this that we could visit regularly.	9/4/2020 8:16 AM
63	Less traffic, yet somehow, I need more reminders that it's there !!!	9/3/2020 10:46 PM
64	Trail markers plus signage alerting to multi-use trails such as hikers plus bikers.	9/3/2020 9:19 PM
65	It's already been improved wonderfully.	9/3/2020 9:17 PM
66	Improved habitat, consistent signage, levels of trails marked (maybe through all trails?), enhancements that would benefit all user groups.	9/3/2020 8:40 PM
67	A few other muddy spots could be improved, like what was done on the south range border trail. Flush toilets at the new parking lot would be wonderful.	9/3/2020 4:14 PM
68	less people, less trails, gates that actually lock down the entrance and exit in evening.	9/3/2020 4:04 PM
69	more protected spaces for wildlife, large refuge areas for wildlife. it would be great to see deer and turkeys like you did 10 years ago...now there's too many people and trails, the wildlife isn't as abundant. its quite sad, considering this is suppose to be a nature preserve	9/3/2020 3:52 PM
70	Creation Of large areas of wildlife refuge, habitat recovery areas, off limits to people. More trees planted Less people	9/3/2020 2:46 PM
71	Stricter dog access laws - maybe ban from most of park because too many people do not pick up feces and maybe 20% still do not leash dogs. Maybe only allow on pathways along Jordan Creek	9/3/2020 12:29 PM
72	Maybe an additional longer trail system that would add up to more mileage (like the length of the Border Trail). Different mountain biking trails, something like gravel/rail trail and variation in complexity (easy, intermediate, hard). Feel like most of these now are intermediate, but it would be good to throw one or two easier ones in there. Also, having up to date maps both online and the ones at the kiosks.	9/3/2020 6:39 AM
73	Widen some of the narrowest trails, such as part of Fireman's Trail and South Range Border Trail. Better trail marking - trail signs at all trail intersections. A wooden walkway in the South	9/2/2020 9:23 PM



# Trexler Nature Preserve Public Opinion Survey

	Range swampy area.	
74	Better Mark trails	9/2/2020 9:17 PM
75	I would like to see a few additional bathrooms (or port-o-johns) located near some of the parking lots. The other thing is that it would be nice for some of the trails to be remarked so that there markings are more visable.	9/2/2020 12:13 PM
76	Create large sanctuary areas for wildlife, improve habitat, Fix the gate entry....park hours are dawn to dusk, people can enter park and leave anytime. people need to respect the preserve rules	9/2/2020 8:39 AM
77	Trail build and maintenance of the border trail. It is severely eroded and muddy in places because it's built in a way that funnels water down the trails and causes erosion. The mountain bikers know how to build sustainable trails. They should be consulted or empowered to rebuild the damages sections	9/1/2020 11:04 PM
78	I'd like to see more miles of single track bike trails. Perhaps expanding into the center range area. This would offer more options to ride rather than just taking the double track back up from firemen's to the gate.	9/1/2020 11:04 PM
79	More mountain bike trails	9/1/2020 10:07 PM
80	Mor mountain bike trails	9/1/2020 8:58 PM
81	More mountain biking trails in the North Range and more Parking in the North Range lot.	9/1/2020 8:31 PM
82	Trail signs	9/1/2020 6:15 PM
83	More mtb trails built	9/1/2020 4:48 PM
84	It's not a zoo and shouldn't cater to it and the limited demographic. Careful stewardship with good planning is extremely important. Usage has dramatically increased which is good, but must be properly planned.	9/1/2020 4:01 PM
85	Parking and more mountain bike specific teal	9/1/2020 3:31 PM
86	Bathroom options at north range parking area.	9/1/2020 3:16 PM
87	Garbage cans. Water	9/1/2020 3:10 PM
88	More biking/hiking trails! I love the trails -- they are why I come. I also like the water access and would love cleaner/more accessible water near the hiking trails.	8/31/2020 5:27 PM
89	Trails systems, professionally build and maintained by strong network of community volunteers and supporters.	8/31/2020 8:33 AM
90	Mountain bike trails-more of them and additional progressive jump features	8/31/2020 8:05 AM
91	signs and security	8/30/2020 1:03 PM
92	Remove all picnic tables from ford area. Do not allow vehicle traffic on road in picnic area. Extremely crowded area at ford. Not a nature preserve	8/30/2020 12:22 PM
93	An area of easier MtB trails in the North Range; removal of some of the thistle along Brian's trail (unless that was one of the things done this summer)	8/30/2020 8:53 AM
94	Restroom availability	8/29/2020 10:00 PM
95	Nothing	8/29/2020 3:38 PM
96	More bike trails	8/29/2020 11:49 AM
97	Add a few more trails and a jump line.	8/28/2020 11:33 PM
98	More mountain bike trails Pump track, skills park, jumps drops and berms	8/28/2020 10:15 PM
99	Would love to see more trails added. It is one of the few areas around without a ton of rocks and great flow. The lay of the land looks like it has more opportunities for flow trails.	8/28/2020 5:12 PM
100	more trails for mountain biking/ multi use	8/28/2020 5:07 PM
101	Expanded Parking for MTB access	8/28/2020 3:59 PM
102	More MTB parking areas. More benches/picnic tables in shaded areas. A donation box or place to donate to the people who maintain/add new trails.	8/28/2020 3:39 PM
103	For mountain biking I think there needs to be a few more trails with better flow.	8/28/2020 3:31 PM
104	Flow and good build quality on mountain bike trails.	8/28/2020 2:52 PM
105	I like it just as it is.	8/28/2020 1:49 PM
106	Mt bike trails	8/28/2020 1:23 PM
107	Mtb Trails, more progression and flow	8/28/2020 12:08 PM
108	Educational opportunities	8/28/2020 10:52 AM
109	Mountain bike trails on the Central and South Ranges so biking is spread out.	8/27/2020 7:17 PM
110	its really good. can't complain.	8/27/2020 3:23 PM
111	more trails	8/27/2020 7:20 AM
112	A bathroom	8/26/2020 11:48 PM
113	Really appreciate the work being done on the new and improved mountain biking trails.	8/26/2020 10:53 PM
114	North Range needs more parking and porta-potties would be great.	8/26/2020 10:15 PM
115	Trail access and improved trail maintenance	8/26/2020 9:26 PM
116	mapping and signage. more environmental/education outreach and infrastructure. for example, not just a big diagram like "this is how solar power work!" but actually have solar stations	8/26/2020 9:10 PM



## Trexler Nature Preserve Public Opinion Survey

around the park maybe with little usb and charging ports to help people (especiall the youth) see the benefits of local renewables.

117	More trash receptacles.	8/26/2020 6:02 PM
118	Parking.	8/26/2020 9:11 AM
119	Better maintenance of the trails	8/26/2020 8:13 AM
120	Additional longer flowing bike trails that are maintained but natural. The current trail upgrades are fun but excessive. They are not following IMBA recommendations	8/26/2020 6:55 AM
121	Water purification in the ponds around the zoo	8/26/2020 6:30 AM
122	Addition of more trails. Equally diverse trails as well	8/26/2020 4:22 AM
123	Native species	8/26/2020 3:37 AM
124	I would like to see more progression with trail building on mountain bike trails. It's very nice to have flow trails but the removal of roots and rocks in certain sections is unnecessary.	8/26/2020 2:28 AM
125	Mountain bike trails. Not improved so much as expanded	8/25/2020 11:08 PM
126	Keep doing what is working. It's a beautiful place.	8/25/2020 10:49 PM
127	Mountain biking traila	8/25/2020 10:22 PM
128	trail marking and potential more trails	8/25/2020 10:18 PM
129	Crowd control in summer	8/25/2020 10:02 PM
130	Nothing	8/25/2020 9:58 PM
131	Many trails are becoming groomed like rail-trails... please keep some more natural	8/25/2020 9:53 PM
132	Not much.	8/25/2020 9:53 PM
133	Signs	8/25/2020 9:46 PM
134	More mountain bike trails	8/25/2020 9:32 PM
135	Additional mountain biking trails and increased native plants and trees	8/25/2020 9:32 PM
136	Nothing!	8/25/2020 9:20 PM
137	North range parking could use a bathroom	8/25/2020 9:16 PM
138	Bathrooms	8/25/2020 9:07 PM
139	additional trails, bring back Killdozer Trail, restroom facilities at North Range Lot	8/25/2020 9:07 PM
140	The mountain biking and maybe bathrooms, changing rooms, and water fountains	8/25/2020 9:00 PM
141	More mtb trails	8/25/2020 8:43 PM
142	Trail maintenance	8/25/2020 8:37 PM
143	More And improved mountain biking trails	8/25/2020 8:19 PM
144	Marking trails	8/25/2020 8:18 PM
145	More mountain bike trails and more trails for trail running.	8/25/2020 8:18 PM
146	it's pretty good	8/25/2020 8:12 PM
147	More mtb trails	8/25/2020 8:12 PM
148	Have the high grass areas of border trail mowed more regularly. Often times the grasses are very high and infested with ticks.	8/25/2020 8:12 PM
149	Protect and grow the mountain biking trails, it really is a differentiator. Creating more events can drive traffic to the zoo as well.	8/25/2020 7:57 PM
150	more mountain bike trails	8/25/2020 7:51 PM
151	Bring the active community together to help maintain the overgrowth on the trails at certain times of the year. Have the runners and hikers work in collaboration with the mountain bikers who do such a great job on their trails.	8/25/2020 7:37 PM
152	The mountain biking trails.	8/25/2020 7:16 PM
153	Doing a great job with trail maintenance especially after the early August storm.	8/25/2020 7:09 PM
154	A couple more down hill type trails.	8/25/2020 7:07 PM
155	Perhaps a few more trails and trail activity designator so everyone can enjoy the preserve without crowding each other	8/25/2020 7:07 PM
156	Bathroom at mountain bike parking.	8/25/2020 6:57 PM
157	The mountain bike trails- more of them.	8/25/2020 6:47 PM
158	Trail markings	8/25/2020 6:44 PM
159	More trails	8/25/2020 6:42 PM
160	We love it as it is! More trails are always fun!	8/25/2020 6:41 PM
161	Mountain bike trails.	8/25/2020 6:33 PM
162	The mountain biking trails	8/25/2020 6:27 PM
163	more bathrooms along hiking trails	8/25/2020 6:21 PM
164	Better trail design. Trails that follow the contours of the landscape that utilize the terrain more efficiently.	8/25/2020 6:21 PM
165	Maps showing mileage for each section of trail if u go from one trail to the next	8/25/2020 6:12 PM



## Trexler Nature Preserve Public Opinion Survey

166	Better trail markings	8/25/2020 6:01 PM
167	Mountain bike trails	8/25/2020 5:54 PM
168	Just maintaining it	8/25/2020 5:53 PM
169	That gravel road to the north range parking.	8/25/2020 5:53 PM
170	More garbage cans along the hiking trails.	8/25/2020 5:52 PM
171	Visitors cleaning up after themselves	8/25/2020 5:45 PM
172	Better signage for the mountain biking trails	8/25/2020 5:41 PM
173	More trails, longer trails, more technical trails. More areas to run through the zoo or see animals	8/25/2020 5:39 PM
174	Parking.	8/25/2020 5:38 PM
175	Love it as is, maybe a few more signs with information for the kids and walkers.	8/25/2020 5:36 PM
176	Preservation efforts	8/25/2020 5:32 PM
177	I park at the environmental center and the bathrooms were closed. Not sure if I got there early or need to be closed	8/25/2020 5:30 PM
178	Mtn bike trails	8/25/2020 5:26 PM
179	More mountain bike trails	8/25/2020 5:24 PM
180	Bathrooms & water fountains, & restore the old border trail!	8/25/2020 5:09 PM
181	Parking and restrooms at all parking lots. More trail markings/ difficulty markers	8/25/2020 5:06 PM
182	Shade trees/lean-to access on open space trails	8/25/2020 5:06 PM
183	More flow trails.	8/25/2020 5:05 PM
184	The crowd control. I applaud seeing recent security vehicles added. The crowds on the weekends really trash the place. It's a shame.	8/25/2020 4:54 PM
185	Maybe a few more Mountain biking trails.	8/25/2020 4:47 PM
186	Expansion of MTB trails and inclusion of a pump track for more kid friendly riding.	8/25/2020 4:45 PM
187	More mountain bike trails; fewer invasive species.	8/25/2020 4:45 PM
188	Bathroom facility	8/25/2020 4:40 PM
189	The Border Trail	8/25/2020 4:39 PM
190	MTB trails	8/25/2020 4:32 PM
191	No horses on majority of trails. They destroy the Single track trails. You are fined if you don't pick up dog poop - but equestrians lean HUGE piles of poop on the trail with no regard.	8/25/2020 4:32 PM
192	More mountain bike trails with features (ie - jumps)	8/25/2020 4:29 PM
193	More help with the trails in the north range.	8/25/2020 4:29 PM
194	Please consider grooming the trails in accordance with sustainable hiking trail standards with proper inslope and outslope. Water erosion is taking a greater toll on the trails and this practice would help reduce erosion damage and the related repairs.	8/25/2020 4:29 PM
195	mountain bike trails	8/25/2020 4:23 PM
196	More of a good thing wouldn't hurt. More mountain biking trails. As long as they are clearly marked and hikers know that the trail is being used for mountain biking.	8/25/2020 4:23 PM
197	More trail access and facilities in central range. Better maintained and planned trails. Including reroute and redevelopment of unsustainable, poorly designed legacy trails including most of the border trail. More passive recreation opportunities, including mountain biking and hiking trails appropriate for younger and older users. Current trail design, especially in Central and South Range, and the horrors of the Border trail make most of the preserve's trail miles dangerous and inappropriate for all but advanced and very fit users.	8/25/2020 4:21 PM
198	Updated educational information signs.	8/23/2020 3:28 PM
199	The fencing system at the elk and bison pastures. The elk fence looks like it is falling down in many places. A double barrier system would be nice, to keep the animals safe and the people safe as well.	8/22/2020 4:10 PM
200	Better landscaping and basic upkeep	8/22/2020 3:50 PM
201	Improve the parking lot what used to be the recycling center. Not very attractive. I'm for adding more benches and small picnic tables, but no large pavilions. The beauty of the preserve will get trashed because of overcrowding.	8/21/2020 5:07 PM
202	Signage about areas/trails/activities and picnic areas	8/21/2020 1:52 PM
203	Maintenance and easier safety access for Fire, EMS and Police, especially to the Ford and the Zoo.	8/21/2020 12:06 PM
204	Perhaps some polite signage to encourage people to not litter. I also enjoy the posters showing the turtles, snakes, fish species, so I can identify them when I am lucky enough to spot one. Some plant identification posters would be nice. Also, the plastic signs identifying trees have been destroyed by nature; perhaps more durable metal ones would be nice.	8/21/2020 6:41 AM
205	More (or better advertised) environmental educational programs, especially for children.	8/20/2020 8:46 PM
206	As a camp counselor for the Lehigh Valley Zoo, I think it would be beneficial to have a functioning restroom down by the Jordan creek.	8/20/2020 8:07 PM
207	Parking and signage. Parking is tough to locate and GPS often does not work in the area so signage along the roads is important.	8/20/2020 2:46 PM



## Trexler Nature Preserve Public Opinion Survey

208	Elk enclosure	8/20/2020 1:34 PM
209	clearer markings for what trail you are on	8/20/2020 7:25 AM
210	Added protection for the animals	8/20/2020 5:54 AM
211	Invasive species management	8/19/2020 10:01 PM
212	Less litter	8/19/2020 8:05 PM
213	Porta Potties are poorly maintained.	8/19/2020 2:11 PM
214	Improved fencing for the bison and the elk to protect both the animals and people. More signage about these animals to educate people about them and encourage them to respectfully observe the animals.	8/19/2020 2:06 PM
215	I would like to see more bathrooms and trash cans at trail intersections, I see quite a bit of trash at these locations.	8/19/2020 1:54 PM
216	Security during the summer months - the picnic areas are inundated with folks partying with loud music. It takes away from the peaceful, natural experience.	8/19/2020 1:41 PM
217	Updated informational/educational bulletin boards. Fresh paved parking lots	8/19/2020 12:53 PM
218	Zoo Growth/Expansion. Clean electricity.	8/19/2020 12:48 PM
219	Improved roadways and road signage.	8/19/2020 12:45 PM
220	More bison and more room for them and the elk to roam. Take away the road gates so I can the bison whenever I want. The preserve is for the people of the county to enjoy the bison.	8/19/2020 12:08 PM
221	Less overuse/abuse of the fishing area, other attractions to spread out the "crowd".	8/19/2020 8:38 AM
222	More bridges across deteriorated areas or waterways. Also more restroom facilities.	8/18/2020 1:46 PM
223	additional single track MTB trails, or improved disability of the border trail	8/18/2020 12:08 PM
224	Clean up any muddy areas similar to what was done near the orchard and bridge	8/17/2020 9:23 PM
225	Stronger monitoring and regulations around picking up your dog poop and keeping your dogs on leashes	8/17/2020 9:07 PM
226	Currently the river is being used as the city pool and I think that better facilities could be built if this continues	8/17/2020 6:44 PM
227	I'd like to see more mountain bike trails	8/17/2020 5:36 PM
228	Parking options and amenities at North Range parking area. The popularity of the trails is great, and in general the respect of the area remains quite high with little trash or similar issues. However with increased popularity and use, it would good to stay ahead of issues that could result from having too few parking options and restroom facilities and waste/trash issues.	8/17/2020 4:48 PM
229	The north range has had considerable die off of it's large hardwood trees and an explosion of invasive plant growth. I would like to see an aggressive program to restore native plants and trees.	8/17/2020 2:23 PM
230	Trail marking, trail quality	8/17/2020 12:50 PM
231	Don't change a thing. It's a nature trail not an amusement park.	8/17/2020 11:33 AM
232	More "Pack it in, pack it out" signage.	8/17/2020 10:50 AM
233	Summer time trail maintenance is non existant other than light mowing	8/17/2020 10:46 AM
234	more mountain biking trails	8/17/2020 10:46 AM
235	More native plants and no horses allowed without waste collection and removal	8/17/2020 9:56 AM
236	Autumn olive eradication was a failure, degraded the park	8/17/2020 7:59 AM
237	Limiting people into the park	8/16/2020 7:28 PM
238	Mountain bike trails and parking.	8/16/2020 5:24 PM
239	Parking	8/16/2020 5:03 PM
240	Parking area and general hangout area.	8/16/2020 5:00 PM
241	Continued expansion	8/16/2020 4:44 PM
242	Trail signage/blazing	8/16/2020 4:30 PM
243	Rebuilding killdozer and adding new MTB trails	8/16/2020 3:07 PM
244	More trials	8/16/2020 3:07 PM
245	More mountain bike trails!	8/16/2020 2:39 PM
246	More parking and bathrooms	8/16/2020 2:37 PM
247	More signage pertaining to flora, fauna Upkeep of mountain biking trails	8/16/2020 2:14 PM
248	More trails	8/16/2020 2:11 PM
249	Nothing stands out as I am very happy with TNP. However, I can't argue with more trails, mountain biking or walking/hiking.	8/16/2020 2:09 PM
250	Additional MTB trails.	8/16/2020 1:42 PM
251	Bike trails, and adding more trails	8/16/2020 1:42 PM
252	Would love to see more MTB trails.	8/16/2020 1:40 PM
253	add more trails	8/16/2020 1:31 PM
254	Trail design, consistent construct to allow ADA cycle riders.	8/16/2020 1:19 PM



## Trexler Nature Preserve Public Opinion Survey

255	Would like to see minimally invasive activities like trail use encouraged, hundreds of people picnicking, swimming in the creek discouraged.	8/15/2020 12:00 PM
256	Anti-littering initiatives	8/14/2020 10:36 PM
257	Some programming like Wildlands.	8/14/2020 9:51 PM



Q32 Please share any additional thoughts, comments, or ideas you would like to share about Trexler Nature Preserve.

Answered: 124 Skipped: 339



## Trexler Nature Preserve Public Opinion Survey

#	RESPONSES	DATE
1	Trexler Nature Preserve is a truly unique area and offers a lot of different activities/experiences. Any improvements made or the addition of recreational facilities should not degrade the already scarce habitat that exists.	1/4/2021 3:38 PM
2	Citizens or companies could "adopt" a section of the preserve based on how much they donate. Funds could go towards native plantings, removal of invasives, trail maintenance, habitat restoration, etc. Places like mount cuba and Mohonk mountain house have done a great job focusing on native species.	12/24/2020 9:43 PM
3	Thank you for the many opportunities for public comment. Trexler Nature Preserve is a very special place, and I'm excited to see how the master plan helps prepare this destination for the next 15 years.	12/8/2020 11:07 PM
4	I was instrumental in restarting the bison breeding program and would hope it continues. I also would like to see the elk flourish in the future	11/23/2020 12:26 PM
5	Summer picnics at the Ford usually include loud music and drinking. More policing needed.	11/10/2020 12:30 PM
6	I am so happy these trails exist. I feel blessed to live close to this beautiful area	11/5/2020 12:21 PM
7	Mountain bikers should only be permitted on trails in the designated section on north range. They've posted pictures of heavy machinery building trails. The trails they've created create sediment pollution as documented on Mill Creek Rd. and exit road from preserve. The north range used to be beautiful but is now overtaken by mountain bikers. This is not a nature preserve activity. Structured festivals such as trexfest should not be permitted. Not a nature preserve activity. A similar situation with horse riders parking everywhere and permitted to ride anywhere. Not a nature preserve type of activity. Horses have torn up trails. Used to be a nice place but now trails overused. I only visit during snowstorms or rainy days to actually see a nature preserve. Please do not allow mountain bikers and horse riders and loud picnic parties take over nature preserve. Additionally please do not allow parking in grasslands for trexfest and overflow christmas lights visitors.	10/28/2020 5:35 PM
8	Thankful to have it in our community.	10/19/2020 2:15 PM
9	I've never encountered anyone in a bad mood while enjoying the trail system. Hikers, bikers, walkers, all happy to be out enjoying the beauty of nature	10/12/2020 1:52 PM
10	Expand it. Rewild the suburbs I say!	10/4/2020 1:43 AM
11	I love the preserve. Thank you!	10/2/2020 4:58 PM
12	The bison and elk viewing is a priority. Perhaps these areas can be better managed and more land provided.	9/28/2020 12:13 PM
13	I think it is a great asset that is being managed fairly well given the heavy use and demands made on it, and recognize that resources to maintain and improve it are used as effectively as possible and likely spread thin.	9/27/2020 7:21 PM
14	I would be interested in a Trexler trail ambassador group/program. I'm willing to volunteer to give back to the place I enjoy so much and to be of service to the preserve and visitors.	9/24/2020 9:08 PM
15	I understand the purpose of General Trexler's Trust and what was envisioned, but is what has been happening really what was envisioned? As you consider a master plan, please consider the environment - the flora and fauna that is impacted, what the Preserve really should become, the neighboring communities and please ask yourself what you would want and not want in your back yard. Thank you	9/20/2020 6:22 PM
16	It seems the township works well with the valley mountain bikers org.	9/19/2020 5:46 PM
17	I have lived in the Valley for 23 years and know people who have always lived here and have never been there. The nature preserve is for people who want to enjoy nature so leave it alone	9/12/2020 1:47 PM
18	Trexler Nature Preserve is a wonderful place that my children and I have enjoyed for many, many years and hope to continue enjoying for many more to come.	9/10/2020 9:26 AM
19	While the Ford is nice it draws too many disrespectful, loud people who disrupt the peaceful, quiet, natural setting which most visitors coming to TNP are seeking.	9/9/2020 4:59 PM
20	Horses destroy the trail too much.	9/9/2020 10:07 AM
21	It's great!	9/8/2020 4:24 PM
22	As life-long residents of the area, I have been going to the Preserve and Zoo for decades. My wife and I go to the Preserve several times a week, primarily to watch the sunset from the area of the Chestnut Orchard, but we also enjoy short walks/hikes, bird watching, and most recently, watching for the baby fox. As an Officer of the Schnecksville Fire Company, I also have an interest in public safety at the facility, including emergency response and access	9/8/2020 12:06 AM
23	We love using it! We walked/hiked a lot before the pandemic and even more during it! Love the new lot on old packhouse! We love the trails!	9/7/2020 3:36 PM
24	Positive reinforcement of the value of archery hunting. When I visit and ask it is treated like a pariah.	9/6/2020 5:56 PM
25	I love the Trexler nature preserve. It's a great place for animals and people alike. I am excited to see this project develop as I am a Penn State student of Landscape Architecture and want to make similar projects in the future.	9/6/2020 3:52 PM
26	Thank you to all the hard working individuals that keep the preserve running and beautiful! Your hard work is not unnoticed.	9/4/2020 2:40 PM
27	This is one of my favorite places in the entire Lehigh Valley.	9/4/2020 2:03 PM
28	Organize a group "friends of the game Preserve" for donors and volunteers to help with maintenance, provide feedback and organize a few guided hikes with guides that explain features seen around the trails	9/4/2020 11:05 AM
29	Please provide a link to the 2006 Master Plan;	9/4/2020 10:24 AM
30	This place is special and an amazing asset to the community. I am thankful that it exists.	9/4/2020 10:19 AM



## Trexler Nature Preserve Public Opinion Survey

31	the best part of the the preserve is that it is mostly untouched and full of wildlife, plants etc. I would hate to see it developed to the point where it becomes overused and the natural beauty is gone.	9/4/2020 10:17 AM
32	The new markings to deter people from gathering near the ford was long overdue. People are not smart. I do love when it floods and is closed by that's me being antisocial.	9/4/2020 9:04 AM
33	More signs indicating noise violations would be nice. The out-of-towners have been blasting their music and trashing the area.	9/4/2020 9:01 AM
34	The park is very well done and beautiful!	9/4/2020 8:58 AM
35	Anything that protects the nature against the impact of humans is the best to implement.	9/4/2020 8:16 AM
36	Keep up the good work !!!	9/3/2020 10:46 PM
37	The improvements over the last year are great. Love the new parking lot and trail connectors. There are now several 2-5 mile loops from that spot. Keep up the good work.	9/3/2020 4:14 PM
38	The use of the nature preserve is now considered a public park. large groups of People grilling, loud music,garbage everywhere. Too many mountain bikers and trails. The focus needs to be on preservation and wildlife.	9/3/2020 4:04 PM
39	fix the entry exit system to adhere to park rules and hours, load music and partying shouldn't be taking place after hours, but the current gate system allows anyone to stay in the park after hours. All gates should lock when park closes. Its a VERY simple fix	9/3/2020 3:52 PM
40	We must remember the wishes of general Trexler as a nature preserve for wildlife, i feel like the county has gone the other way and turned it into a mtn bike park and people park. Stop letting the mtn bikers control the trails and park	9/3/2020 2:46 PM
41	The preserve has been declining for the last 5-8 years.	9/2/2020 8:39 AM
42	Restoring native forest should take priority over maintaining the elk herd	9/1/2020 11:04 PM
43	Thank you for spending some bucks on the new flow trail Brian's return. For the love of god, bring back gravity cavity, kill dozer and half pipe 3 trails. Y'all dozed it and the olive came back the very next season. It made for a more exciting longer loop.	9/1/2020 11:04 PM
44	I have grown up going to the nature preserve and the Ford which I have passed down to doing with my children. The Ford makes this preserve unique	9/1/2020 6:15 PM
45	Limit the mountain bikers. They are aggressive and present a safety issue to trail users abs the environment. I have seen them injure themselves and others on separate occasions. They also are aggressive towards the general public	9/1/2020 5:52 PM
46	Trexler is a fantastic place to enjoy the preserve safely through mountain biking. The trails are great but there is definitely potential to build a few more Mountain bike trails which would encourage many people to get out and enjoy the preserve	9/1/2020 4:48 PM
47	Please don't cater to different groups. Do what is best for the natural landscape while promoting use as a public park.	9/1/2020 4:01 PM
48	The mountain biking has improved significantly over the last couple years, keep it coming	9/1/2020 3:31 PM
49	Great place love it	9/1/2020 3:10 PM
50	Thanks so much for all your hard work. I enjoy it immensely and am appreciative of all you guys.	8/31/2020 5:27 PM
51	Continue to provide stewardship for the environmentally safety, preservation, beautification, growth and management of the preserve.	8/31/2020 8:33 AM
52	Give more land to the zoo	8/30/2020 1:03 PM
53	Remove picnic tables and from most areas of nature preserve. Especially at ford. Not a nature preserve but a party place on weekends for out of towners	8/30/2020 12:22 PM
54	Great place to ride. We go up from Lancaster Co 2 times a year	8/29/2020 11:49 AM
55	More mountain bike trails - they are awesome now but could be a real mountain bike destination Look at Bentleyville Arkansas - huge amount of tourism due to mountain biking - lots of tourism dollars	8/28/2020 10:15 PM
56	Trexler is a wonderful riding destination. I love the flow the trails have. More trails like broken arrow and the new revision of brians trail would be great. High speeds, jumps, and other features would be great! Check out Bentonville Arkansas and see what they have done...I feel trexler has the potential to do a lot of the same.	8/28/2020 5:12 PM
57	Its a great place with quality trails typically maintained very well, it would be exciting to have more trails to ride bikes on.	8/28/2020 5:07 PM
58	The people and organizations that maintain Trexler Nature Preserve are doing a wonderful job. Every time I come here the MTB trails are better then before and they keep me coming back for more!	8/28/2020 3:39 PM
59	Beautiful.	8/28/2020 2:52 PM
60	Solicit local Mtb Trail Builders for their input and Volunteer to build	8/28/2020 12:08 PM
61	na	8/27/2020 7:20 AM
62	Thank you	8/26/2020 11:48 PM
63	When considering improvements to trails, get advice from the MTB community. They make trails with decent switchbacks that are more friendly for climbing and designed to resist erosion.	8/26/2020 10:15 PM
64	More Opportunities to volunteer	8/26/2020 9:11 AM
65	Great place. I believe additional picnic areas will increase the current disrespect for nature	8/26/2020 6:55 AM
66	More trails for bikes	8/26/2020 6:30 AM



## Trexler Nature Preserve Public Opinion Survey

67	So much room at the preserve, it can easily be used to add more trail systems	8/26/2020 4:22 AM
68	More eagle scout projects that actually do som6	8/26/2020 3:37 AM
69	The Ford is incredibly unique for both Pennsylvania and the east coast	8/25/2020 10:22 PM
70	lovely preserve	8/25/2020 10:18 PM
71	Would love easier access to information for volunteering cleaning up the park. Ran their for years and want to give back	8/25/2020 9:53 PM
72	When I drive center city Allentown Girl Scouts up, the greatest gift you give us is the Ford. The amazement on the girls faces is priceless. Please keep up the good work!	8/25/2020 9:20 PM
73	additional parking	8/25/2020 9:07 PM
74	Don't over complicate the preserve. Keep it simple and natural.	8/25/2020 8:56 PM
75	N/A	8/25/2020 8:18 PM
76	i like it. it's fine by me	8/25/2020 8:12 PM
77	Overall the trails are well kept. I used the trails all year round and at least three times per week.	8/25/2020 8:12 PM
78	Please keep it as natural as possible.	8/25/2020 7:37 PM
79	My favorite place to be	8/25/2020 7:09 PM
80	I know it may not ecologically be the best, but I would hate to see the ford removed. It intrigues kids and piques their interest.	8/25/2020 6:41 PM
81	Equestrians have parking already. Hikers need very little. Children need even less. A playground isnt exactly natural and when I was a kid we played in streams and climbed trees not jungle gyms. People who are Geriatric could use more benches. Theyre old and need to take breaks. The boarder trail is great for elderly but not an easy feat. Set them up with benches to enjoy our Beautiful land. Most importantly lets build a mountain bike mecca! Hikers can use it. Keep equestrian on separate trails. This will bring mountain bikers to the area. They will stay in hotels, airbnb. Eat at restaurants and ultimately bring money to the area. Look at other locations with great trail systems. Richmond Va, Ashville NC, chatenooga Tn. All great cities bringing millennials to work enticing them with Outdoor activities and bringing in tourists to ride the trail system. It can work here too! Love the preserve cant wait to see how it turns out in the next 10 years! Best of Luck.	8/25/2020 6:33 PM
82	Composting toilets on the Border Trail...yeah I am a runner	8/25/2020 6:01 PM
83	Would love to have an astronomy spot somewhere near the zoo parking lot I think. I've set up my telescope at the environmental center a couple times but it's closer to 309 and the light pollution right there kind of sucks. Don't need much and I'd be happy to help add some kind of telescope set up or astronomy out reach with the NJAA	8/25/2020 5:36 PM
84	Mountain bikers are among the best stewards of the environment. Give them a chance to make the trails they want because for the most part, they are the majority of the patronage.	8/25/2020 5:32 PM
85	Keep doing what you do.	8/25/2020 5:30 PM
86	More diverse mountain bike trails	8/25/2020 5:24 PM
87	So many runners are introduced to trail running for the first time at Trexler. There should be a running program to assist and educate proper use of the preserve for runners, for everyone's benefit! I know a few top candidates to help run it!	8/25/2020 5:09 PM
88	None at the moment	8/25/2020 5:06 PM
89	N/a	8/25/2020 5:06 PM
90	it would be cool if there is a area you could ride down a rock slab.	8/25/2020 5:05 PM
91	As much as I enjoy the river crossing the crowds around it can get out of hand. And the people speed out of there and and almost the entire way out of the park	8/25/2020 4:54 PM
92	The Ford seems to be at issue in the context of this survey. It should remain for generations to enjoy as others have.	8/25/2020 4:39 PM
93	I have been going to The preserve since I was very young child with my dad. I would love opportunity to give back to the trail with trail work days of some sort. I belong to VMB - but utilize all of the trail system. Lots of fellow trail runners would love to give back - but have never seen opportunity posted.	8/25/2020 4:32 PM
94	I believe a few years back they said something about autumn olive removal. What about now that its been growing like wild fire. Are they going to chop it down and ruin more trails in doing so like last time?	8/25/2020 4:29 PM
95	The Parks and Recreation department does a great job with resources they have available to them. Please maintain their budget appropriately so they may continue to finance improvement projects within the TNP.	8/25/2020 4:29 PM
96	mtb trails need better flow, one way direction down broken arrow	8/25/2020 4:23 PM
97	A clarification on question 15 (I think). The North Range trails are very well maintained (as a VMB member who participated in volunteer maintenance, I see that first hand) but the rest of the park trails, especially the Border trail are poorly planned, developed and maintained. That trail can be a HUGE resource if it's redesigned to be a better, more sustainable multi use trail for users of all ages.	8/25/2020 4:21 PM
98	N/A	8/22/2020 4:10 PM
99	It would be nice to see more environmental, educational programs for all ages to be hosted in tandem between the Preserve and the Zoo.	8/21/2020 12:06 PM
100	If changes are made, I hope they will be with the intention of preserving nature. I would support losing things like the ford if it is causing environmental destruction, even though it is very fun for kids. In the conservation literature, views on invasive species (flora and fauna) are	8/21/2020 6:41 AM



## Trexler Nature Preserve Public Opinion Survey

evolving; perhaps trying to eliminate invasive species is not a realistic goal, though some management to protect natives is important. I would like more active monitoring of cyanobacteria during summer months and signage if it is detected, since many dogs and children play in Jordan Creek. This year, there is only one article in the Morning Call, with no follow-up to confirm, only says "suspected."

101	The maintenance staff is doing a great job! Trails are kept clear of fallen trees and washouts are repaired on a timely basis.	8/20/2020 8:46 PM
102	Link educational programming closely with the Lehigh Valley Zoo	8/20/2020 1:34 PM
103	I work at the lehigh valley zoo and almost daily we get people that come up to out gates and want to know how to get to the water crossing and want to drive over the water many of our guests site the forge as one of there favorite parts about visiting and are upset when it is closed. Also I would like to say that whoever maintenances the trails is doing a fabulous job. After a big rain and the trails were washed out it only took them a day or to to have the trails back up and running.	8/20/2020 9:03 AM
104	I'd wonder if there are any plans to sell the Zoo any more land so they can expand. My son really likes it there.	8/20/2020 5:54 AM
105	I love the Preserve and it adds so much value to my life. My mother grew up in Allentown and her parents would take her and her siblings to the ford for picnics and passive recreation. I do the same with my family. We are also LV Zoo members, I trail run, mountain bike, hike, bird, explore nature, and plan on archery hunting there.	8/19/2020 10:01 PM
106	I love the Trexler Nature Preserve!	8/19/2020 1:54 PM
107	Follow the will and stop trying to sneak in things that are not allowed. You are just wasting money and will be blocked by the courts.	8/19/2020 12:08 PM
108	I sense in the survey, there is a push to increase the "textbook" value of the preserve at a cost to the human aspect. Don't hinder the human enjoyment aspect by removing many of the attractions of the preserve.... i.e. ford removal....	8/19/2020 8:38 AM
109	Jim Kerschner, whom I have never met, seems like a wrong advocate for keeping the nature preserve's beautiful state while allowing recreational for us that like to MTB.	8/18/2020 12:08 PM
110	Please do not add picnic tables as littler and noise will increase. I dislike when I am on a trail and hear music. I want to hear the water, birds, the wind in the trees, little mammals rustling, and snakes slithering in the leaves.	8/17/2020 9:07 PM
111	I think the Zoo is an important educational resource and working with them could benefit both parties when it comes to building educational opportunities into the Preserve.	8/17/2020 6:44 PM
112	I used to live in Oregon and enjoyed outdoor recreation year long. Facilities and trail systems did a great job catering to trail users of all kinds. As a result local infrastructure benefitted from the outdoor recreation. Since moving to PA and mountain biking at Trexler, I've been impressed with what the area offers. It's nice to see coordination with mountain bikers and the county.	8/17/2020 4:48 PM
113	The Valley Mountain Bike club has done wonderful work in creating and maintaining the trails on the North Range. The only criticism I have is that they have been mostly creating one-way, downhill trails. I would like to see the county insist on new trails being two-way trails from now on.	8/17/2020 2:23 PM
114	If you add to much, people will take advantage of it. Keep it simple.	8/17/2020 11:33 AM
115	New trails, clearer marked trail options	8/17/2020 10:46 AM
116	please support mountain biking here for future generations	8/17/2020 10:46 AM
117	n/a	8/16/2020 3:07 PM
118	A wonderful gem in the region. Thank you for keeping it beautiful and accessible	8/16/2020 2:37 PM
119	Volunteers who maintain mountain biking trails are super important!!!	8/16/2020 2:14 PM
120	Keep up the good work and thank you.	8/16/2020 2:09 PM
121	The park is a great resource for all. I primarily use it for MTB but I appreciate the overall multi use options and consider it one of my favorite places to visit and frequently recommend to others	8/16/2020 1:40 PM
122	We need to get rid if the Autumn Olive trees there a mess	8/16/2020 1:31 PM
123	The volunteer efforts in the North Range exceed the rest of the park outside of the ADA area. The County should make better use of those volunteer efforts in the North Range and let them do more with more.	8/16/2020 1:19 PM
124	Would like to avoid adding large group accommodations like pavilions for the same reason as above.	8/15/2020 12:00 PM



# **Trexler-Lehigh County Game Preserve Master Plan**

County of Lehigh  
Department of General Services

## *Consultants*

Urban Research and Development Corporation  
Bethlehem, PA  
in association with  
Natural Resource Consultants, Inc.  
Somerset, PA

May 2006



# CONTENTS

	<u>PAGE</u>
<b>Contents</b> .....	<b>i</b>
<b>Background</b> .....	<b>1-1</b>
Location .....	1-1
History of the Site .....	1-2
Purpose and Structure of the Plan .....	1-4
Master Plan Process .....	1-5
Project Management Group .....	1-5
Field Views .....	1-5
Interviews .....	1-6
Public Meetings .....	1-6
Site Characteristics .....	1-6
<b>Master Plan</b> .....	<b>2-1</b>
Vision for the Site .....	2-2
Recommended Trail System .....	2-3
Recommended Support Facilities .....	2-12
Improvements to North and Central Ranges .....	2-23
Recommended Policies .....	2-25
Summary of Proposed Improvement Costs .....	2-30
Maintenance Costs .....	2-32
Implementation/Other Improvements .....	2-33
<b>Appendices</b>	
A <i>Observations and Recommendations Regarding the Bison, Elk, Palomino Horse and White-tailed Deer Herds at the Trexler-Lehigh Game Preserve; An Historic Perspective of General Harry C. Trexler's Intentions</i>	
B Project Management Group	
C Interviewees	



## Appendices (continued)

- D Recommendations from the Report, *Trexler-Lehigh County Game Preserve, Ecological Inventory and Assessment*
- E Details

## Maps, Tables, and Figures

Map 1.1	Location Map .....	following 1–2
Map 1.2	Site Location .....	following 1–2
Map 1.3	Pasture Location .....	following 1–4
Map 2.1	Trail System .....	following 2–2
Map 2.2	T1 — Trail A .....	following 2–4
Map 2.3	T3 — Trail B .....	following 2–6
Map 2.4	T5 — Trail C .....	following 2–8
Map 2.5	Entrance and Parking Plan .....	following 2–12
Map 2.6	Entrance E5, at Covered Bridge .....	following 2–16
Map 2.7	Central Range .....	following 2–24
Map 2.8	North Range .....	following 2–24
Map 2.9	G1 Guide Rail Location .....	following 2–26
Map 2.10	G2 Guide Rail Location .....	following 2–26
Table 2.1	Cost Estimate — Trail A .....	2–4
Table 2.2	Cost Estimate — Trail Segments D5, D6, and D7 .....	2–5
Table 2.3	Cost Estimate — Trail B .....	2–6
Table 2.4	Cost Estimate — Trail Segments D2 and D3 .....	2–6
Table 2.5	Cost Estimate — Trail C .....	2–8
Table 2.6	Cost Estimate — Trail Segments D1 and D4 .....	2–11
Table 2.7	Master Plan Cost Summary .....	2–30
Figure 2.1	E1 Mill Creek Road, North .....	following 2–12
Figure 2.2	E2 Pathway at CCC Road, West .....	following 2–14
Figure 2.3	E2 Pathway at CCC Road, East .....	following 2–14
Figure 2.4	E3 Main Entrance .....	following 2–16
Figure 2.5	Trail C Crossing .....	following 2–16
Figure 2.6	E5 Covered Bridge Entrance .....	following 2–16
Figure 2.7	Exit from Central Range .....	following 2–18



## BACKGROUND

Harry C. Trexler (1854–1933) was an extraordinary businessman, civic leader, and philanthropist with the ability to create and manage large corporations while fostering and maintaining a strong sense of community and social needs. He retired from the Pennsylvania National Guard in 1918, having achieved the rank of Brigadier General. A co-founder of Lehigh Portland Cement, which became one of the largest cement producers in the world, Trexler was also involved with many public utilities and held seats on several corporate boards as well as trusteeships at three area hospitals, two colleges, and a university. He served on the staffs of six Pennsylvania governors.

General Trexler was keenly aware of the value of leisure time and the importance of family and community activities. Instrumental in planning Allentown’s extensive park system, Trexler served as chairman of the city’s first planning commission. The general’s imprint on the landscape of both Allentown and Lehigh County is clearly visible today:

- At his own expense, Trexler hired a renowned landscape architect to beautify a vacant city lot, which later became Allentown’s first park, West Park.
- Trexler’s summer home, Springwood Farm, was conveyed to the City of Allentown after his death and is now known as Trexler Memorial Park.
- The general conveyed his game preserve property to Lehigh County in his will.

The following document presents a brief history and a new beginning for the revitalization of the property known as the Trexler-Lehigh County Game Preserve.

### Location

The Trexler-Lehigh County Game Preserve (TLCGP) is located in the northwest portion of Lehigh County, in the townships of North Whitehall and Lowhill, approximately eight miles northwest of the City of Allentown (Map 1.1). Primary access to the site is Game Preserve Road to the west of PA Route 309. Other major roads in the vicinity include PA 100, U.S. 22, and the Pennsylvania Turnpike (I-476).

The TLCGP site contains approximately 1,108 acres, surrounding the 29-acre Lehigh Valley Zoo (Map 1.2).<sup>1</sup> The site is adjacent to Lehigh-Carbon Community College, the KidsPeace Children’s Hospital, and the KidsPeace Orchard Hills Campus.

---

<sup>1</sup> The Lehigh Valley Zoo is not part of the *Trexler-Lehigh County Game Preserve Master Plan*.



## History of the Site

Harry Trexler owned a ranch in Jackson Hole, Wyoming at the beginning of the 20<sup>th</sup> century. An avid hunter, the general possessed a keen understanding of man's role in nature. As he witnessed the dramatic reduction in game populations, he became interested in protecting and restoring wildlife.

The general began purchasing small farms in the low hills of the Blue Mountain in 1906 with the express purpose of saving the American bison from extinction.<sup>2</sup> In 1911, he began purchasing the foundation stock of bison, elk, and white-tailed deer. At the time, bison, elk, and deer had all been hunted to the brink of extinction, and Trexler used the game preserve property to protect the animals from hunters as "breeding stock" to assure the species' survival. When the county assumed responsibility in 1935, the preserve was reportedly home to 98 bison, 78 wapiti elk, and 269 Virginia deer.<sup>3</sup>

Trexler bequeathed the TLCGP site to Lehigh County, and the wording of his will provides important guidance for the master plan:

"Tenth: I further authorize and direct my Executors and Trustees to convey in fee simple to the County of Lehigh, *for use as a public park, by the citizens of that County*, my Game Preserve Property in North Whitehall and Lowhill Townships..." (emphasis added)

The assets of the Trexler estate have grown significantly since his death in 1933, and the administration of the Trexler will has evolved into the nonprofit Trexler Trust. The trust provides millions of dollars annually for the maintenance and improvement of Allentown city parks, the TLCGP site, and various local educational, charitable, and cultural projects.

Under county jurisdiction, the game preserve property became a ritual family destination; a site fondly remembered by virtually every local child, parent, and grandparent for the beautiful scenery, the natural environment, the excitement of fording the Jordan Creek, and the sight of elk, deer, bison, and (after Trexler's death) palomino horses.<sup>4</sup>

Nationwide efforts to restore bison, elk, and deer, of which General Trexler's game preserve was a part, were extremely successful. None of the three animals is considered endangered today. Bison

---

<sup>2</sup> *The General and His Captain; Memoirs of Nolan P. Benner*, Proceedings of the Lehigh County Historical Society, vol. 36, 1984, p. 66

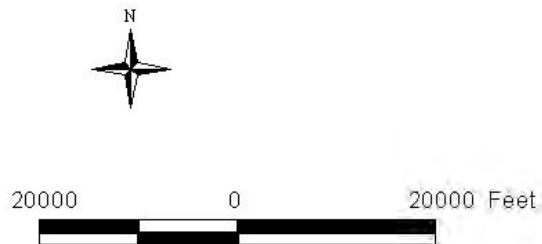
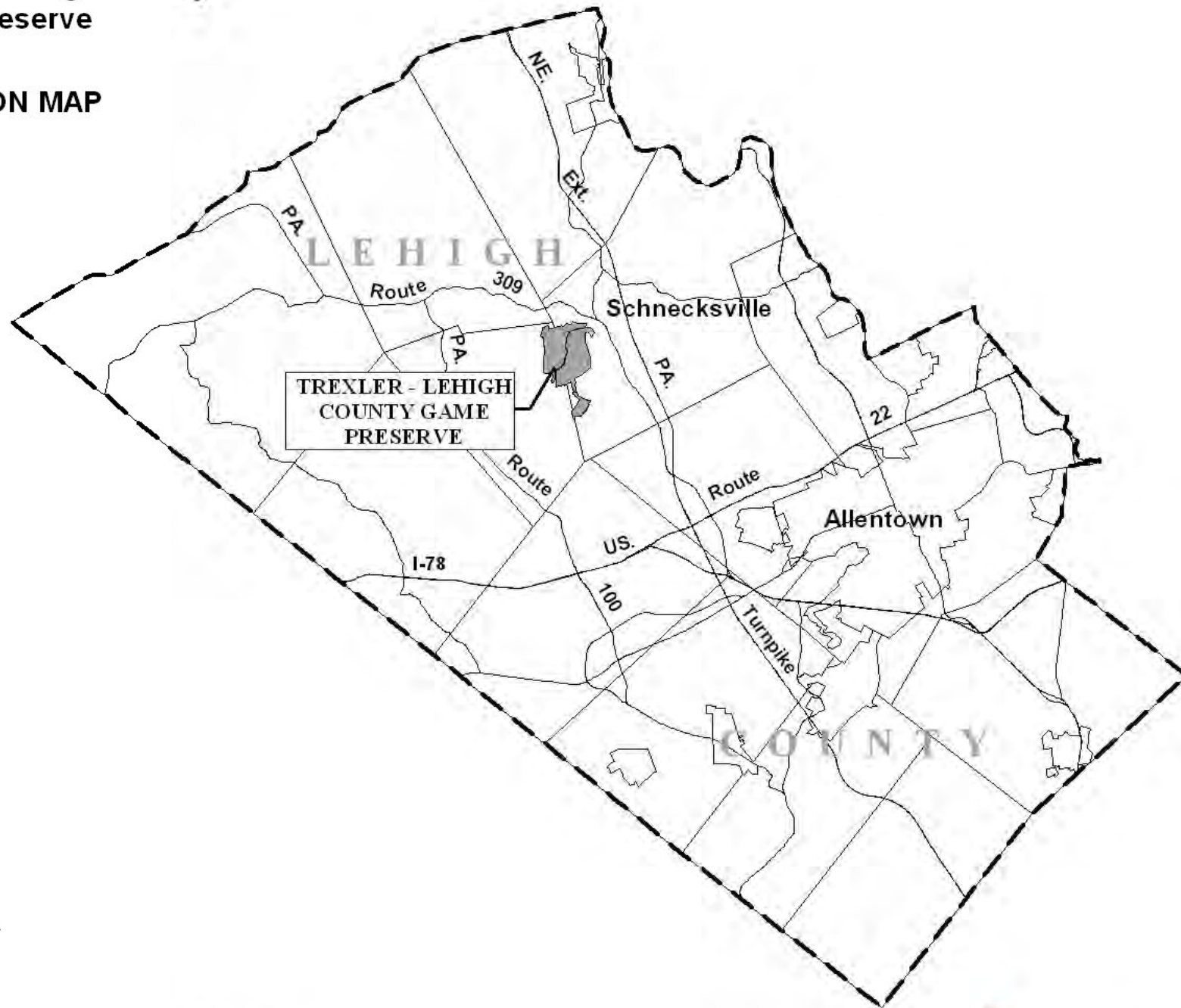
<sup>3</sup> *Ibid.*, p. 74

<sup>4</sup> For more information on the animal herds on the game preserve property, the reader is referred to *Observations and Recommendations Regarding the Bison, Elk, Palomino Horse and White-tailed Deer Herds at the Trexler-Lehigh Game Preserve*, Natural Resource Consultants, Inc., 2006, which appears in Appendix A.



**Trexler - Lehigh County  
Game Preserve**

**MAP 1.1  
LOCATION MAP**

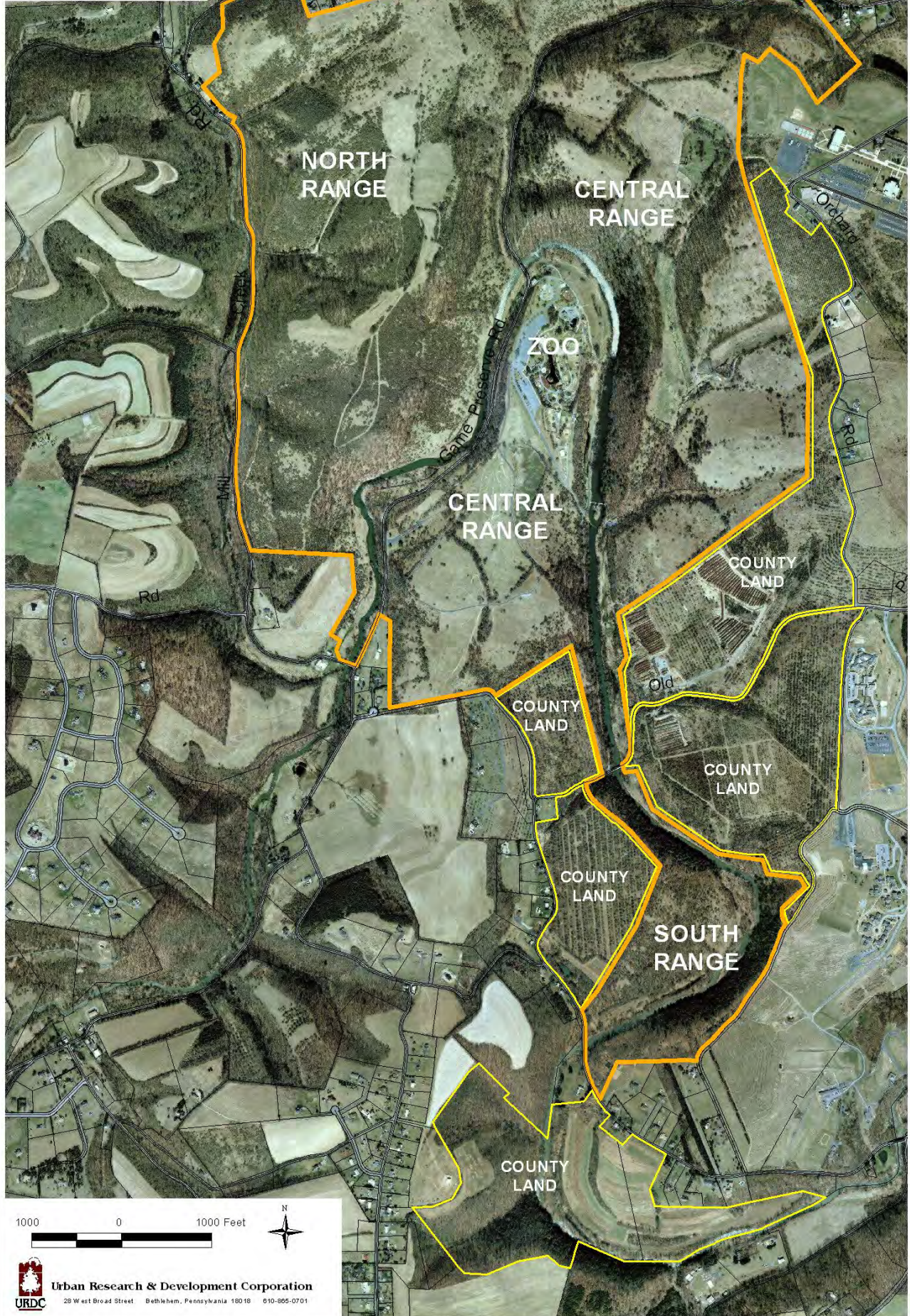


**Urban Research & Development Corporation**  
28 West Broad Street, Bethlehem, Pennsylvania 18018 610-865-0701



# Trexler - Lehigh County Game Preserve

## MAP 1.2 SITE LOCATION





and elk are considered livestock. Elk roam freely in many parts of northern and western Pennsylvania.

Deer have replenished to the point of controversy, and many Pennsylvanians consider the animal to be too abundant. During the 1980s, the exterior fence of the game preserve was severely compromised, allowing the captive herd out of and wild deer in to the property. Today, the captive deer population has been completely assimilated into the native, wild population that roams freely. Legally, the deer now belong to the citizens of Pennsylvania and are regulated by the Pennsylvania Game Commission.

General Trexler also showed an interest in horse breeding. He purchased 12 Percheron horses (draft horses for working his many farms throughout northwestern Lehigh County), and the herd grew to 100 within ten years. As combines and other machinery became available to increase farm productivity, the need for the horses on the farms declined. General Trexler sold his entire herd of Percherons in 1928.<sup>5</sup> Palomino horses were reintroduced to the site long after Trexler's death, but the current equine stock has no historical link to the general.

In the decades after the general's death, the captive herds have declined in size. The buffalo herd was reduced to seven yearlings by an outbreak of tuberculosis in 1956 and completely destroyed by an epidemic of tuberculosis in 1960. Today, the captive herds include 14 bison, 15 elk, and six horses.<sup>6</sup>

For 40 years after the county assumed management of the site, the preserve was open only on Sundays, operating with informal petting and feeding exhibits. In 1969, the game preserve commission engaged McFadzean, Everly & Associates to plan and develop a children's zoo at the site. The 29-acre zoo was dedicated on 18 May 1975. The exhibits became more formalized, and the animal collection was expanded to include exotics from Africa, Asia, and Australia. Construction costs, estimated to be \$400,000, ballooned to more than \$2,000,000. According to admission projections, zoo attendance was to reach 650,000 by 1977. Actual 1977 admissions were 112,342.

Unfortunately, local government budgets are extremely difficult to balance and, under county stewardship, funding for the zoo declined to a point that the county had announced plans to close the zoo. In November of 2004, a local nonprofit organization, the Lehigh Valley Zoological Society, assumed management of the zoo under a lease arrangement with the county. The zoo is now formally named the Lehigh Valley Zoo. As a separate operating entity, the Lehigh Valley Zoo is not part of the *Trexler-Lehigh County Game Preserve Master Plan*.

Today, the game preserve site includes both the zoo, the buffalo, elk, and horses, and much open space (Map 1.3). The growth of the zoo and the lease arrangement with the Lehigh Valley Zoo

---

<sup>5</sup> Lehigh County Historical Society, op. cit., p. 87

<sup>6</sup> Natural Resource Consultants, Inc., *Observations and Recommendations Regarding the Bison, Elk, Palomino Horse and White-tailed Deer Herds at the Trexler-Lehigh County Game Preserve*, 2006, pp. 4–7



represented a significant commitment by the county perceived by the Trexler Trust to be to the detriment of the remainder of the game preserve property. The trust filed suit against the county to force the county to devote at least an equal amount of funding to the game preserve property as had been provided to the zoo.

The county and the trust agreed to a settlement of the suit which calls for the county to spend \$1.9 million by the end of 2010 to improve the nonzoo portion of the property for public use. The trust agreed to add \$850,000 to the settlement, giving the county a total of \$2.75 million for improvements to the property.

## Purpose and Structure of the Plan

The *Trexler-Lehigh County Game Preserve Master Plan* presents improvements that will open the game preserve to the public, in accord with General Trexler's wishes and the agreement between Lehigh County and the Trexler Trust. The plan is intended to:

- Provide a vision for an improved game preserve site open for the use and enjoyment of Lehigh County citizens.
- Guide Lehigh County in spending the \$2.75 million required by the legal agreement with the Trexler Trust.

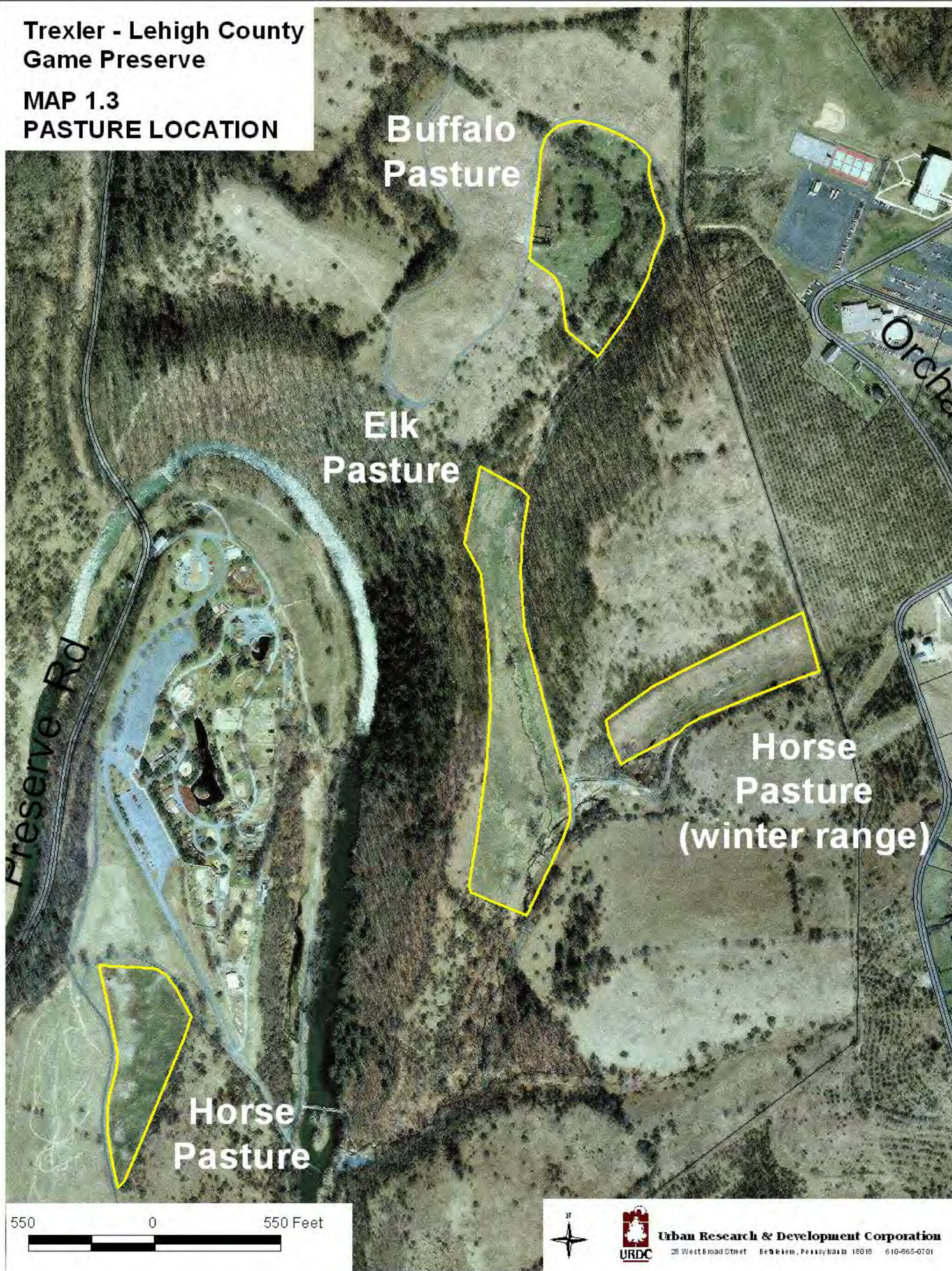
The plan contains two sections:

- **Background** — The background information for the plan includes the history of the site, some information about the site itself, and the process of developing the master plan. The process involved meetings of a Project Management Group (PMG), interviews, and public meetings to determine the most desirable uses of the site.
- **Master Plan** — The second section of the report presents the vision and recommendations of the plan, including both physical improvements and policy recommendations. The vision, developed through the background studies, is perhaps, the most important section of the plan, offering a direction for the site molded from the ideas of the PMG, public meetings, and many on-site visits and discussions. The vision establishes the framework for the recommendations of the plan. The recommendations include cost estimates for capital improvements and an implementation section offering additional guidance to Lehigh County in developing the site.



**Trexler - Lehigh County  
Game Preserve**

**MAP 1.3  
PASTURE LOCATION**





## Master Plan Process

The master plan process began in August 2005, when Lehigh County retained a consultant<sup>7</sup> to help prepare the plan. The planning process consisted of four basic elements:

- Project Management Group meetings
- Field views
- Interviews
- Public meetings

### Project Management Group

The county also assembled the Project Management Group (PMG) to help guide the plan.<sup>8</sup> The PMG met on the following six occasions to review progress, discuss key issues, and provide guidance for the master plan:

- 14 September 2005
- 6 October 2005
- 3 November 2005
- 5 January 2006
- 2 February 2006
- 2 March 2006

During the initial meetings, as a vision for the property began to emerge, the PMG decided to invite a representative from the Jacobsburg Environmental Education Center (JEEC) in Northampton County to join the group. The members felt that the Jacobsburg site had many attractive features that might be emulated in the improvements to the Trexler-Lehigh County Game Preserve site.

### Field Views

Field views provided on-site information for the consulting team and the entire PMG. URDC personnel visited the site 10 times, each for a minimum of ½-day. In addition, the PMG met at the game preserve site for a field view on 8 September 05.

The PMG also visited the JEEC on 28 October 2005 to tour the facility and understand the history of development. The focus of the JEEC is passive recreation. The site includes trails for hiking, biking, and horseback riding and various facilities and exhibits for environmental education.

---

<sup>7</sup> The consultant was Urban Research and Development Corporation (URDC — Bethlehem, PA), in association with Natural Resource Consultants, Inc. (Somerset, PA) and Donald R. Marushak (Allentown, PA).

<sup>8</sup> A complete list of PMG members appears in Appendix B of the master plan.



## Interviews

Interviews were a critical part of developing the *Trexler-Lehigh County Game Preserve Master Plan*. The site has a long and emotional history in the county, and many viewpoints were necessary to craft a vision for the site which reflects both General Trexler's intentions and the desires of the people for whom he bequeathed the site. The consultant team conducted meetings/interviews with 34 persons knowledgeable about and having an interest in the TLCGP site.<sup>9</sup>

The interviews resulted in a variety of ideas for use and specific facilities on the TLCGP site. As in any broad interview/opinion process, some views reflected special interests. The interviews also produced information about resources for helping to provide and maintain specific facilities. However, several broad concepts were common to the vast majority of interviews:

- The site is a special asset for the county that must be preserved.
- Activities and facilities should be targeted to the enjoyment of the natural setting.
- JEEC is a good model for use of the TLCGP site.
- Trails are an appropriate use for the site.
- Active recreation facilities, such as fields and courts, should be limited or avoided.
- Motorized vehicles should be prohibited on any trails.

## Public Meetings

The PMG hosted two public meetings as part of the *Trexler-Lehigh County Game Preserve Master Plan*. The first meeting, attended by approximately 40 persons, occurred on 17 November 2005. The consultant, URDC, explained the plan process, detailed progress to date, and moderated questions and comments from the audience.

The second public meeting, held on 16 March 2006, attracted approximately 60 persons. Michael Kaiser, Executive Director of the Lehigh Valley Planning Commission, moderated the meeting, which included presentations of plan recommendations by both URDC and NRC, as well as comments from the audience.

## Site Characteristics

The Trexler-Lehigh County Game Preserve encompasses approximately 1,108 acres, divided into three distinct areas (Map 1.2): the North Range, the Central Range, and the South Range. The ecological inventory report prepared by the Wildlands Conservancy, notes the distinct character of each range, and the plan recognizes the character of each range:

---

<sup>9</sup> A complete list of interviewees appears in Appendix C of the master plan.



- The North Range (471.3 acres) is characterized by steep slopes and ridge tops that offer breathtaking views of surrounding land. At a point in the North Range, one can see both the Blue Mountain, to the north, and South Mountain, to the south, encompassing the entire width of the Lehigh Valley. Activity on the North Range has been relatively sparse. Therefore, the North Range should be open only for limited activity, primarily designed to allow users access to the outstanding scenery and natural setting of the range.
- The Central Range (538.5 acres) includes the pastures for the remaining bison, elk, and horses, the zoo, the pedestrian bridge across the Jordan Creek, the ford, and the picnic area. The Central Range has been the center of activity since Lehigh County began involvement in 1935 and is the focus of the site's identity for many, if not most, Lehigh County residents. Therefore, the Central Range should continue to be the focus of activity, including accessibility for the disabled.
- The South Range (98.6 acres) is both the smallest and the most ecologically sensitive portion of the site. The South Range has experienced the least amount of activity, which is due to the sensitive environmental conditions and which helps to maintain those same environmental conditions. The South Range is currently used for some limited biology assignments by a few faculty and students of the neighboring Lehigh-Carbon Community College. Therefore, the South Range should continue to be limited to the minimum amount of human intervention. Only authorized educational activities should be allowed.

One of the most visible characteristics of the TLCGP site is the poor condition of much of the land. Large areas of the North Range and Central Range are overgrown with Autumn Olive, an invasive, aggressive, exotic (not native) plant. The bison and elk pens are overgrazed. Deer roam freely, since the formerly captive herd has been assimilated into the native population, and cause additional damage for much of the foliage not decimated by the Autumn Olive invasion.

Lehigh County also owns five parcels immediately adjacent to the TLCGP property, encompassing approximately 400 acres (Map 1.2). One of the parcels contains the Lehigh County Solid Waste Recycling Center. Three of the parcels are leased to the Pennsylvania Game Commission as game lands for hunting.

The PMG spent considerable time in discussion about the future of the county-owned land adjacent to the site. The TLCGP is of immeasurable value not simply because of its history but as the largest public open space in the county. At a time when county population is rising and development continues at a rapid pace, the value of the site as open space is one its most important characteristics. Controlling an adjacent 400 acres of undeveloped land presents a significant opportunity. The plan, therefore, addresses the issue of the adjacent lands under county ownership even though the adjacent lands are not part of the TLCGP site.



## MASTER PLAN

The *Trexler-Lehigh County Game Preserve Master Plan* is built upon the ideas and concepts from the background activities. The Wildlands Conservancy ecological inventory, PMG meetings, field studies, interviews, and public meetings all contributed to establishing the direction of the master plan. Therefore, the plan begins with a vision. Subsequent sections include recommended trails, support facilities, policies, and considerations regarding implementation of the plan.

The *Trexler-Lehigh County Game Preserve Master Plan* provides complete guidance for the improvement of the TLCGP site, as follows:

- **Environment** — By reference, the plan incorporates the recommendations of the ecological inventory performed by Wildlands Conservancy.<sup>1</sup> The conservancy is also developing plans to address the issues of autumn olive and deer on the site.
- **Land Use** — The major portion of the plan provides recommendations for improvements to the site developed through URDC.
- **Wildlife** — The plan includes a study of the bison, elk, and horses to assess the appropriate place for the herds within the context of the proposed improvements. The study, performed by Natural Resource Consultants, Inc., specifically addresses the ecological and biological importance of the herds as related to General Trexler’s mission of species survival.

Each recommendation is identified for easy reference by letter(s) and number. Letter(s) refer to the subject of the recommendation as follows:

- |                |                           |                        |
|----------------|---------------------------|------------------------|
| • A Activities | • I Indoor Space          | • R Restrooms          |
| • E Entrances  | • J Jordan Creek Corridor | • RP Roads and Parking |
| • F Fences     | • M Management            | • T Trails             |
| • G Guide Rail | • N Name                  | • W Wildlife           |

The number of each recommendation is for identification only and does not necessarily represent the priority of the recommendation. Recommendations regarding capital improvements include cost estimates. At the direction of Lehigh County, costs are shown for capital improvements only up to the limit of approximately \$2.75 million, the amount of the agreement reached in response to the suit filed by the Harry C. Trexler Trust. The “Implementation” section of the plan includes information that might be used to identify future improvements in the event that Lehigh County wishes to continue improvements to the site beyond the required \$2.75 million.

---

<sup>1</sup> Appendix D contains a complete list of recommendations from the ecological inventory and assessment conducted by the Wildlands Conservancy.



## Vision for the Site

The population and development of Lehigh County are increasing. The Lehigh Valley Planning Commission projects that Lowhill and North Whitehall Townships, where the TLCGP is located, will increase in population from 16,600 in 2000 to 19,683 in 2010, an increase of 18.6 percent, which is more than three times the growth rate for Lehigh County (5.6 percent).

As population increases, open space becomes more and more scarce. Recognizing the value of open space, the needs of Lehigh County citizens, and the wishes of General Trexler, the *Trexler-Lehigh County Game Preserve Master Plan* includes the following vision for the future of the property:

**The Trexler-Lehigh County Game Preserve is a safe, public space that fosters an understanding of man's relationship with and impact upon the natural environment. The preserve is the focal point for land conservation efforts within the Jordan Creek watershed. The preserve protects and manages natural resources and offers appropriate educational and passive recreational opportunities for children and adults that promote:**

- 1. The physical, mental, and social well-being of people.**
- 2. The health, sustainability, and diversity of the natural environment.**
- 3. The responsible use of resources.**

**The game preserve is offered to the citizens of Lehigh County through the will of General Harry C. Trexler and with the support of government, business, educational, social, cultural, philanthropic, and environmental organizations.**

The vision statement provides the foundation for the plan (Map 2.1). The focus of the preserve is clearly the land and the natural environment. The term "passive" is not intended to imply a complete lack of activity, but rather the relationship of the activity to the land and the natural environment. Therefore, in addition to obvious activities, such as walking or hiking, "passive recreational opportunities" can include, for example:

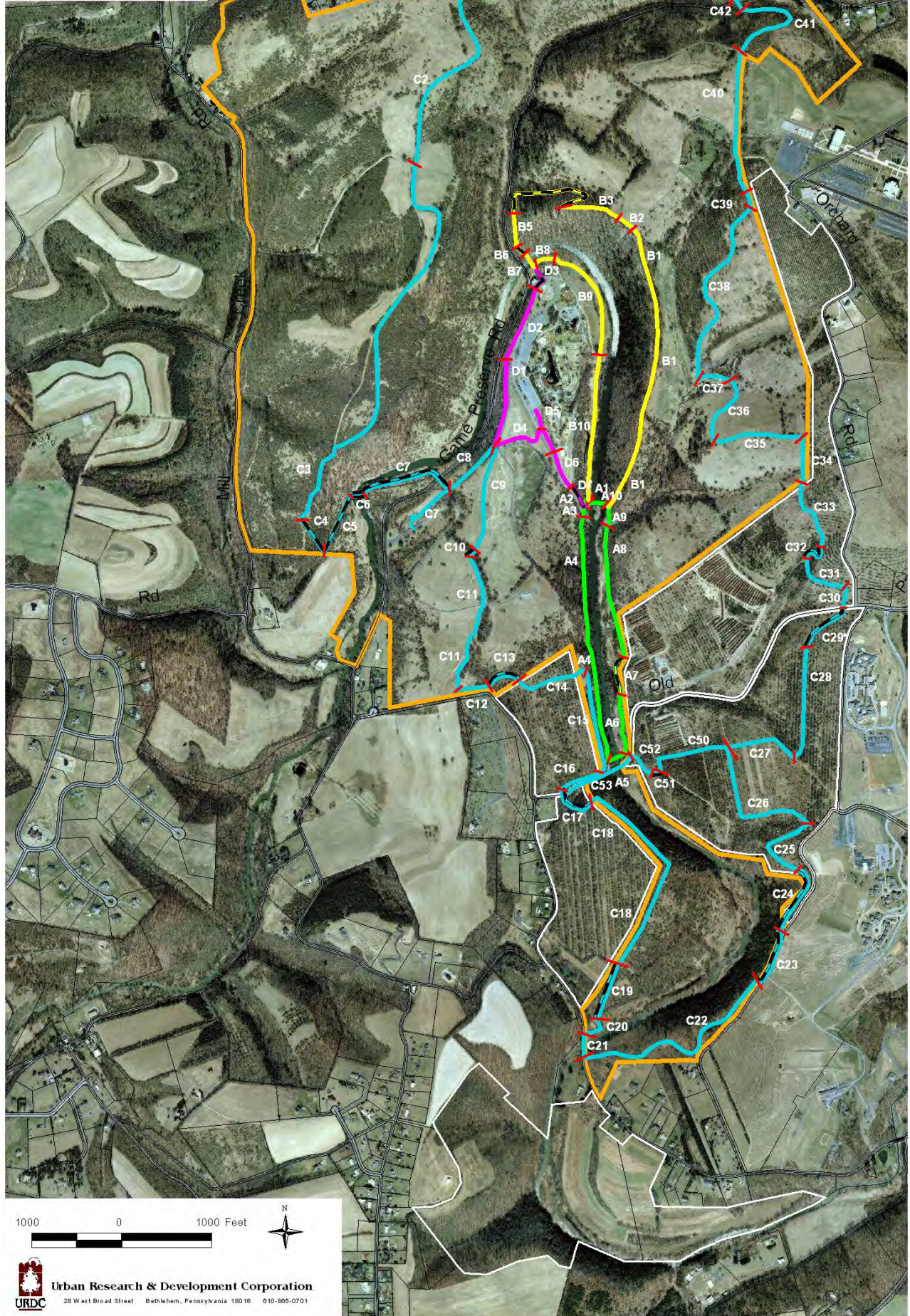
- Bicycling, but not extreme competitive bicycling events.
- Horseback riding, but not horse racing.
- Family picnicking, but not large-scale social events.

Furthermore, more active recreational pursuits involving significant modifications to the land, such as field/court sports, motor sports, and golf, are not consistent with the vision. The issue that should drive all decisions about activity at the preserve is the preservation of the land and the natural environment.



# Trexler - Lehigh County Game Preserve

## MAP 2.1 TRAIL SYSTEM



1000 0 1000 Feet



Urban Research & Development Corporation  
29 West Broad Street Bethlehem, Pennsylvania 18018 610-865-0701



## Recommended Trail System

The plan includes a trail system for the use of pedestrians (walkers, hikers, joggers), bicycles (including mountain bikes), and equestrians (Map 2.1). Each recommendation for the trail system includes information on the type of trail and rationale for the trail or trail segment, as well as cost estimates.

### ***Trails (T)–1: Build Trail A to handicapped accessible specifications.***

Trail A (Map 2.2) is the primary trail at the center of activity for the site. Trail A, approximately 1.2 miles in length, uses much of the alignment of the pathway currently known as the Covered Bridge Trail. Trail A should be a 12-foot wide gravel path for pedestrian use only. The trail should be built with the following characteristics to encourage use by the disabled community:

- Maximum slope of 5.0 percent.
- Firm and stable surface.
- No barriers on the trail.
- 12-foot width.

Other considerations for Trail A include:

- Make use of the pedestrian bridge over the Jordan Creek in segment A10.
- The west end of the pedestrian bridge (A1) will require a ramp for accessibility, which could be a wooden ramp to maintain the character of the bridge.
- Most of Trail A (segments A4 and A8) is currently an old road that needs upgrading, including a swale on the uphill side and pipes to carry storm water under the trail. The surface also needs to be stabilized.
- A trail bed must be constructed in segments A6 and A7 before laying the gravel surface.
- Segment A5 includes a pedestrian bridge upstream from Geiger’s Covered Bridge for safety to avoid pedestrians on the trail using a vehicular cartway (Old Packhouse Road).
- Trail A will be accessible from Old Packhouse Road (entrances E8 and E9), with a small, four-car gravel parking area at E9.
- Trail A should be built by a contractor instead of volunteers or other unpaid labor due to the large amount of grading and paving and use of heavy equipment required.
- The cost estimate for Trail A is \$401,465 (Table 2.1).

### ***T–2: Build segments D5, D6, and D7 to connect the zoo parking lot to the existing pedestrian bridge area.***

Trail segments D5, D6, and D7 (Map 2.2) form an important link between the zoo parking lot and Trail A at the covered bridge area. Segments D5 and D6 will be on or adjacent to an existing road. Segment D7 travels through a wooded area and down a slope. Therefore, segment D7 will require



the skill of a contractor with heavy equipment. Segments D5, D6, and D7 are anticipated to cost approximately \$22,040 (Table 2.2)

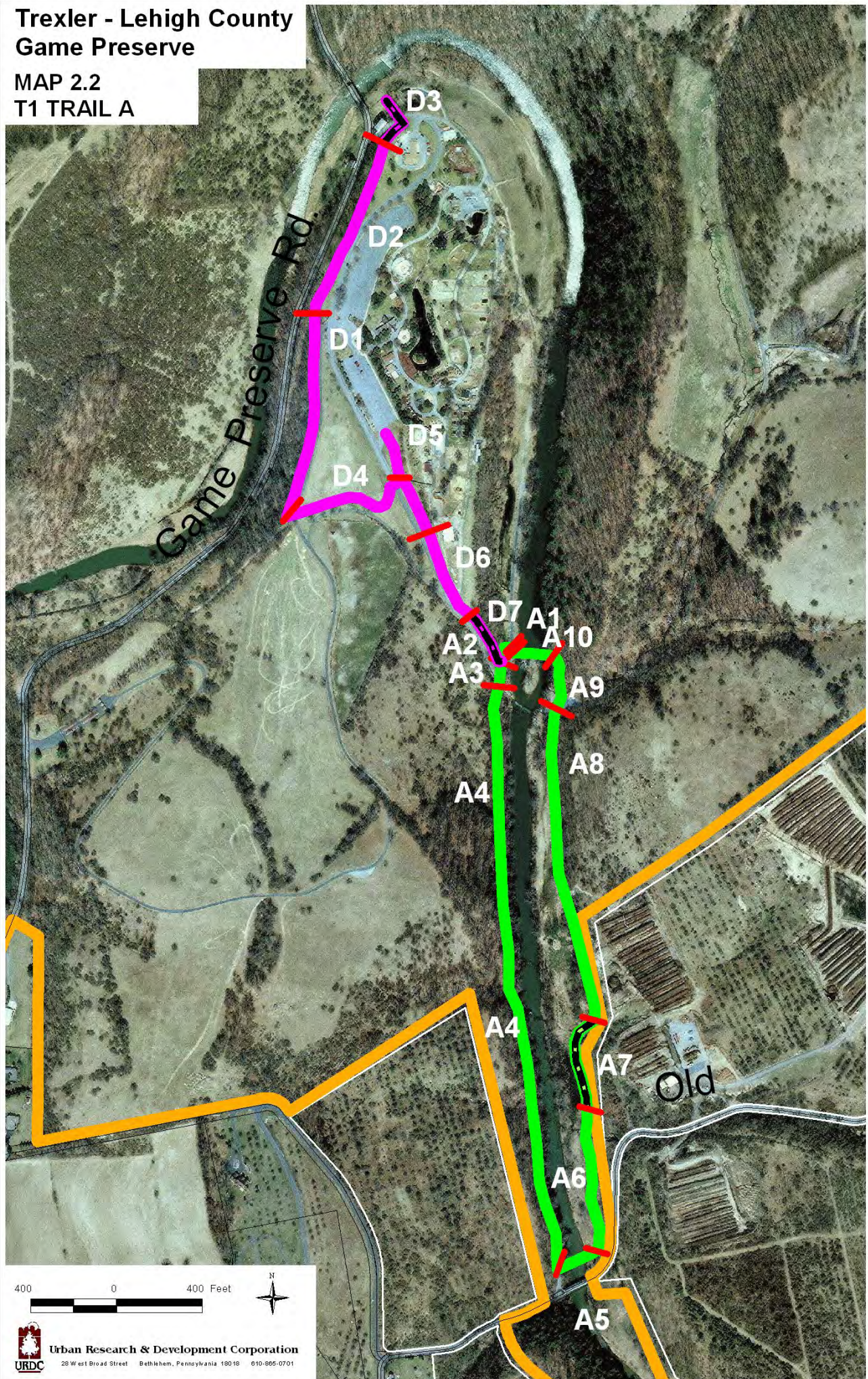
**Table 2.1  
Cost Estimate — Trail A**

<b>Segment</b>	<b>Length (ft.)</b>	<b>Work Description</b>	<b>Amount</b>	<b>Unit Cost</b>	<b>Unit</b>	<b>Cost</b>
A1	20	Handicapped ramp at bridge	1	\$15,000	ea	\$15,000
A2	96	Kiosk	1	\$2,000	ea	\$2,000
		12' gravel pave	96	\$17	lf	\$1,632
		12' grading and drainage	96	\$8	lf	\$768
A3	115	12' gravel pave	85	\$17	lf	\$1,445
		12' grading and drainage	85	\$20	lf	\$1,700
		Signs	2	\$200	ea	\$400
		Road crossing (1)	1	\$1,500	ea	\$1,500
A4	2,870	12' gravel pave	2,870	\$17	lf	\$48,790
		12' grading and drainage	2,870	\$8	lf	\$22,960
		Road crossing (2)	1	\$4,000	ea	\$4,000
A5	120	4' wide Pedestrien Bridge	1	\$200,000	ea	\$200,000
A6	800	Kiosk	1	\$2,000	ea	\$2,000
		12' gravel pave	800	\$17	lf	\$13,600
		12' grading and drainage	800	\$15	lf	\$12,000
		Road crossing (4)	1	\$4,000	ea	\$4,000
A7	460	12' gravel pave	460	\$17	lf	\$7,820
		12' grading & drainage	460	\$20	lf	\$9,200
A8	1,480	12' gravel pave	1,480	\$17	lf	\$25,160
		12' grading & drainage	1,480	\$8	lf	\$11,840
		Road crossing (2)	1	\$4,000	ea	\$4,000
A9	260	Kiosk	1	\$2,000		\$2,000
		12' gravel pave	230	\$17	lf	\$3,910
		12' grading & drainage	230	\$8	lf	\$1,840
		Signs	2	\$200	ea	\$400
		Road entrance (1)	1	\$1,500	ea	\$1,500
A10	200	Existing Bridge	0			
		Signs	10	\$200	ea	\$2,000
<b>Totals</b>	<b>6,421</b>	<b>(1.2 mi)</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>\$401,465</b>



**Trexler - Lehigh County  
Game Preserve**

**MAP 2.2  
T1 TRAIL A**



400 0 400 Feet



Urban Research & Development Corporation  
20 West Broad Street Bethlehem, Pennsylvania 18010 610-865-0701



**Table 2.2**  
**Cost Estimate — Trail Segments D5, D6, and D7**

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
D5	350	6' gravel pave	350	\$17	lf	\$ 5,950
		6' grading and drainage	350	\$8	lf	\$ 2,800
		Kiosk	1	\$200	ea	\$ 200
		Road Crossing (1)	1	\$1,500	ea	\$ 1,500
D6	600	Use Existing Road	0			\$ -
		Signs	4	\$200	ea	\$ 800
D7	270	6' gravel pave	270	\$12	lf	\$ 3,240
		6' grading and drainage	270	\$15	lf	\$ 4,050
		Kiosk	1	\$2,000	ea	\$ 2,000
		Road Crossing (1)	1	\$1,500	ea	\$ 1,500
<b>Totals</b>	<b>1,220</b>	<b>(0.23 mi.)</b>				<b>\$ 22,040</b>

***T3: Build Trail B.***

Trail B (Map 2.3), approximately 1.8 miles in length, should be a minimum 3.0 feet wide with a dirt or gravel surface. Located near the zoo in the Central Range, Trail B is for pedestrians only. The trail will make use of the existing pedestrian bridge (A10). Other characteristics of Trail B include:

- Segment B1 is already in use but may need some surface treatment.
- Segment B2 winds through the Central Range, providing outstanding views of the zoo and the surrounding area.
- Segments B3, B5, B9, and B10 are on existing paths that will need upgrading.
- Segment B4 passes through a wooded area and winds down a steep slope, which will require significant construction.
- Segment B6 is very steep and will require steps.
- Trail B requires crossing the Jordan Creek. Schlicher's Covered Bridge is owned by PennDOT, and permission to use the bridge as part of a pedestrian trail would be difficult, if not impossible, to obtain. Therefore, the plan includes a new pedestrian bridge across the Jordan slightly downstream from the covered bridge.
- The estimated cost for Trail B is \$230,314 (Table 2.3).

***T4: Build trail segments D2 and D3 to connect the zoo parking to the Game Preserve Road/covered bridge area.***

As with segments D5, D6, and D7 above, segments D2 and D3 (Map 2.3) serve primarily as connecting pieces of trail, rather than a separate and distinct trail. Segment D2 will be on a level area adjacent to the zoo parking lot. Segment D3 traverses a steep bank and will require much grading and/or steps. Segments D2 and D3 are estimated to cost approximately \$ 27,580 (Table 2.4).



**Table 2.3**  
**Cost Estimate — Trail B**

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
B1	3,240	Clear Vegetation (25%)	810	\$1	lf	\$ 810
		3' gravel pave (5%)	162	\$8	lf	\$ 1,296
		3' grade & drain (5%)	162	\$3	lf	\$ 486
B2	170	Paved Roadway (existing)	0			
B3	680	Clear Vegetation	680	\$1	lf	\$ 680
		3' gravel pave (5%)	34	\$8	lf	\$ 272
		3' grade & drain (5%)	34	\$3	lf	\$ 102
B4	1,320	Clear Vegetation	1,320	\$1	lf	\$ 1,320
		3' gravel pave (70%)	924	\$8	lf	\$ 7,392
		3' grade & drain (70%)	924	\$6	lf	\$ 5,544
B5	370	Clear Vegetation	370	\$1	lf	\$ 370
		3' gravel pave (10%)	37	\$8	lf	\$ 296
		3' grade & drain (10%)	37	\$3	lf	\$ 111
B6	100	Steps	100	\$100	lf	\$ 10,000
B7	100	4" Pedestrian	1	\$180,000	ea	\$ 180,000
B8	430	Clear Vegetation	430	\$1	lf	\$ 430
		3' gravel pave	430	\$8	lf	\$ 3,440
		3' grade & drain	430	\$3	lf	\$ 1,290
B9	1,300	6' gravel pave (25%)	325	\$8	lf	\$ 2,600
		6' grade & drain (25%)	325	\$3	lf	\$ 975
		Road Entrance (3)	1	\$4,500	ea	\$ 4,500
B10	1,630	Up-grade Existing Road (25%)	400	\$17	lf	\$ 6,800
		Signs	8	\$200	ea	\$ 1,600
<b>Total</b>	<b>7,710</b>	<b>(1.8mi)</b>				<b>\$ 230,314</b>

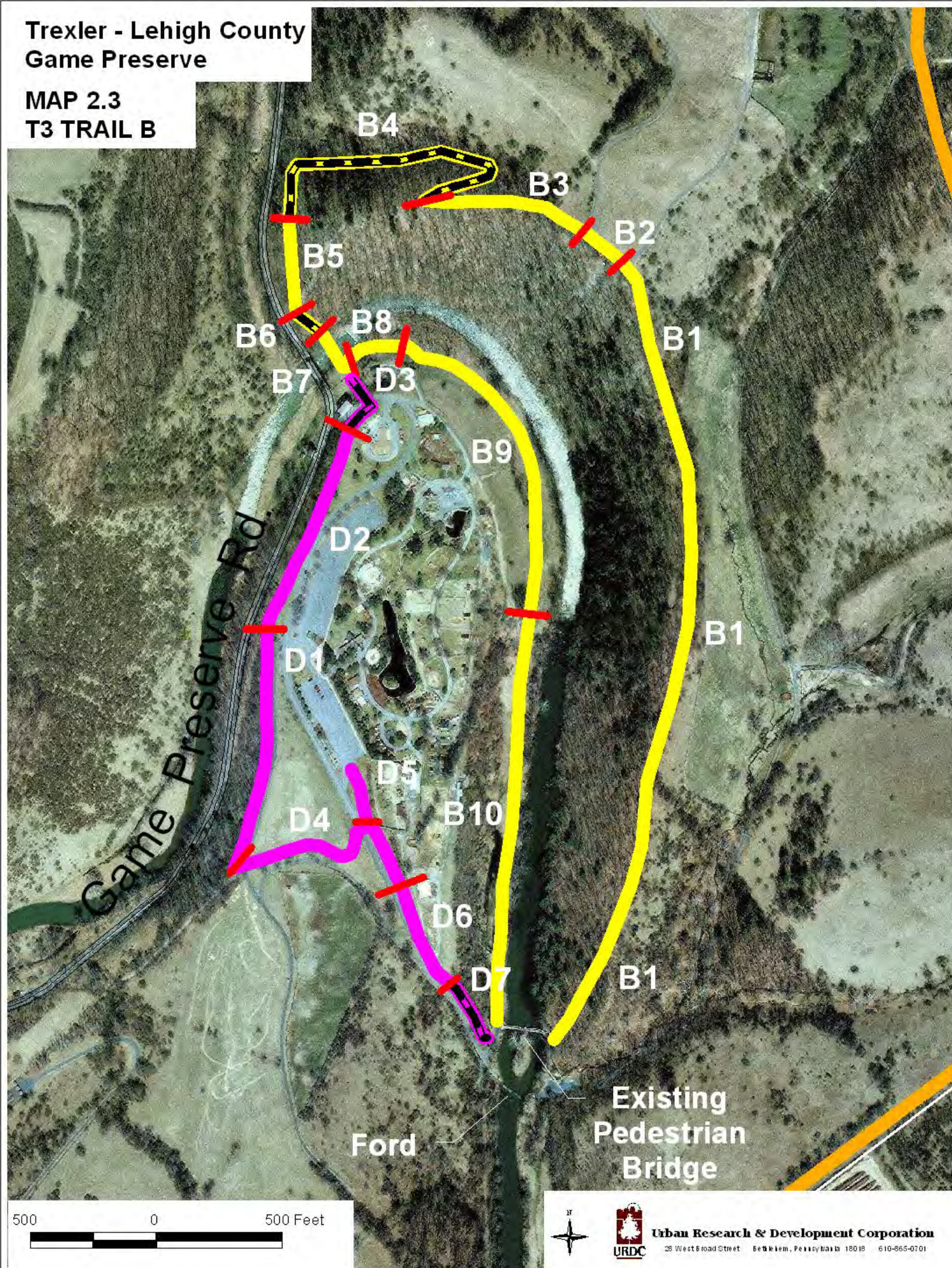
**Table 2.4**  
**Cost Estimate — Trail Segments D2 and D3**

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
D2	900	6' gravel pave	900	\$12	LF	\$ 10,800
		6' grading and drainage	900	\$5	LF	\$ 4,500
		Road Crossing (1)	1	\$1,500	ea	\$ 1,500
		Sings	4	\$200	ea	\$ 800
D3	260	6' gravel pave	240	\$12	LF	\$ 2,880
		6' grading and drainage	240	\$15	LF	\$ 3,600
		Steps	20	\$100	LF	\$ 2,000
		Road Crossing (1)	1	\$1,500	ea	\$ 1,500
<b>Totals</b>	<b>3,980</b>	<b>0.75 mi.</b>				<b>\$ 27,580</b>



**Trexler - Lehigh County  
Game Preserve**

**MAP 2.3  
T3 TRAIL B**





***T5: Build Trail C, the Loop Trail.***

Trail C (Map 2.4) is an 8.3-mile trail stretching around the entire TLCGP property. Trail C will generally range from 6–12 feet in width, narrowing to a 3-foot path in some steep areas. The Loop Trail should be open to pedestrians, bikes, and horses.

In order to complete the Loop Trail, some portions must be located off the TLCGP site and onto the adjacent county lands. The use of adjacent county lands is consistent with the plan’s vision of land preservation explained earlier. Plans for the Jordan Creek Greenway will also require the use of county lands adjacent to the TLCGP site.

On the west side of the Jordan Creek, segment C14 must cross onto adjacent county land to provide a buffer for the existing wildlife viewing station. Steep slopes prohibit a trail across Old Packhouse Road west of Geiger’s Covered Bridge on TLCGP land. The crossing can be made over smaller slopes at a point further west along Old Packhouse Road (segments C16 and C17). Furthermore, the TLCGP site is very narrow and steep east of the Jordan Creek, also prohibiting a trail crossing.

Segments C24 through C29 and C50 through C53 are located on adjacent county lands. Without the use of adjacent county lands, the Loop Trail cannot be completed.

The length of the Loop Trail, 8.3 miles, is important for the equestrian community. According to the equestrian representatives interviewed, any trails of less than approximately 8–10 miles will not attract significant equestrian use because of the work entailed in transporting the horse. The interviewees were excited about the Loop Trail, not only for its length, but for the outstanding views along the path and interesting character in the wooded areas.

Other considerations for Trail C include:

- The Loop Trail requires two bridges for stream crossings: segment C6 over the Jordan Creek and segment C42 over a small tributary of the Jordan Creek near the Central Range exit onto Game Preserve Road.
- Segments C1 and C2 are an existing, overgrown road bed originally constructed by the Civilian Conservation Corps (CCC). The structure is in excellent condition and needs very little work to be opened as a trail.
- A contractor will be required to complete several steep segments including C4, C5, C13, C23, and C41.
- Section C23 is on the South Range of the TLCGP site. The land between the TLCGP property line and the Jordan Creek is very steep. A site survey must be performed to determine the amount of flat area at the top of the slope that is available for the trail. Building the trail across the slope may require a retaining wall on the low side of the trail to create sufficient width for the trail.



- The cost estimate for Trail C, the Loop Trail, is \$1,187,108 (Table 2.5). No funding is available to construct the segments on adjacent county land, which must, therefore, be constructed with volunteers.

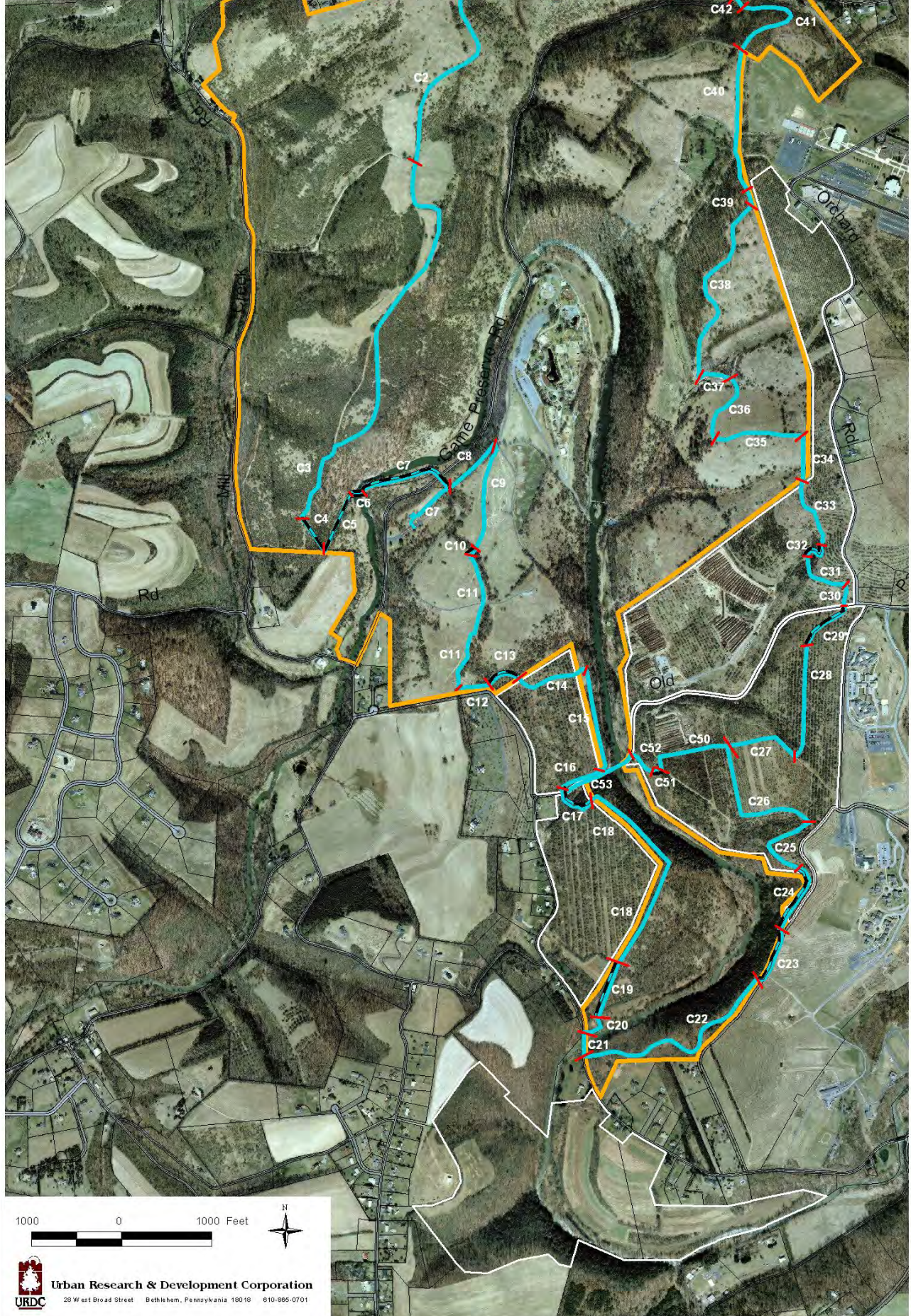
**Table 2.5**  
**Cost Estimate — Trail C**

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
C1	4,420	Mow	4,420	\$1	lf	\$ 4,420
		12' gravel pave	4,420	\$17	lf	\$ 75,140
		12' grade and drain (10%)	442	\$8	lf	\$ 3,536
C2	2,350	Clear Vegetation	2,350	\$1		\$ 2,350
		Mow	2,350	\$1	lf	\$ 2,350
		12' gravel pave	2,350	\$17	lf	\$ 39,950
		12' grade and drain (10%)	235	\$8	lf	\$ 1,880
C3	5,090	Clear Vegetation	5,090	\$5		\$ 25,450
		6' gravel pave (40%)	2,036	\$12	lf	\$ 24,432
		6' grade and drain (40%)	2,036	\$5	lf	\$ 10,180
C4	400	Clear Vegetation	400	\$5	lf	\$ 2,000
		6' gravel pave	400	\$12	lf	\$ 4,800
		6' grade and drain	400	\$15	lf	\$ 6,000
C5	700	Clear Vegetation	700	\$5		\$ 3,500
		6' gravel pave	700	\$12	lf	\$ 8,400
		6' grade and drain	700	\$15	lf	\$ 10,500
C6	150	Pedestrian Bridge 8' wide	1	\$350,000	ea	\$ 350,000
C7	1,080	Clear & Grub Trees	1	\$10,000	ac	\$ 5,000
		6' gravel pave	1,080	\$12	lf	\$ 12,960
		6' grade and drain	1,080	\$15	lf	\$ 16,200
		Road crossing (2)	2	\$4,000	ea	\$ 8,000
C8	700	6' gravel pave	700	\$12	lf	\$ 8,400
		6' grade and drain (50%)	350	\$5	lf	\$ 1,750
		Road crossing (1)	1	\$1,500	ea	\$ 1,500
C9	1,200	6' gravel pave	1,200	\$12	lf	\$ 14,400
		6' grade and drain	1,200	\$8	lf	\$ 9,600
C10	100	6' gravel pave	100	\$12	lf	\$ 1,200
		6' grade and drain swale cross	100	\$50	lf	\$ 5,000
C11	1,600	6' gravel pave	1,600	\$12	lf	\$ 19,200
		6' grade and drain	1,600	\$8	lf	\$ 12,800
		Road crossing (1)	2	\$1,500	ea	\$ 3,000
C12	340	Clear & Grub Trees	0	\$10,000	ac	\$ 1,000



# Trexler - Lehigh County Game Preserve

## MAP 2.4 T5 TRAIL C





♣ Trexler-Lehigh County Game Preserve Master Plan ♣

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
		6' gravel pave	340	\$12	lf	\$ 4,080
		6' grade and drain	340	\$8	lf	\$ 2,720
C13	330	Clear and Grub Trees	0	\$10,000	ac	\$ 2,000
		3' gravel pave	330	\$8	lf	\$ 2,640
		3' grade and drain	330	\$25	lf	\$ 8,250
C14	780	Clear & Grub Trees	0	\$10,000	ac	adjacent land
		Mow, 6' (50%)	370	\$1	lf	adjacent land
		6' Gravel pave (50%)	370	\$12	lf	adjacent land
		6' grade and drain (50%)	370	\$5	lf	adjacent land
C15	1,100	Clear Vegetation	1,100	\$1	lf	\$ 1,100
		6' Gravel pave (50%)	550	\$12		\$ 6,600
		6' grade and drain (50%)	550	\$5	lf	\$ 2,750
C16	500	Clear Vegetation	500	\$1	lf	adjacent land
		Mow, 6'	500	\$1	lf	adjacent land
C17	370	Clear and Grub Trees (50%)	0	\$10,000	ac	adjacent land
		6' gravel pave	370	\$12	lf	adjacent land
		6' grade and drain	370	\$15	lf	adjacent land
		Stream Crossing	1	\$10,000	ea	adjacent land
		Road crossing (2)	2	\$4,000	ea	adjacent land
C18	2,300	Clear & Grub Trees	2	\$10,000	ac	\$ 16,000
		6' gravel pave	2,300	\$12	lf	\$ 27,600
		6' grade and drain	2,300	\$5	lf	\$ 11,500
C19	650	Clear and Grub Trees	0	\$20,000	ac	\$ 8,000
		3' gravel pave	650	\$8	lf	\$ 5,200
		3' grade and drain	650	\$20	lf	\$ 13,000
C20	315	Clear Vegetation	315	\$1	lf	\$ 315
		6' gravel pave	315	\$12	lf	\$ 3,780
		6' grade and drain	315	\$8	lf	\$ 2,520
		Road Cross. ( see Ent. Costs)				\$ -
C21	260	Existing Road & Bridge	0			\$ -
C22	2,440	Clear Vegetation	2,440	\$1	lf	\$ 2,440
		6' gravel pave	2,440	\$12	lf	\$ 29,280
		6' grade and drain	2,445	\$5	lf	\$ 12,225
		Road Cross. ( see Ent. Costs)	1	\$1,000	ea	\$ 1,000
C23	670	Clear & Grub Trees	1	\$10,000	ac	\$ 6,000
		Retaining Wall pathway	670	\$100	lf	\$ 67,000
C24	810	Clear Vegetation	810	\$1	lf	adjacent land
		6' gravel pave	810	\$12	lf	adjacent land



♣ Trexler-Lehigh County Game Preserve Master Plan ♣

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
		6' grade and drain	810	\$8	lf	adjacent land
C25	950	Clear Vegetation	950	\$1	lf	adjacent land
		Mow, 6' (50%)	475	\$1	lf	adjacent land
		6' gravel pave (50%)	475	\$12	lf	adjacent land
		6' grade and drain (50%)	475	\$8	lf	adjacent land
C26	1,570	Existing Mowed Path	0			\$ -
C27	800	Existing Mowed Path	0			\$ -
C28	1,260	Clear Vegetation	1,260	\$3	lf	adjacent land
		Mow, 6'	1,260	\$2	lf	adjacent land
C29	640	Clear Vegetation	640	\$3		adjacent land
		6' gravel pave	640	\$12	lf	adjacent land
		6' grade and drain	640	\$8	lf	adjacent land
		Road crossing (2)	1	\$4,000	ea	adjacent land
C30	240	Clear Vegetation	240	\$2	lf	adjacent land
		6' gravel pave	240	\$12	lf	adjacent land
		6' grade and drain	240	\$8	lf	adjacent land
		Road crossing (2)	1	\$4,000	ea	adjacent land
C31	625	Existing Path	0			\$ -
C32	325	Clear Vegetation	325	\$2	lf	adjacent land
		6' gravel pave	325	\$12	lf	adjacent land
		6' grade and drain	325	\$15	lf	adjacent land
C33	780	Clear Vegetation	780	\$2	lf	adjacent land
		Mow, 6' (50%)	390	\$3	lf	adjacent land
		6' gravel pave (50%)	390	\$12	lf	adjacent land
		6' grade and drain (50%)	390	\$5	lf	adjacent land
C34	500	Mow, 6'	500	\$1	lf	\$ 500
		6' gravel pave (25%)	125	\$12	lf	\$ 1,500
		6' grade and drain (25%)	125	\$5	lf	\$ 625
C35	1,000	Existing Path	0			\$ -
C36	900	Mow, 6' (50%)	450	\$1	lf	\$ 450
		6' gravel pave (50%)	450	\$12	lf	\$ 5,400
		6' grade and drain (50%)	450	\$8	lf	\$ 3,600
C37	400	Existing Path (50%)	200	\$0		\$ -
		6' gravel pave (50%)	200	\$12	lf	\$ 2,400
		6' grade and drain (50%)	200	\$5	lf	\$ 1,000
C38	2,200	Mow, 6' (50%)	1,100	\$1	lf	\$ 1,100
		6' gravel pave (50%)	1,100	\$12	lf	\$ 13,200
		6' grade and drain (50%)	1,100	\$5	lf	\$ 5,500



Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
C39	215	Clear Vegetation	215	\$2	lf	\$ 430
		6' gravel pave	215	\$12	lf	\$ 2,580
		6' grade and drain	215	\$5	lf	\$ 1,075
C40	1,570	Clear Vegetation, Exist. Path	1,570	\$1	lf	\$ 1,570
		6' gravel pave (50%)	3,140	\$12	lf	\$ 37,680
		6' grade and drain (50%)	3,140	\$5	lf	\$ 15,700
		Road crossing (1)	1	\$1,500	ea	\$ 1,500
C41	1,200	Clear & Grub Trees	1	\$10,000	ac	\$ 11,000
		6' gravel pave	1,200	\$12	lf	\$ 14,400
		6' grade and drain	1,200	\$20	lf	\$ 24,000
		Road crossing (1)	1	\$1,000	ea	\$ 1,000
C42	60	8' Pedestrian Bridge	110,000	\$1	ea	\$ 110,000
<b>Totals</b>	<b>43.890</b>	<b>(8.3mi)</b>				<b>\$1,187,108</b>

**T6: Build Trail Segments D1 and D4.**

As above, segments D1 and D4 (Map 2.3) serve as connecting pieces of the system, rather than a separate trail. Segments D1 and D4 should be pedestrian paths 6–12 feet in width. The estimated cost for segments D1 and D4 is \$33,800 (Table 2.6).

Table 2.6  
**Cost Estimate — Trail Segments D1 and D4**

Segment	Length (ft.)	Work Description	Amount	Unit Cost	Unit	Cost
D1	950	6' gravel pave	950	\$12	LF	\$ 11,400
		6' grading and drainage	950	\$5	LF	\$ 4,750
		Kiosk	1	\$2,000	ea	\$ 2,000
		Sings	4	\$200	ea	\$ 800
D4	650	6' gravel pave	650	\$12	LF	\$ 7,800
		6' grading and drainage	650	\$5	LF	\$ 3,250
		Sings	4	\$200	ea	\$ 800
		Road Crossings (1)	2	\$1,500	ea	\$ 3,000
<b>Totals</b>	<b>1,600</b>	<b>(0.3 mi.)</b>	<b>—</b>	<b>—</b>		<b>\$33,800</b>

**Additional Trail Construction Notes**

- Trail construction can be done by contractor or volunteers. Cost estimates assume contractor construction.



- Construction must comply with erosion and sedimentation (E&S) control plans and procedures regardless of construction mode (contractor or volunteers). A plan must be available on-site. Review and approval of E&S plans by the Lehigh County Conservation District may be required before construction begins. The plans will require that all surfaces disturbed by grading be stabilized with crushed stone on the pathways and seeding on the side areas. Any seeded areas on slopes will require erosion matting.
- The plan proposes four pedestrian bridges, one each on Trails A and B and two on Trail C. The area of a proposed bridge must be surveyed to determine the exact location of the stream to be crossed and the surrounding area. Soils, wetlands, and other features must be mapped and analyzed to determine the exact location and size of the bridge piers. State and federal permits may also be required.

## **Recommended Support Facilities**

Support facilities for the trail system on the TLCGP site include:

- Entrances
- Roads and Parking
- Restrooms
- Fences
- Guide Rail

### ***Entrances (E)–I: North Range—Open an entrance to the proposed North Range parking area from Mill Creek Road.***

The entrance from Mill Creek Road is the only new entrance to the TLCGP site proposed in the plan and the only entrance proposed to the North Range. The location of the proposed entrance to the North Range (Map 2.5) is SR 4009, Seq 0030, offset 1279. The posted speed limit is 30 mph. The existing sight distance (Figure 2.1) is:

- Left: 103 L.F. – 4%
- Right: 500 L.F. + 1%

PennDOT required sight distance at 30 mph is:

- Left: 207 L.F.
- Right: 194 L.F.

To the left (south), an 8–10 foot bank must be removed to create the required sight distance. After the bank is removed, sight distance could be lengthened to approximately 500 feet. The bank is tree-



# Trexler - Lehigh County Game Preserve

## MAP 2.5 ENTRANCE & PARKING PLAN

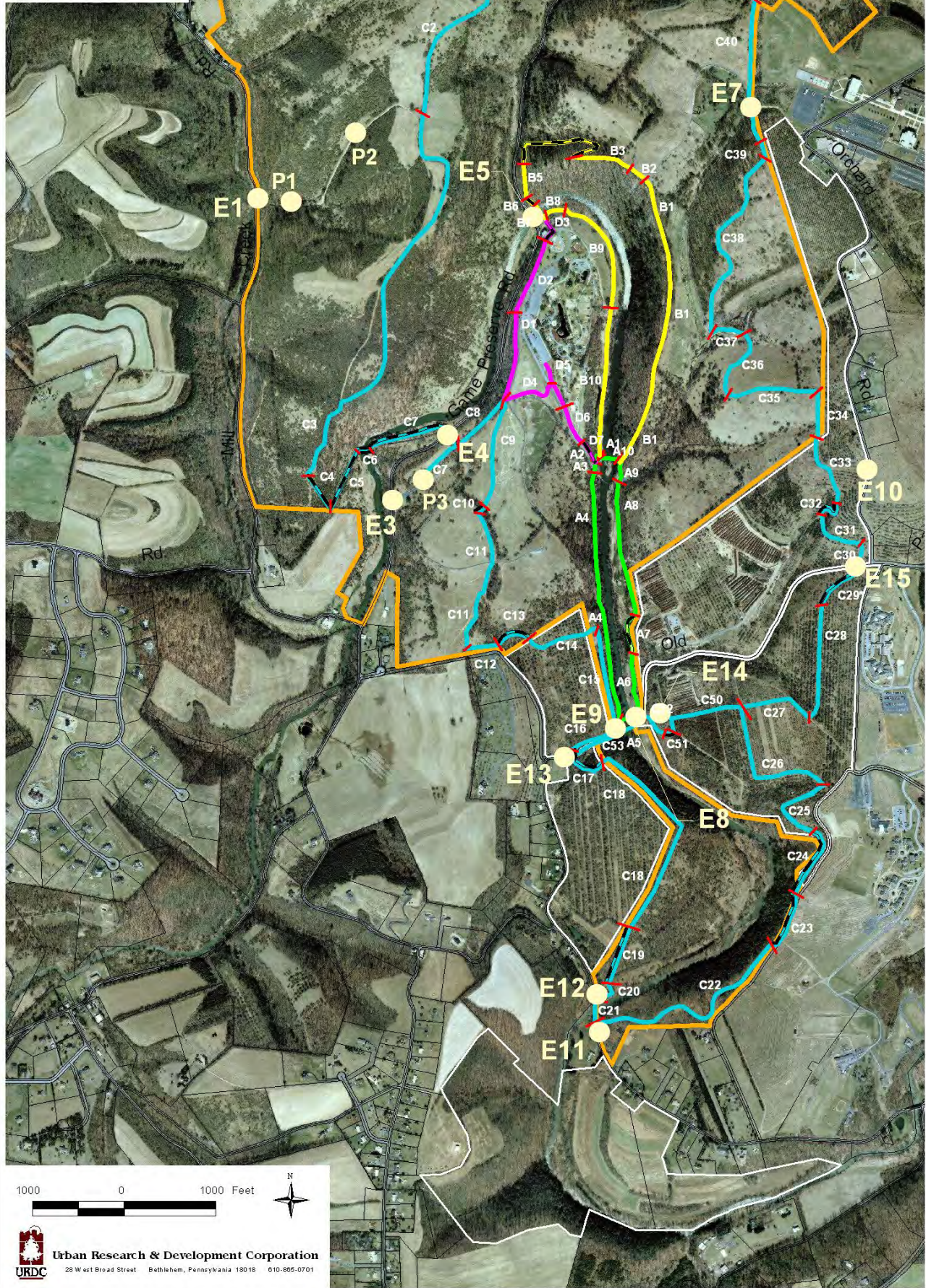




Figure 2.1  
E1 Mill Creek Rd., North



Sight Distance Left





Sight Distance Right



covered shale, which appears to be machine-rippable without blasting. The bank must be restored after earth removal is completed, including placement of topsoil and vegetation.

To the right (north) is an S-curve with good sight distance. The sight distance is not affected by an existing earth mound with a large tree on top. Removed earth could be used to level the proposed parking area in the North Range and to create earth mound lookout areas along trails in the North Range.

Both a PennDOT Highway Occupancy Permit and an E&S plan will be required for the North Range entrance. Each item should be prepared by a professional engineer or landscape architect. The estimated cost for the Mill Creek Road entrance is \$29,400, as follows:

Earthwork	\$14,000
Planting and Topsoil	\$1,000
Road Shoulder Improvements	\$3,000
Traffic Controls	\$500
Entrance Gate	\$2,000
Entrance Sign	\$1,500
Plans and Approvals (20% approximation)	\$3,700
Contingency (20%)	\$3,700
<hr/>	
<b>Total</b>	<b>\$29,400</b>

***E-2: North Range—Add a trail entrance and a four-car gravel parking area off Game Preserve Road where the Civilian Conservation Corps pathway begins.***

The location of the proposed trail entrance (Map 2.5) is SR 4009, Seq 0100, offset (not available). The posted speed limit is 35 mph. The existing sight distance (Figure 2.2) is:

<i>West Side</i>	<i>East Side</i>
• Left: 414 L.F. + 4%	• Left: 320 L.F. – 2%
• Right: 260 L.F. – 2%	• Right: 371 L.F. + 4%

PennDOT required sight distance at 35 mph is:

• Left: 236 L.F.	• 256 L.F.
• Right: 256 L.F.	• 236 L.F.

The proposed pathway crossing at E2 meets sight distance requirements. Sight distances could be increased by removing trees to the right on the west side and to the right on the east side. Currently, the best site for a pathway on the east side of the road is 43 L.F. north of the entrance to the CCC road. PennDOT may require realignment to a perpendicular crossing.



A Highway Occupancy Agreement (HOA) from PennDOT will be required for the entrance on the east side. On the west side, the small (4-car) parking area and the maintenance/emergency access will require a Highway Occupancy Permit (HOP) from PennDOT.

The west side entrance will conform to Detail 3, entitled “road entrance with parking”. The east side entrance will conform to Detail 1, entitled “road crossing with ballard”.<sup>2</sup> Estimated cost for the entrance at E2 is \$6,500, as follows:

Paving of shoulders	\$3,000
Traffic Controls	\$500
Plans and Approvals (20% approximation)	\$2,000
Contingency (20%)	\$1,000
<b>Total</b>	<b>\$6,500</b>

***E3:    Central Range—Upgrade the main entrance from Game Preserve Road to meet PennDOT standards.***

The location of the main entrance to the TLCGP site (Map 2.5) is SR 4007, Seq 0070, offset 1480. The posted speed limit is 35 mph. The existing sight distance at the main entrance (Figure 2.3) is:

<i>at main entrance</i>	<i>35 feet south of entrance (offset 1,445)</i>
• Left: 180 L.F.    + 3%	• Left: 700 L.F.
• Right: 250 L.F.    + 5%	• Right: 285 L.F.

PennDOT required sight distance at 35 mph is:

- Left: 239 L.F.
- Right: 233 L.F.

The main entrance at the current location does not meet PennDOT requirements for sight distance. Moving the centerline of the entrance 35 feet to the south gains sight over an existing knoll, greatly increasing the sight distance. In addition, the paving at the entrance is now 50 feet wide, but PennDOT allows a paved area only 24 feet wide for the existing type of entrance. Therefore, both the centerline and the paved area must be reconfigured. The estimated cost for the necessary improvements is \$25,500, as follows:

---

<sup>2</sup> All details appear in Appendix E of the plan.



Figure 2.2  
E2 Pathway at CCC Rd, West



Sight Distance Left





Sight Distance Right



Figure 2.3  
E2 Pathway at CCC Rd, East



Sight Distance Left





Sight Distance Right



Remove Paving	\$2,000
Regrade Entrance	\$7,000
Pave New Entrance	\$6,000
Pave Shoulders	\$3,000
Traffic Controls	\$500
Plans and Approvals (20% approximation)	\$3,500
Contingency (20%)	\$3,500
<hr/>	
<b>Total</b>	<b>\$25,500</b>

***E4:   Central Range—Add a trail crossing (Trail C) north of the main entrance from the Central Range to the North Range.***

The location of the proposed trail crossing (Map 2.5) is SR 4007, Seq (not available), offset (not available). The posted speed limit is 35 mph. The existing sight distance (Figure 2.4) is:

- Left:   506 L.F.   0% (west side)
- Right: 320 L.F.   + 1% (west side)

PennDOT required sight distance at 35 mph is:

- Left:   249 L.F.
- Right: 245 L.F.

The proposed crossing meets sight distance requirements in both directions. Sight distance to the left (north) is restricted by trees and other vegetation. Sight distance to the right (south) is restricted by an existing garage. The estimated cost for improvements is \$6,000, as follows:

Pave Shoulders	\$3,000
Traffic Controls	\$500
Plans and Approvals	\$2,000
Contingency (20%)	\$1,000
<hr/>	
<b>Total</b>	<b>\$6,000</b>

***E5:   Central Range — Rebuild the entrance at Schlicher’s Covered Bridge.***

The entrance at Schlicher’s Covered Bridge is critical for current and future activities at the TLCGP site. The location is used regularly by zoo staff as an entrance and exit. In addition, the entrance is used by zoo visitors as an exit when high water levels prohibit using the ford to cross the Jordan Creek.

The location of the covered bridge entrance (Map 2.5) is SR 4007, Seq 0080, offset 2158. The posted speed limit is 35 mph. The existing sight distance (Figures 2.5 and 2.6) is:



- Left: 242 L.F.
- Right: 135 L.F.

PennDOT required sight distance at 35 mph is:

- Left: 265 L.F.
- Right: 256 L.F.

The sight distance at the current driveway is insufficient. The plan identifies three options to address the situation (Map 2.6).

Option 1: Remove the existing barn adjacent to the entrance and realign the driveway approximately 66 feet closer to the covered bridge. Option 1 allows for clear sight distance through the covered bridge (Figure 2.5).

Advantages:    –    Less cost.  
                           –    Minimal site disruption.  
                           –    No change to the interior traffic flow of the site.

Disadvantage: –    Loss of barn for storage and aesthetics.

The estimated cost for Option 1 is \$70,000, as follows:

Remove Barn	\$20,000
Earthwork and Grading	\$20,000
Pave New Entrance	\$10,000
Pave Shoulders	\$3,000
Traffic Controls	\$1,000
Plans and Approvals (15% approximation)	\$8,000
Contingency (15%)	\$8,000
<hr style="border-top: 3px double #000;"/>	
<b>Total</b>	<b>\$70,000</b>

Option 2: Close and abandon the entrance at the covered bridge. Widen the existing road leading to the zoo parking lot. Build a new road on the old road bed to the main entrance along Game Preserve Road. Allow two-way traffic on the new road to permit exiting from the zoo during high water conditions.

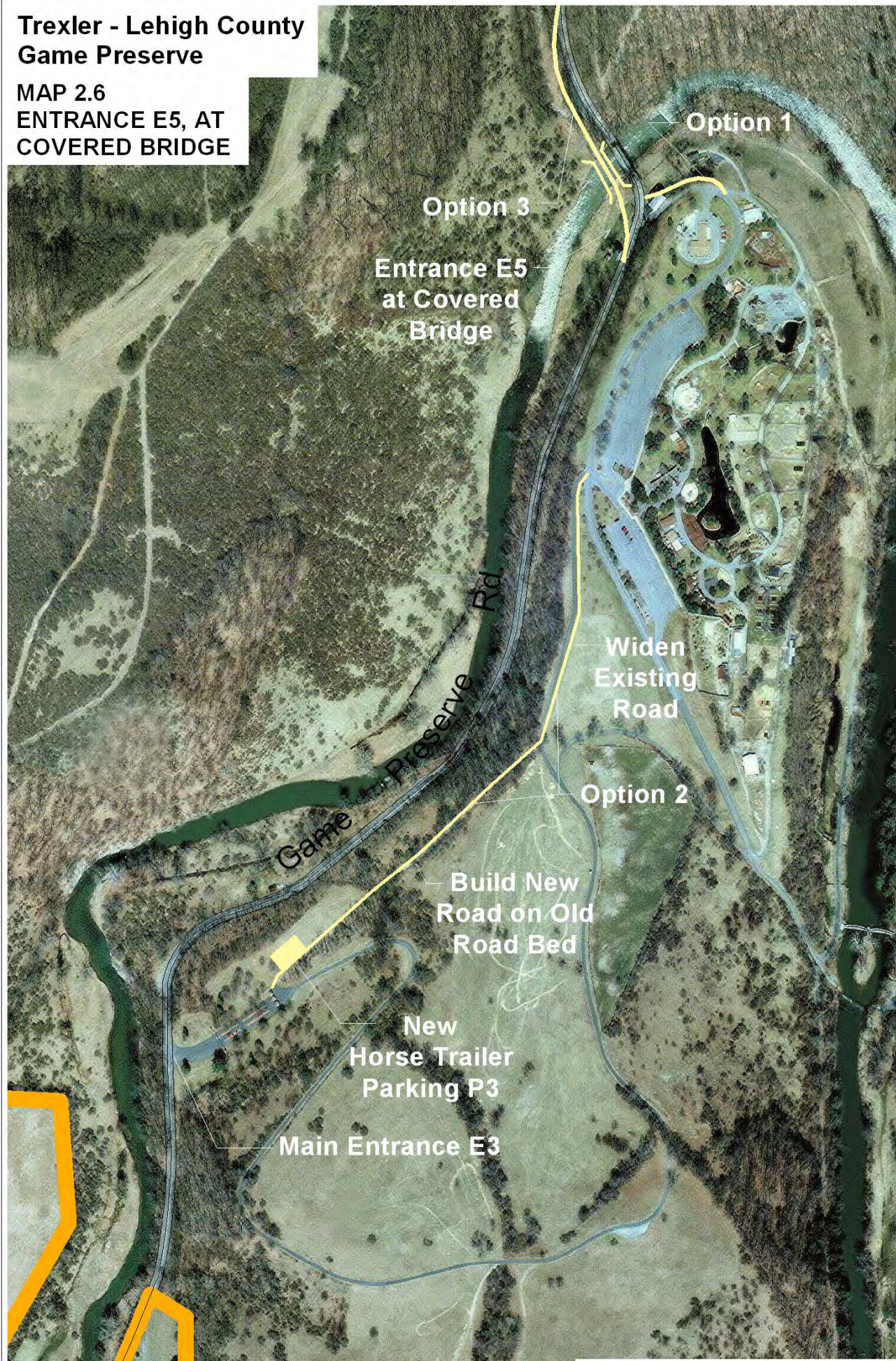
Advantages:    –    Allows more options for exiting the zoo.  
                           –    Shorter than current road, requiring less winter maintenance.

Disadvantages:    –    Higher cost than option 1.  
                           –    More road to maintain overall.  
                           –    New road creates a longer distance for zoo employees to travel into the zoo from PA 309.



# Trexler - Lehigh County Game Preserve

MAP 2.6  
ENTRANCE E5, AT  
COVERED BRIDGE



300 0 300 Feet



Urban Research & Development Corporation  
28 West Broad Street Bethlehem, Pennsylvania 18018 610-865-0701



# Figure 2.4 E3 Main Entrance



Sight Distance Left





Sight Distance Right





Figure 2.5  
E4 Trail C Crossing

Sight Distance-Left





Sight Distance Right



Figure 2.6  
E5 Covered Bridge Entrance



Sight Distance Left  
at New Drive Location







The estimated cost for Option 2 is \$118,750, as follows:

Widen Existing Road (1,000 L.F. @ \$18/L.F.)	\$18,000
Build New Road on Slope (750 L.F. @ \$70/L.F.)	\$52,500
Build New Road in Field (450 L.F. @ \$45/L.F.)	\$20,250
Plans (15% approximation)	\$14,000
Contingency (15% approximation)	\$14,000
<b>Total</b>	<b>\$118,750</b>

Option 3: Negotiate with PennDOT to have the state build a bypass around the covered bridge with a new vehicular bridge across Jordan Creek, then abandon the covered bridge. Realignment of the entrance with proper sight distance would be possible without removing the barn. Negotiations should result in PennDOT paying all or most of the cost. PennDOT representatives expressed an interest in the project if the county is willing to take responsibility for the covered bridge.

Advantages: – Barn is maintained.  
– Covered bridge is a unique attraction on the trail.

Disadvantages: – Potentially long period for negotiations with PennDOT. The project is not in PennDOT's current plans and programs.

The cost for Option 3 is unknown.

***E6: Central Range—Upgrade the exit at the north end of the site to PennDOT standards.***

The location of the north exit onto Game Preserve Road (Map 2.5) is SR 4007, Seq 0110, Offset 0556. The posted speed limit is 35 mph. The existing sight distance (Figure 2.7) is:

- Left: 406 L.F. + 2%
- Right: 332 L.F. – 5%

PennDOT required sight distance is:

- Left: 242 L.F.
- Right: 269 L.F.

The proposed crossing meets sight distance requirements in both directions. Sight distance to the left (south) is limited by shrubs growing along the road. Sight distance to the right (north) is restricted by a roadside bank and the top of a knoll in the road.



The grade of the entrance drive may be too low to meet PennDOT grading standards. In addition, since trucks use the entrance, the centerline perpendicular to the highway must be increased from the current 40 L.F. to 60 L.F. The estimated cost for the improvements at E6 is \$19,500, as follows:

Earthwork and Grading	\$ 5,000.
Paving of Entrance Drive	5,000.
Paving of Shoulders	3,000.
Traffic Controls	500.
Plans and Approvals (20% approx.)	3,000.
<u>Contingency (20% approx.)</u>	<u>3,000.</u>
<b>Total</b>	<b>\$ 19,500.</b>

***E7: Central Range — Provide a gate at the property boundary with Lehigh-Carbon Community College to control access.***

The entrance (Map 2.5) is needed to allow emergency access to the TLCGP property. The two covered bridges on Game Preserve Road and Old Packhouse Road restrict fire truck access to the zoo and parts of the Central Range. Necessary improvements to the road are the responsibility of the college. The estimated cost for a new gate and fence is \$4,500, as follows:

Remove Existing Gate and Fence	\$ 500.
<u>Provide and Install New Gate and Fence</u>	<u>4,000.</u>
<b>Total</b>	<b>\$ 4,500.</b>

***E8: Central Range — Add a four-car gravel parking lot on Packhouse Road at the east side of the covered bridge. Add a trail entrance on each side of the covered bridge to trail A.***

The proposed project at E8 (Map 2.5) improves an existing pull-off area along Packhouse Road into a small (4-car) parking area. The proposed entrance will allow access from Old Packhouse Road to Trail A and the TLCGP property. The entrance will conform to Detail 4, entitled “road entrance with parking” (Appendix E). The estimated cost of improvements is \$7,100, as follows:

Remove Existing Fence	\$ 300.
Grade and Pave Area	4,000.
Provide and Install New Fence	2,000.
<u>Provide and Install New Two Signs</u>	<u>800.</u>
<b>Total</b>	<b>\$ 7,100.</b>



Figure 2.7  
E6 Exit From Central Range



Sight Distance Left





Sight Distance Right



***E9:    Central Range — Provide a trail entrance on Jordan Road west of Geiger’s Covered Bridge.***

The plan includes a trail entrance at E9 (Map 2.5) to provide access to Trail A from Jordan Road. The entrance will conform to Detail 2 (Appendix E), entitled “road crossing with gate”. All costs associated with entrance E9 are included in the cost estimate for Trail A.

***E10:   Central Range — Add a gravel horse trailer parking area and trail entrance on the county-owned land off of Orchard Road. (FUTURE PROJECT — See “Implementation” section)***

***E11:   South Range — Add a maintenance/emergency/trail entrance and four gravel parking spaces off of Jordan Road south of the bridge crossing Jordan Creek.***

Entrance E11 (Map 2.5) will be used for emergency/maintenance/trail access with a small (4-car) parking lot off Jordan Road. Parking should be at least 25 feet from the road surface, with the entrance gate beyond, allowing a vehicle to pull off the road before opening the gate. Entrance E11 should conform to Detail 3 in Appendix E, entitled “road entrance with parking”. The estimated cost for entrance E11 is \$9,300, as follows:

Remove Existing Fence	\$    300.
Grade and Pave Entrance	5,000.
<u>Provide and Install New Gate and Fence</u>	<u>4,000.</u>
<b>Total</b>	<b>\$ 9,300.</b>

***E12:   South Range — Add a maintenance/emergency/trail entrance off of Jordan Road on the north side of the bridge crossing Jordan Creek.***

Similar to E11, entrance E12 (Map 2.5) will be used for emergency/maintenance/trail access with a small (4-car) parking lot off Jordan Road. Parking should be at least 25 feet from the road surface, with the entrance gate beyond, allowing a vehicle to pull off the road before opening the gate. Entrance E12 should conform to Detail 2 in Appendix E, entitled “road entrance with gate”. The estimated cost for entrance E12 is \$8,000, as follows:

Remove Existing Gate and Fence	\$    1,000.
Grade and Pave Entrance	4,000.
<u>Provide and Install New Gate and Fence</u>	<u>3,000.</u>
<b>Total</b>	<b>\$ 8,000.</b>



***E13: Build a trail crossing of Jordan Road west of Geiger’s Covered Bridge. (FUTURE PROJECT — See “Implementation” section)***

***E14: Build a trail crossing of Old Packhouse Road east of Geiger’s Covered Bridge. (FUTURE PROJECT — See “Implementation” section)***

***E15: Build a trail crossing of Old Packhouse Road west of Orchard Road. (FUTURE PROJECT — See “Implementation” section)***

***Roads and Parking (RP)–1: Provide a gravel entrance road to the North Range from Mill Creek Road.***

The current entrance drive from Mill Creek Road to the proposed parking area in the North Range (Map 2.5) must be upgraded. The plan concurs with a representative of the Lehigh County Conservation District, who suggested that the improvements proposed at RP1 could be funded through the Dirt and Gravel Road grant program. Lehigh County should pursue funding for the necessary improvements.

***RP2: Provide a gravel parking area on the North Range off of Mill Creek Road.***

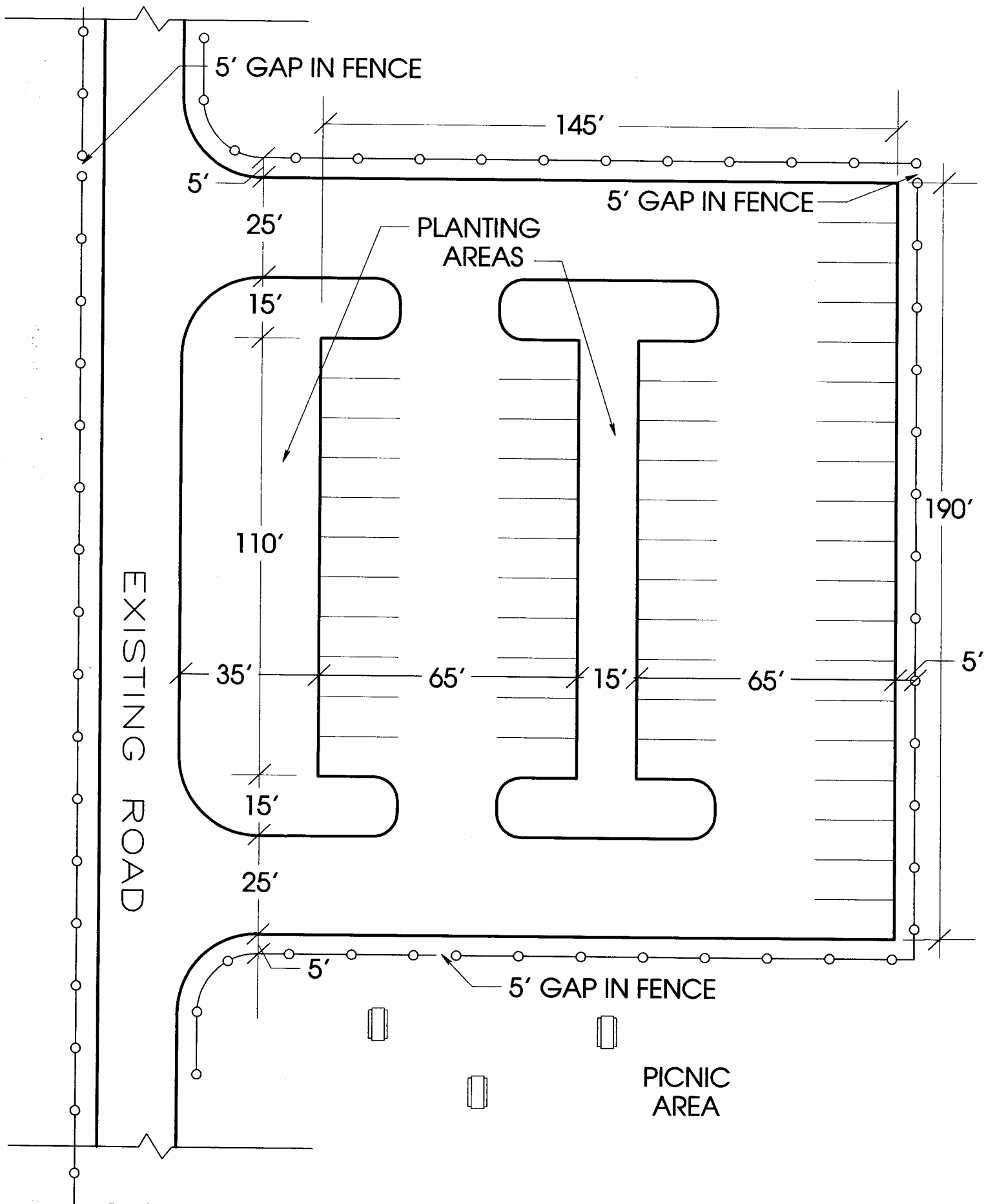
The plan recommends a gravel parking area in the open area at the storage shed on the North Range (Map 2.5). The area should provide approximately 30 spaces (see sketch on page 2–21) with a grass overflow parking area. The existing storage shed and debris in the area should be removed. The estimated cost for the North Range parking area at RP2 is \$52,000, as follows:

Remove Building and Debris	\$ 5,000.
Gravel paving (1,300 S.Y. @ \$15/S.Y.)	20,000.
Planting (8 trees @ \$250/tree)	2,000.
Signs (5 signs @ \$200/sign)	1,000.
Fence (800 L.F. @ \$15/L.F.)	12,000.
Design and Engineering (15% approx.)	6,000.
<u>Contingency (15% approx.)</u>	<u>6,000.</u>
<b>Total</b>	<b>\$ 52,000.</b>

***RP3: Provide gravel parking area for horse trailers.***

A horse trailer parking area should be developed in the open space west of the main entrance road. The surface should be gravel paving, and the area should accommodate 10–12 horse trailers with 10-foot wide lanes for parking and ample room for vehicle turns (see sketch on page 2–22). The estimated cost for the horse trailer parking area at RP3 is \$63,970, as follows:

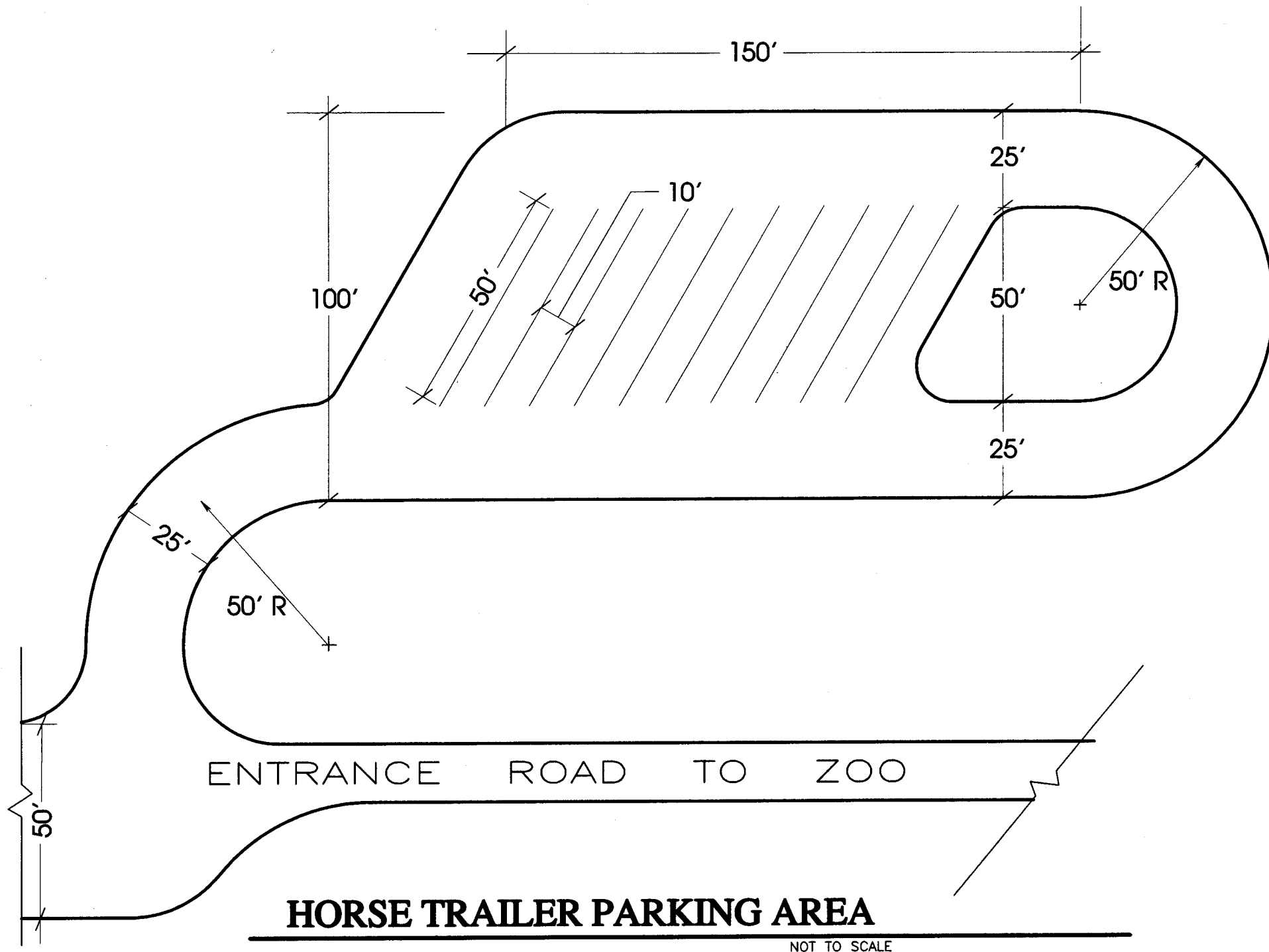




## NORTH RANGE PARKING AREA

NOT TO SCALE





NOT TO SCALE



---

Drive Between Main Entrance and Parking (100 L.F., 24' wide grade, drainage @ \$25/L.F.)	\$ 2,500.
Parking Area	
100 x 150 gravel paving (1,667 S.Y. @ \$15/S.Y.)	25,000.
100 x 150 grade and drainage (1,667 S.Y. @ \$10/S.Y.)	16,670.
Gate, one each	4,000.
Signs (4 signs @ \$200/sign)	800.
Design and Engineering (15% approx.)	7,500.
Contingency (15% approx.)	7,500.
	<b>Total \$ 63,970.</b>

***RP4: Keep the parking area east of the ford.***

The plan recommends maintaining the small parking area east of the ford. No additional cost is involved.

**Improvements to North and Central Ranges**

The trail, entrance, roads, and parking improvements to the North Range (Map 2.7) and Central Range (Map 2.8) represent the majority of the capital expense identified in the *Trexler-Lehigh County Game Preserve Master Plan*. Remaining capital items concern restrooms, fences, guide rail, and picnic areas.

***Restrooms (R)1: Build restrooms at the south end of the zoo parking lot open to the public using the existing water and sewer systems.***

Restrooms should be provided on the Central Range, the activity center for the TLCPG, for people visiting the site that do not visit the zoo. The zoo's restrooms are inside the zoo gates and cannot be isolated to separate zoo visitors from site visitors. Therefore, a new restroom facility outside the zoo should be built at the south end of the zoo parking area. The facility should be connected to the zoo's water and sanitary sewer system, which, according to zoo personnel, has ample capacity available. The estimated cost for the R1 restroom facility is \$205,000, as follows:

Restroom Building	\$145,000.
Landscaping	4,000.
Water Line Extension	4,000.
Sewer Line Extension	4,000.
Design and Engineering (15% approx.)	24,000.
Contingency (15% approx.)	24,000.
	<b>Total \$ 205,000.</b>



**R2: Provide portable toilets:**

- A. At the North Range parking area.*
- B. Near the pedestrian bridge to serve the picnic area and nearby trails.*
- C. At the parking area near the ford.*
- D. At the horse trailer parking area.*

Additional restroom facilities should be provided at key locations throughout the TLCGP property. The additional facilities do not have to be permanent restrooms, but rather can be portable restrooms. The plan identifies four strategic locations for portable toilets. The estimated cost of the portable facilities is \$2,000 per site, for a total of \$8,000.

**Fence (F)1: Repair and maintain boundary fencing in the area of the composting facility to keep preserve visitors from crossing into the composting facility.**

The fencing at the county composting facility must be maintained to identify the boundary between the preserve and the composting site and keep visitors to the preserve from wandering into the facility. The estimated cost to upgrade the fencing (1,500 L.F. @ \$15/L.F.) is \$ 22,500.

**F2. Remove the existing fencing and gates at entrances and replace with new posts, 3-rail fence, and gates to control preserve entrances.**

Fencing and gates at entrances should be replaced to clearly identify preserve boundaries and help provide some security. Exact locations for fencing and gates at entrances is included in the discussion of each entrance. Likewise, costs for fencing and gates are included in entrance costs.

**F3. Remove fences from animal enclosures after each of the buffalo, elk, and horses have vacated the property.**

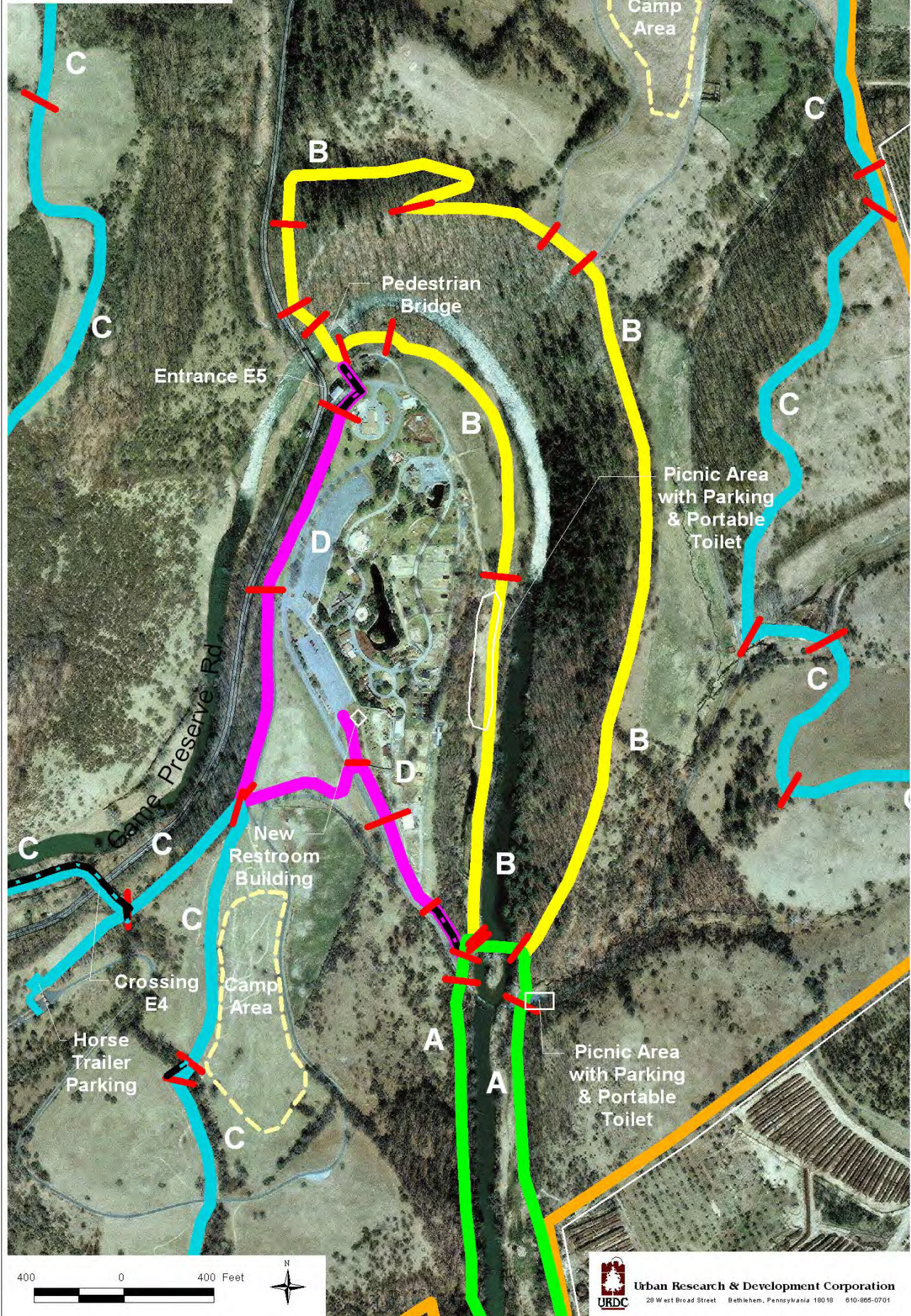
The *Trexler-Lehigh County Game Preserve Master Plan* recommends the removal of the remaining bison, elk, and horses (see recommendation on wildlife below). The recommendation follows a study of the current herds by Natural Resource Consultants, Inc., whose report appears in Appendix A of the plan. After the animals have vacated the site, fencing and animal enclosures should be removed. The estimated cost for removal of interior fencing and pens is \$48,300, as follows:

Bison Pasture	2,481 L.F.	\$6/L.F.	\$ 15,000.
Bison Pens			8,000.
Elk Pasture	3,853 L.F.	\$3/L.F.	11,600.
Horses, Summer Pasture	2,122 L.F.	\$3/L.F.	6,400.
Horses, Winter Pasture	2,422 L.F.	\$3/L.F.	7,300.
<b>Total</b>			<b>\$ 48,300.</b>



# Trexler - Lehigh County Game Preserve

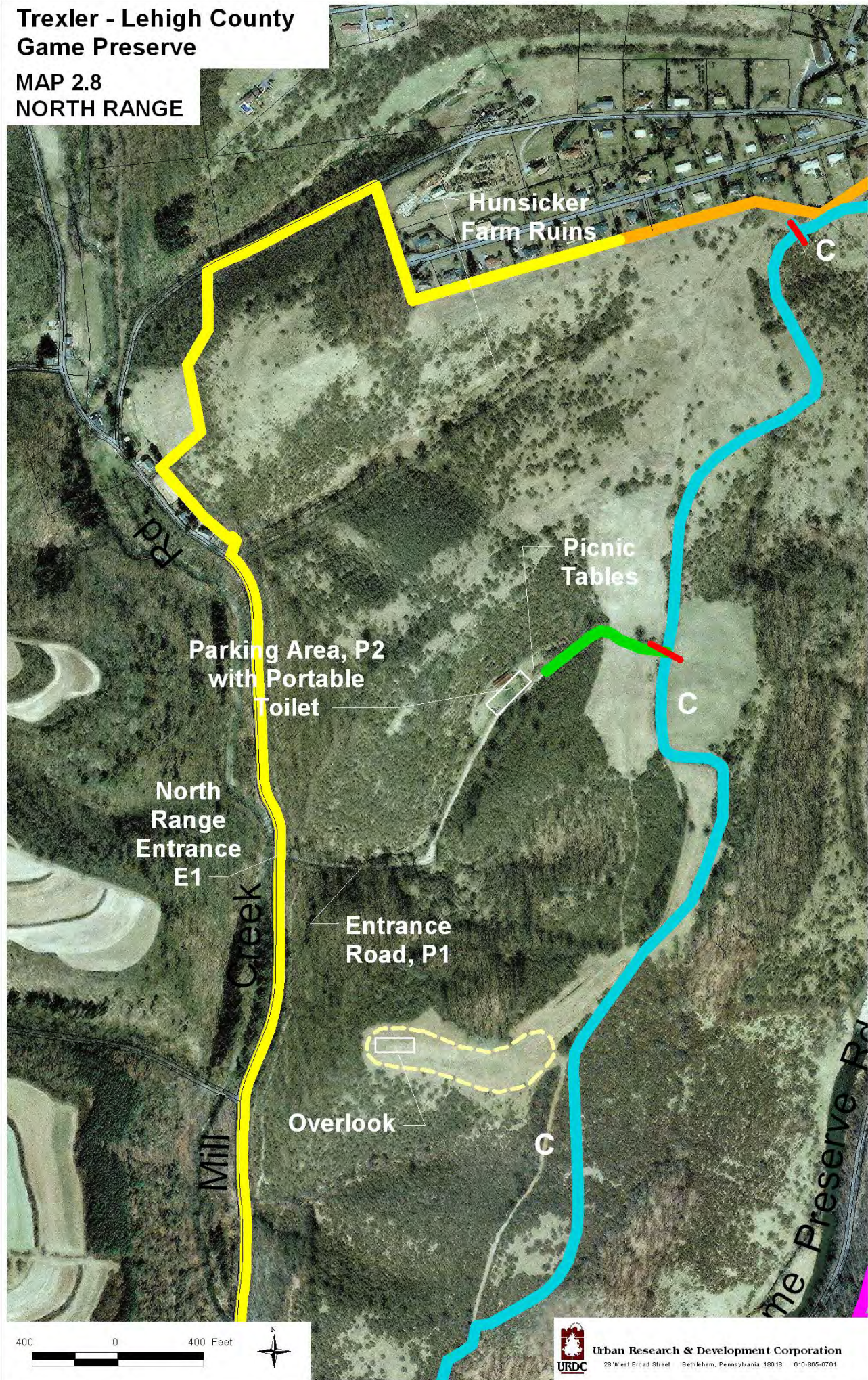
## MAP 2.7 CENTRAL RANGE





**Trexler - Lehigh County  
Game Preserve**

**MAP 2.8  
NORTH RANGE**





***F4:   Add fencing in the picnic area.***

The cost for fencing in F4 is part of the cost of improvements in A2.

***F5:   Add fencing around the North Range parking area to contain vehicles.***

The cost for fencing in F5 is part of the cost of improvements in RP2.

***F6.   Add fencing around the horse trailer parking area to contain vehicles. (FUTURE PROJECT — See “Implementation” section)***

***Guide Rail (G)1: Add guide rail at entrance drive.***

***G2:   Add guide rail at exit drive.***

Two sections of road require additional guide rail:

G1: along the single-lane entrance road to the site between the entrance and the zoo.

G2: along the exit road shortly before the exit.

Two options are available for guide rail:

- Continue to use planted posts.
- Install wooden guide rail.

Wooden guide rail is considerably more expensive than planted posts and is, therefore, not recommended. The estimated cost of the needed guide rail is \$5,340, as follows:

G1 (Map 2.9):	600 L.F. (1 post/10 ft. = 60 posts @ \$30/post)	\$ 1,800
G2 (Map 2.10):	1,180 L.F. (1 post/10 ft. = 118 posts @ \$30/post)	\$ 3,540
<b>Total</b>		<b>\$ 5,340</b>

## **Recommended Policies**

In addition to capital recommendations, the *Trexler-Lehigh County Game Preserve Master Plan* also includes recommendations regarding county policies for the improvement of the preserve. The following section provides policy guidance regarding:



- Jordan Creek Corridor
- Activities encouraged at the site
- Indoor space requirements
- Maintenance area on the site
- Wildlife, specifically the bison, elk, and horses
- Management of the site

***Jordan Creek Corridor (J)1: Permit fishing in the Jordan Creek when the water level is high enough to support fish.***

The water level of the Jordan Creek can fluctuate drastically and has frequently been too low to support significant fish populations. When the water is low, fishing should be prohibited until water levels have risen to or above normal.

***J2: Continue to allow/encourage wading in the Jordan Creek near the ford and pedestrian bridge.***

Wading in the Jordan is one of the fun activities known to many Lehigh Valley residents. The area near the ford allows easy access to the creek, and children and adults should be allowed to enjoy the creek safely.

***J3: Redesign the picnic area along the Jordan Creek upstream of the pedestrian bridge.***

The improvements in J3 have been incorporated into A2 below.

***Activities (A)1: Camping — Allow only organized, responsible groups, such as Boy Scouts, Girl Scouts, and similar groups, to use the preserve for camping events.***

Camping can be a wonderful event on a site as breathtaking as the preserve. However, camping groups must be very responsible if the site is to be maintained for future generations to enjoy. Organized groups, such as the Boy Scouts, Girl Scouts, and others, are strong advocates of personal responsibility and respect for nature. The organized groups will most likely be responsible for providing and removing all necessary facilities and for cleaning and restoring the area to pre-existing conditions.

***A2: Picnicking — Relocate the picnic area along Jordan Creek upstream of the ford.***

The picnic area should be reorganized to encourage walking or sitting on the stream side of the gravel road and picnicking and parking on the zoo side of the road. Picnic tables upstream of the ford should be moved from the stream side of the road to the zoo side of the road. More benches should be installed on the stream side of the road. “No parking” signs should also be placed on the stream



**Trexler - Lehigh County  
Game Preserve**

**MAP 2.9  
G1 GUIDE RAIL  
LOCATION**



300 0 300 Feet

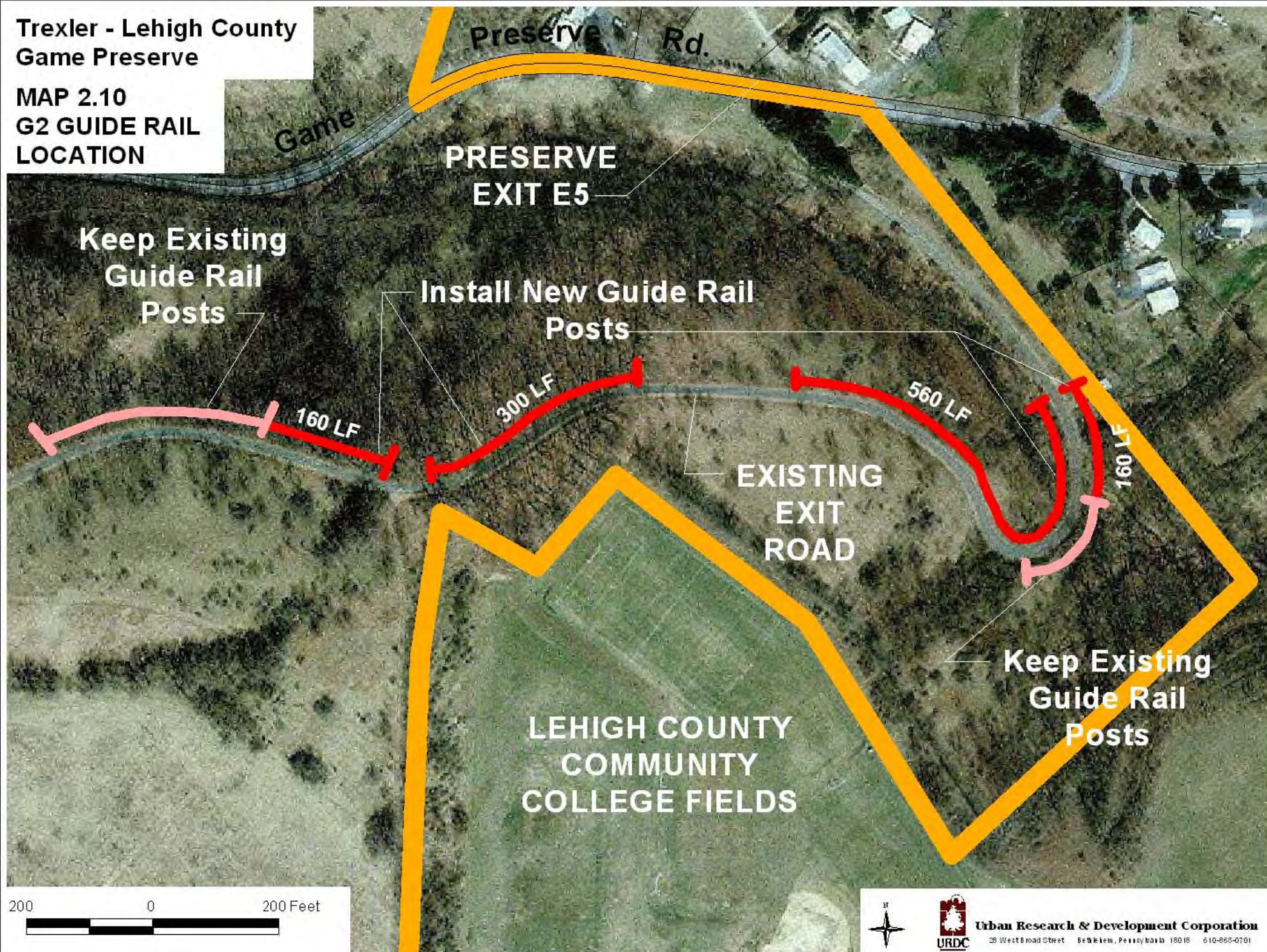


**Urban Research & Development Corporation**  
28 West 60th Street Berks, Pennsylvania 18018 610-865-0701



**Trexler - Lehigh County  
Game Preserve**

**MAP 2.10  
G2 GUIDE RAIL  
LOCATION**





side of the road. Picnic tables should be grouped into three areas with parking between the picnic areas (see sketch on page 2–28). Perimeter posts should be used to clearly define the areas. The cost of proposed improvements to A2 is \$12,350, as follows:

Perimeter Post (7.0 feet between posts)	
Area 1: 200 L.F. / 7 = 29 posts x \$30/post	\$ 870.
Area 2: 160 L.F. / 7 = 23 posts x \$30/post	690.
Area 3: 160 L.F. / 7 = 23 posts x \$30/post	690.
Tables (10 @ \$500/table)	5,000.
Benches (8 @ \$400/bench)	3,200.
<u>Signs (8 @ \$200/sign)</u>	<u>1,600.</u>
<b>Total</b>	<b>\$ 12,350.</b>

**A3:   *Picnicking — Keep the picnic area east of the ford.***

The small picnic area east of the ford adjacent to the existing parking area should be maintained.

**A4:   *Picnicking — Add picnic tables at the parking area in the North Range.***

To enhance the utilization of the North Range without encouraging overuse, a few picnic tables should be placed adjacent to the proposed North Range parking lot just outside the perimeter fence. The estimated cost of eight tables at \$500 per table is \$4,000.

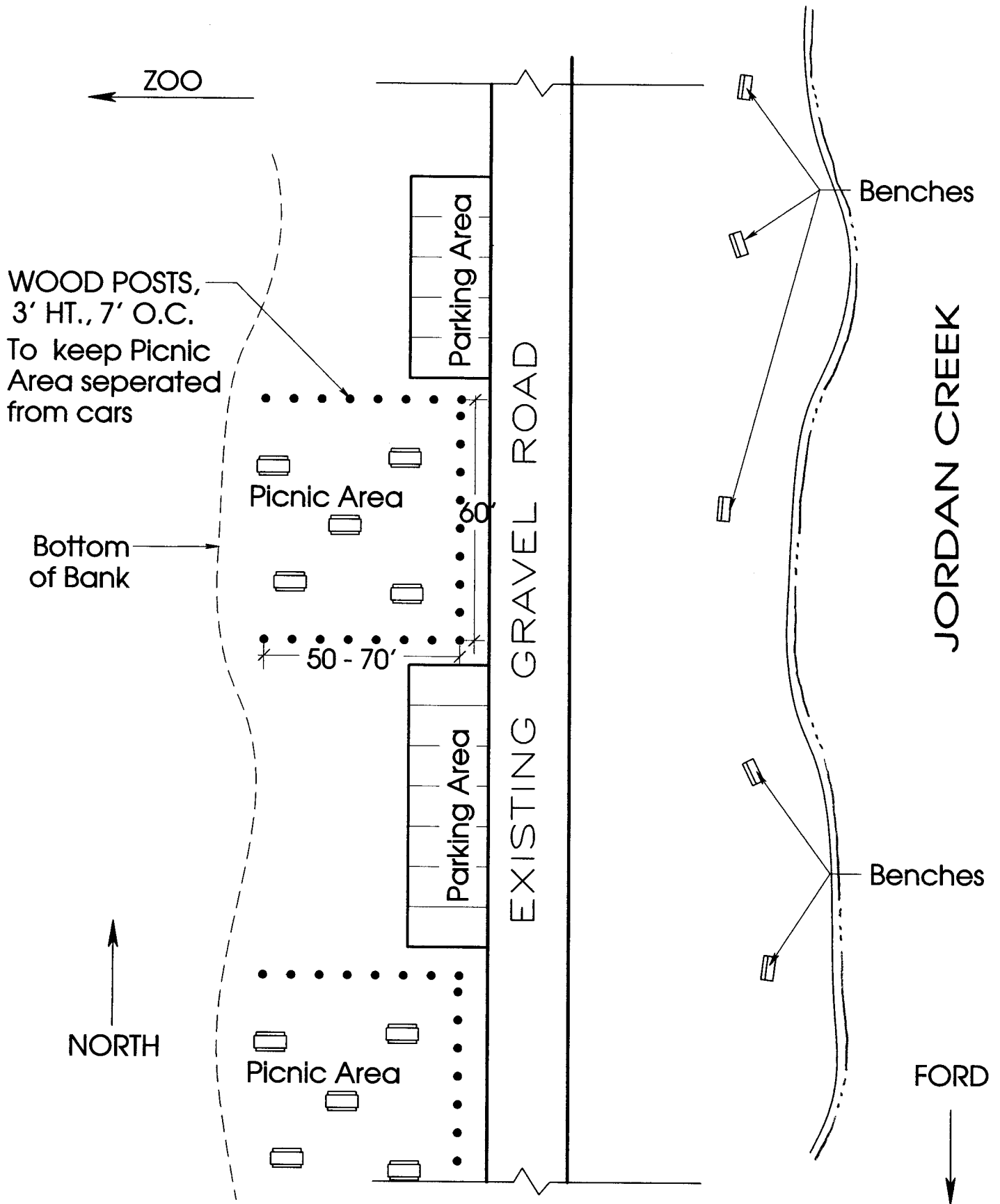
**A5:   *Nature Watching — Relocate the trail to the existing nature watching area west of Trail A.***

The trail to the nature watching area approaches from the front. Therefore, a trail user must get to the shelter, wait for the environment to settle, then hope no other user approaches. The trail should be relocated to approach the shelter from behind so wildlife watchers will disturb the area as little as possible. There is no cost associated with A5.

**Indoor Space (I)1:   *Use/modify existing space for administrative purposes, rather than constructing a new administration building.***

One of the tasks initially established for the *Trexler-Lehigh County Game Preserve Master Plan* was to assess the need for on-site, indoor, administrative space. On-site administrative tasks at the preserve require very little space. Existing space in storage and maintenance buildings appears sufficient for the foreseeable future without the need to construct new facilities.





NOTE: Place 3 Picnic Areas West of Existing Road along Jordan Creek

## PICNIC AREA UP STREAM OF FORD

NOT TO SCALE



***I2: Work with the Lehigh-Carbon Community College to make optimum use of the preserve for college classes and site-based environmental education programs.***

The Lehigh-Carbon Community College (LCCC) is a tremendous asset to Lehigh County and an equally valuable neighbor to the preserve. LCCC professors use the preserve for student experiences in learning about and caring for the natural environment. The college has expressed a strong willingness to work with the county to develop sites and programs that are mutually beneficial to both the college and to the public.

***Wildlife (W): Remove the bison, elk, and horses.***

The bison, elk, and horses have been an attraction at the preserve for decades. Clearly, General Trexler was a leader in helping to rescue the bison and elk from the brink of extinction, and the TLCGP was a significant part of that effort.

More than 70 years after the general's death, the circumstances of the animal herds have changed considerably. The animals are no longer endangered. Indeed, both buffalo and elk are now considered livestock instead of game. The horses, although pleasant, are not even part of the game preserve's original history, arriving years after the general's death.

In today's world, too, transportation has become much more available than in decades past. Seeing bison in their natural habitat in the western parts of the country is no longer only a dream, but a relatively short flight of a few hours. Elk have regenerated in the wild here in Pennsylvania, a 4-hour drive from Lehigh County.

One of the major tasks of the *Trexler-Lehigh County Game Preserve Master Plan* was to assess the current circumstances of the bison, elk, and horses and outline options for the future of the herds. Natural Resource Consultants, Inc, prepared the report, *Observations and Recommendations Regarding the Bison, Elk, Palomino Horse and White-Tailed Deer Herds at the Trexler-Lehigh County Game Preserve; An Historic Perspective of General Harry C. Trexler's Intentions*, as part of the master plan. The report appears as Appendix A of the plan.

The report examines the biological and cultural significance of the herds at the preserve and analyzes four options for the herds. From the biological and cultural viewpoints, the NRC report, and the master plan of which the report is a part, recommends that the herds be removed. Many factors contribute to the recommendation and are explained in Appendix A.

***Management (M): Provide a permanent full-time, on-site park manager or an organized group to accomplish the same result.***

The preserve is a major asset to the county that requires the full professional attention to properly manage its resources. Lehigh County should either hire a full-time director for the preserve, as is the



case at the Jacobsburg Environmental Education Center, or contract with a consulting organization capable of providing the necessary service.

**Name (N):**     *Consider changing the name of the site to the Trexler Nature Preserve to emphasize the environmental education and outdoor experiences available at the site.*

The preserve is, first and foremost, a large amount of open space. Activities at the preserve should be focused on environmental education and enjoyment. To reflect the evolving character of the site, the name should be changed to the ***Trexler Nature Preserve***. The new name maintains the homage necessary to General Trexler’s life and great work and instills a clear understanding of the character and purpose of the site.

**Site (S):**     *Consider expanding the preserve site to include adjacent county lands in order to promote land conservation, expand the proposed trail system, and unify the identity of the preserve.*

As noted from the beginning of the plan, the Trexler Nature Preserve is a cornerstone of land preservation in Lehigh County, particularly in the Jordan Creek Valley. The adjacent county lands are made all the more valuable as open space by proximity to the preserve. The county should explore ways to unite the Trexler Nature Preserve and the adjacent county lands to enhance the land preservation effort in the Jordan Creek Valley not only for current residents, but for future generations as well.

## Summary of Proposed Improvement Costs

The *Trexler-Lehigh County Game Preserve Master Plan* estimates that the estimated cost of improvements specifically identified in the plan is \$2,749,567 (Table 2.7). Additional potential improvements are provided in the following section.

Table 2.7  
**Master Plan Capital Cost Summary**

Recommendation		Cost	Subtotals
T1 Trail A	Build Covered Bridge Trail	\$ 401,465	
T2 Trail D	Build sect D5,D6 & D7	\$ 22,040	
T3 Trail B	Build Elk View Trail	\$ 230,314	
T4 Trail D	Build sect D2 & D3	\$ 27,580	
T5 Trail C	Build Loop Trail	\$ 1,187,108	
T6 Trail D	Build sect D1 & D4	\$ 33,800	
		Subtotal	\$ 1,902,307



Recommendation		Cost	Subtotals
E1	Mill Creek, North	\$ 29,400	
E2	Pathway at CCC Rd.	\$ 6,500	
E3	Main Entrance	\$ 25,500	
E4	Trail C crossing	\$ 6,000	
E5	Covered Bridge Entrance	\$ 70,000	
E6	Exit from Central Range	\$ 19,500	
E7	Preserve from LCCC	\$ 4,500	
E8	Packhouse Rd. parking	\$ 7,100	
E9	Jordan Rd. at Covered Bridge	Future project	
E10	Orchard Rd. horse parking	Future project	
E11	Jordan Rd., South	\$ 9,300	
E12	Jordan Rd., North	\$ 8,000	
E13	Jordan Rd. trail crossing	Future project	
E14	Packhouse Rd. entrance	Future project	
E15	Packhouse Rd. crossing	Future project	
		Subtotal	\$ 185,800
RP1	Entrance Road to North Range	Funded by state grant	
RP2	North Range parking	\$ 52,000	
RP3	Horse parking area	\$ 63,970	
		Subtotal	\$ 115,970
R1	Restroom building at zoo	\$ 205,000	
R2.A	North Range, portable toilet	\$ 2,000	
R2.B	Picnic area, portable toilet	\$ 2,000	
R2.C	Ford parking, portable toilet	\$ 2,000	
R2.D	Horse parking area, port.toilet	\$ 2,000	
		Subtotal	\$ 213,000
F1	add at composting facility	\$ 22,500	
F2	Remove fence at entrances	see others	
F3	Remove fence at herds		
	Buffalo	\$ 15,000	
	Buffalo pens	\$ 8,000	
	Elk	\$ 11,600	
	Horses, summer	\$ 6,400	
	Horses, winter	\$ 7,300	
F4	Add fencing at picnic area	see A2	
F5	Add fencing at North Range parking	see R2	
		Subtotal	\$ 70,800



Recommendation		Cost	Subtotals
G1	Entrance drive	\$ 1,800	
G2	Exit drive	\$ 3,540	
		Subtotal	\$ 5,340
A2	Picnic, pedestrian bridge	\$ 12,350	
A4	Picnic, North Range parking	\$ 4,000	
		Subtotal	\$ 16,350
O1	Autumn Olive Control	\$ 208,000	
O2	Deer Control (study and management)	\$ 32,000	
		Subtotal	\$ 240,000
		<b>Total</b>	<b>\$ 2,749,567</b>

NOTE: Table 2.7 is not a complete summary of all recommendations of the *Trexler-Lehigh County Game Preserve Master Plan*. Policies, future projects, and projects funded without any county funding are not included in the listing. The summary only includes capital items for initial recommended improvements to the site plus an amount to begin addressing the ongoing concerns of deer management and autumn olive control. At the request of Lehigh County, the items in Table 2.7 approximate the county liability of \$2.75 million in the settlement of the suit brought by the Harry C. Trexler Trust

The \$2.75 million shown in Table 2.7 includes two items that were not a formal part of the master plan: control of the autumn olive and management of the deer population. The plan recognizes both tasks as imperative to restore and maintain a healthy preserve. The Wildlands Conservancy, in an informal but ongoing role as a major steward of the site, has prepared plans and cost estimates to begin both tasks. A total of \$240,000 is included for both tasks as part of the plan's \$2.75 million and represents an initial investment in dealing with both circumstances. The \$208,000 shown for the autumn olive problem is an estimate for addressing only the areas necessary to build the trail system. The \$32,000 shown for deer management includes \$17,000 for a study of the herd and a management plan and \$5,000 per year for each of the following three years to implement the recommended strategy. Both the autumn olive and the deer herd will require additional expenditures over many years as part of the operating costs at the Trexler Nature Preserve. However, both activities should be eligible for funding from the Pennsylvania Department of Conservation and Natural Resources.

## Maintenance Costs

The improvements proposed to the Trexler-Lehigh County Game Preserve pose not only a capital cost but ongoing maintenance costs as well. The amount of maintenance costs is difficult to anticipate because many variables are involved.

As an example, the maintenance cost to Lehigh County will depend, for instance, on whether the site manager is a full-time county employee or a professional under contract. As another example, the largest single component of O&M is and will continue to be labor, but debate continues in public



and nonprofit circles about the *cost* of labor for O&M. Some agencies make extensive use of volunteer labor, which includes environmental organizations, scout troops, community groups, or prison labor. Other agencies refuse to use volunteers as a matter of policy because of the cost to organize the work tasks and supervise the volunteers.

To provide some information on O&M costs for a similar site, the 2005–2006 budget for Jacobsburg Environmental Education Center, which is formally operated as a state park, was \$455,500. Maintenance (as opposed to education) accounts for approximately \$214,200 of the budget. Jacobsburg has 20.5 miles of trails, which is approximately \$10,500 per trail mile per year.<sup>3</sup> At a rate of \$10,500 per mile, annual maintenance of the 12.58 miles of trails presented in Tables 2.1 through 2.6 would be approximately \$132,090.

## Implementation/Other Improvements

At the request of Lehigh County, the *Trexler-Lehigh County Game Preserve Master Plan* recommends only the tasks on which to spend the \$2.75 million required by the settlement of the suit brought by the Harry C. Trexler Trust. Additional funds in the form of matching grants may be available to expand the amount of money available for improvements. The plan recommends that Lehigh County aggressively pursue additional funding for the Trexler Preserve beyond the \$2.75 million cited in the plan as part of ongoing support for the preserve.

The *Trexler-Lehigh County Game Preserve Master Plan* recommends that Lehigh County begin to implement the proposed policy changes as soon as possible. In addition, the plan establishes two top priorities for implementing the capital recommendations of the plan:

1. *Highway Occupancy Permits* — Four proposed entrances (E1, E3, E5, and E6) will require Highway Occupancy Permits. PennDOT procedures take time to complete. A qualified engineer should begin meeting with PennDOT as soon as possible to begin the process of obtaining each of the four permits.
2. *Bridges* — The plan includes four new bridges for the trail system. Qualified professionals (e.g., land planner, landscape architect, engineer, surveyor) should begin studies as soon as possible to determine the exact placement of the bridge and to prepare plans and specifications. Collectively, the four bridges are the single most expensive item in the master plan, estimated to cost a total of approximately \$840,000. As a high-cost, easily identifiable item, the four bridges would be an ideal candidate to package as a single project for possible grant funding. The county should immediately begin to look for possible grants to underwrite the cost of the bridges.

---

<sup>3</sup> In 2005–2006, Jacobsburg also benefitted from approximately 1,200 volunteer hours, approximately 35% of which were devoted to maintenance.



As additional funds become available, the plan suggests the following projects for consideration:<sup>4</sup>

- Trail E: bicycle trail through the North Range.
- Trail F: multiuse trail through the North Range near the Hunsicker Homestead.
- Trail G: realigned trail from the wildlife viewing area to Trail A.
- Trail H: multiuse trail through the North Range along Mill Road.
- Trail J: loop trail in the Central Range across a ridge from trail segments B3 and B4.
- Trail K: pedestrian trail through the Central Range connecting trail segments A8 and C37.
- Trail L: pedestrian loop trail in the Central Range to provide access to a new wildlife viewing area east of the ford.
- Wildlife Viewing Area: second wildlife viewing area east of the ford in former feeding station.
- Orchard Road horse trailer parking: second horse trailer parking area on the east side of the preserve.
- Maintenance area/  
Outdoor storage area: areas to be provided on county-owned lands adjacent to the preserve east of Old Packhouse Road across from the county composting facility.
- Trail overlook: earth mound overlook on the Loop Trail (segment C1) to highlight the view down the valley to the Jordan Creek.

---

<sup>4</sup> The order of projects is not intended to indicate priority.



## **APPENDICES**

**A *Observations and Recommendations Regarding the Bison, Elk, Palomino Horse and White-Tailed Deer Herds at the Trexler-Lehigh Game Preserve; An Historic Perspective of General Harry C. Trexler's Intentions***

**B Project Management Group**

**C Interviewees**

**D Recommendations from the report, *Trexler-Lehigh County Game Preserve, Ecological Inventory and Assessment***

**E Details**



## APPENDIX A

### Observations and Recommendations Regarding the Bison, Elk, Palomino Horse and White-tailed Deer Herds at the Trexler-Lehigh Game Preserve

### An Historic Perspective of General Harry C. Trexler's Intentions

Prepared by:

Natural Resource Consultants, Inc.  
1723 Fort Hill Road  
Fort Hill, PA 15540  
(814) 395-5335  
Toll Free: 866-795-3337  
Email: [nrc@qcol.com](mailto:nrc@qcol.com)  
[www.nrcdeer.com](http://www.nrcdeer.com)



**Observations and Recommendations Regarding the  
Bison, Elk, Palomino Horse and White-tailed Deer Herds  
at the  
Trexler-Lehigh Game Preserve  
An Historic Perspective of General Trexler's Intentions**

It is likely that we will never know precisely what General Harry C. Trexler's personal long-term plans were for his captive bison, elk and white-tailed deer at the Trexler-Lehigh Game Preserve. However, there are clear inferences as to his intentions and values regarding these animals that, when viewed in the context of his time, provide some possible insights.

General Trexler was born into an age when the phenomena of North America's abundant wildlife was still at its peak. Buffalo swarmed across the plains by the millions, passenger pigeons blacken the skies for hours and our rivers and bays were choked with shad, stripped bass and waterfowl. America was still primarily an agrarian society where year-round subsistence hunting for meat remained a common practice even as society began to focus more on commerce, industry and resource extraction. These endeavors required vast quantities of labor for mining ore, harvesting timber and operating factories. That labor demanded a ready supply of protein which the country's teaming wildlife populations could readily supply. Thus, market hunting was expanded to a scale, extent, and efficiency that was prodigious. No longer was hunting limited to men attempting to feed themselves, their families, and the village. It had become a profession and an industry involving a natural resource that needed to be killed, processed, shipped and sold.

And, sell it we did. Wildlife was harvested for hides, meat and feathers. Fish were harvested for oil, fertilizer and food. Wading birds were slaughtered at their nest sites for their breeding plumes to be used on women's hats. Hunters were able to exploit this seemingly endless supply of wildlife and ship it to hungry markets in cities and towns. The harvest by individual hunters was staggering, with as many as 8,000 ducks in a season, or 35,000 lbs. of elk in three months. The local markets were filled not with beef, pork and domestic poultry but ducks from the Chesapeake Bay, elk from western grasslands and shad from the Susquehanna River. People paved their driveways with oyster shells, stayed warm under buffalo robes and adorned the finest women's hats with feathers from egrets, herons and hummingbirds.

The effects of year-round and unlimited subsistence hunting by a largely rural society combined with large scale market hunting to feed burgeoning cities and towns put tremendous pressure on the wildlife resources of North America. Indeed, by the 1880's the inconceivably abundant and seemingly inexhaustible wildlife resource which had sustained native cultures and greeted European settlers had suffered dramatic declines. By the end of the nineteenth century, many wildlife populations had collapsed, with many species including passenger pigeons, wood ducks, bison, eastern elk, and white-tailed deer on the brink of extinction. It happened so quickly that only the most observant recognized it was occurring.

For the most part, however, society never missed a beat in its march to conquer the continent. Most Americans simply shifted gears from wild game to their domestic cousins. Meat



was meat and society forged ahead fueled on the protein of chickens, hogs and longhorns rather than elk, deer and buffalo. America was becoming an industrialized giant and appeared more than willing to use up its waters, wildlife and forests to get there.

Ironically, while hunting and hunters were the primary driving force for the decimation of the wildlife resource, a small, socially elite group of hunters were the first and most outspoken advocates for its conservation. Beginning in the 1870's national newspapers like *American Sportsman* (1871), *Forest and Stream* (1873), and *Field and Stream* (1874), began to call for the end of the commercial exploitation of wildlife and for hunters to follow a well-defined code of conduct and thinking based on English hunting traditions. These publications promoted the ideas of "sportsmanship," proper etiquette in the field, giving game a fair chance and an aesthetic appreciation of the concept of sport. This elite group of hunters, who defined themselves as sportsmen, advocated that a hunter should pursue game for pleasure and make no profit of his success. They held in low regard "pot-hunters," who committed such offenses as shooting grouse on the ground or geese in the water; the "meat hunter," who took wildlife only to fill his stomach and knew nothing of the subtleties of sport; the poacher, who killed without regard to season or sex, often trespassing in the process; and worst of all, the "market hunter," who destroyed everything from trout to elk for the money they would bring.

In the years and decades to follow, the "sportsman"/conservationist appeared, determined to bring back game. This movement was led not by the subsistence farmers and frontiersmen, but by members of the American aristocracy, old families who were educated, monied and lived in the east. Men who hunted in the west not to put food on the table or money in their pockets but similar to European aristocracy, as a recreational pursuit. They understood that it was unregulated, unrestricted hunting for the purpose of procuring meat and profit that had brought the wildlife resource to the brink of extinction and were determined to stop it and restore America's wildlife and game through the protection and restocking of game animals and the regulation of hunters.

One of these men was General Harry C. Trexler, who in 1900 owned a ranch at Jackson Hole, Wyoming where he hunted with his friends and where they witnessed the dramatic reduction of game populations. It was on these hunting expeditions that the general became interested in the protection and restoration of wildlife populations. As a result, in 1906 he began to establish his "game preserve" back East in his home state of Pennsylvania, where he would stock the then endangered elk, bison and white-tailed deer. All three of the species were likely pursued as game by Trexler during his Western hunts.

The Pennsylvania Game Commission (PGC), which was organized in part to bring back white-tailed deer populations, received 175 deer from General Trexler during the commission's efforts in the early 20th century to re-establish deer populations in the state. These animals were released by the Commission in the Northeastern and Central parts of the commonwealth. During this time, the PGC also established fenceless "game preserves" where hunting was barred and wildlife was protected from hunters by patrolling game wardens. The concept of game preserves



was popular at the time and rooted in the acknowledgment that over-harvesting by hunters was a threat to wildlife populations. Game preserves, whether fenced or unfenced, were designed to protect “breeding stock” that would assure the species’ survival. As state and federal wildlife agencies became better equipped through regulation and education to control hunting impacts while also enforcing seasons and bag limits and introducing the concepts of sport, fair chase and equitable distribution, game preserves were no longer seen as a necessary or effective tool for wildlife conservation. The PGC ended its game refuge program in the 1940’s.

Today, the three species of concern and focus of General Trexler are no longer endangered. The wildlife restoration efforts led by men similar to General Trexler and the regulation of hunting by organizations like the PGC has allowed bison, elk and white-tailed deer to return to abundance.

## **Conclusion**

In 1900 when General Trexler became interested in the protection of bison, elk and white-tailed deer, the outlook for these species was bleak with many believing they would never recover in the wild. Whether General Trexler's vision to save these species from what seemed like certain extinction included their restoration to the wild is unknown. However, given the conservation efforts at the time, which focused on the protection of game species breeding stock, it would seem likely that it did. Today bison, elk and white-tailed deer have recovered and once again thrive in wild places in a way that may have far exceeded the general’s expectations.

Given the general’s life as an active hunter of these species and his harvesting of individual animals in both the wild and later in captivity for meat, it seems apparent that his interest in wildlife conservation and management was at the species population level and not the individual animal.

## **Current Status of The Trexler-Lehigh Game Preserve Captive Animals and Their Conservation and Ecological Significance**

Today the Trexler-Lehigh County Game Preserve retains only a small captive group of elk and bison. The captive white-tailed deer that General Trexler established has long ago been assimilated into native populations that roam free on and off the game preserve property. A small group of Palomino horses, which were acquired more than a decade following General Trexler's death, remain on the property. The zoo, established in the 1940’s following the



general's death, has expanded but is now limited to a 29 acre parcel leased to the Lehigh Valley Zoological Society and is operated independently by a 501(c)(3) as the Lehigh Valley Zoo.

### **American Bison** (*Bison bison*)

The Trexler-Lehigh Game Preserve currently has 14 bison ranging in age from 1 to 19 years old. There are 3 males and 11 females. The herd is contracepted by treating the female animals annually in June using Porcine Zona Pellucida (PZP). This treatment allows the females to enter estrus and ovulate but blocks fertilization thereby preventing pregnancy. Males, who are untreated and females, will display mating and breeding behaviors, but will not conceive. Contraception with PZP began several years ago with 100% efficacy to date.

The animals are fed approximately 73 lbs. of a commercially prepared food mix and 5 to 6 bales of alfalfa hay daily with mineral salt blocks available and supplemental random food enrichment items. The bison receive regular veterinary care.

The bison are housed in a 9.22 acre pen surrounded by a 9 gauge chain link fence of varying height (6 to 7 ft.) supported by wooden posts. The pasture is over-browsed but dragged monthly to break up and distribute fecal material.

There is some debate over the subspecies of bison native to Lehigh County and the eastern woodlands. Some argue that the subspecies native to Pennsylvania was the Eastern Wood Bison (*Bison bison pennsylvanicus*) that was darker, smaller and without the large hump of the western plains subspecies (*Bison bison bison*) but closely related to the Wood Bison of the boreal forest (*Bison bison athabasca*). It is believed the last Eastern Bison in Pennsylvania was killed in 1801 and that the *pennsylvanicus* subspecies went extinct around 1825 due to over-hunting and habitat destruction. Others argue that the Eastern Wood Bison and the Plains Bison were one in the same and the Northern Wood Bison was the only distinct subspecies.

Whatever the reality, there is no serious proposal for a recovery plan to reintroduce Eastern Bison herds into the wild. Bison are a species that on average travels 3 miles per day circulating in a home range of 30-100 square kilometers. Adult males can weigh from 1200 to 1800 lbs. and run 30 mph. Whether the genetics of the Eastern Wood Bison exists, or are extinct can be debated, but what is clear is that the native grasslands of the East necessary to support bison herds in the wild are gone as is the space required to support wild herds of bison in the East.

Captive herds of bison, whatever their genetic composition, are no longer seen as a conservation tool of any ecological significance. Indeed, the American Zoo and Aquarium Association classifies bison as livestock for which standards of management are set by the United States Department of Agriculture. As livestock bison are raised for meat which is sold primarily to restaurants and custom meat stores. Over 7.5 million pounds of bison meat is raised



and sold annually in the United States. The USDA's Meat and Poultry Inspection Directory lists about 100 bison-processing facilities nationwide. The USDA occasionally purchases bison meat for federal food assistance programs. Because bison meat has a low fat content and a cholesterol content that is lower than that of beef, organizations such as the American Heart Association and Weight Watchers recommend bison meat as a healthy alternative to beef. Prior to the general's death, the Trexler-Lehigh Game Preserve herd was managed by the routine harvesting of bison from the herd for meat that was supplied to clubs, restaurants, and food distributors in the Lehigh Valley and New York City. Several restaurants in the Lehigh Valley today serve bison, some of which is raised on local farms.

### **Elk** (*Cervus elaphus*)

The Trexler-Lehigh Game Preserve currently has 15 elk, one male and 14 females. Herd reproduction was ended by vasectomizing the single male in 2003 with 100% efficacy to date. This treatment allows the females to enter estrus and ovulate and the male to exhibit breeding behavior but prevents conception.

The elk are fed approximately 107 lbs. of a commercially prepared food mix and 1 to 2 bales of alfalfa hay daily with mineral salt blocks available and supplemental random food enrichment items. The elk receive regular veterinary care. The antlers are removed from the male every fall prior to the breeding season to prevent injury to the female elk.

The elk are housed in an 11.05 acre pen surrounded by a 9 gauge chain link fence of varying height (6 to 7 ft.) supported by wooden posts. The pasture is over-browsed but dragged monthly to break up and distribute fecal material.

The elk at the Trexler-Lehigh Game Preserve are not native to Lehigh County or Pennsylvania. The Eastern Elk (*Cervus elaphus canadensis*) is one of six North American subspecies, of which only four exist today. The Eastern Elk inhabited the forests of Eastern Canada and eastern United States. The Eastern elk was extirpated from Southeastern Pennsylvania and rare in the rest of the state by the beginning of the 19th century due to over hunting. By the 1850's what remained of the once abundant animal was limited to the remote North Central area of the state and by 1870 they were gone from Pennsylvania and extinct overall before the beginning of the 20th century. The elk brought by the general to the Game Preserve are a western elk subspecies he hunted and unlike the Eastern Elk are more adapted to grazing than browsing.

In 1913, the PGC "reintroduced" elk to the state by shipping Eastern Elk from Yellowstone by train to Pennsylvania. And while the elk population survived, it never thrived as a result of its inability to adapt well to a primarily forested habitat. In the mid 1970's the commission began an active habitat management plan for elk, creating food plots of high quality agricultural grasses and legumes that provide elk with the nutrition more typical of their native western grassland habitats. Elk reproduction and survival increased dramatically as did their numbers growing from a herd which numbered under 50 for decades to well over 600 animals



today. The geographic distribution of elk in Pennsylvania today is limited primarily by the extent to which food plots are established and maintained and by their conflicts with agriculture.

Captive elk herds today are seen as agricultural operations and are common in the East where elk are raised for antler velvet, antlers, meat and hunting preserves. Mature bull elk may produce 30-40 lb. of velvet per year. Elk meat meets the American Heart Association's guidelines for fat, cholesterol and calories and is sold to gourmet restaurants.

### **White-tailed Deer** (*Odocoileus virginianus*)

The captive white-tailed deer that the general established in the Trexler-Lehigh Game Preserve in 1911 was essentially lost in the 1980's, when the perimeter fence of the game preserve was no longer maintained to a level that prevented deer movements in and out of the preserve. This lack of maintenance allowed the movement of the captive herd out and populations of wild deer in so that today the captive herd has been assimilated into the native populations that roam free on and off the game preserve property. All white-tailed deer on the property today belong to the citizens of the commonwealth and are now regulated by the PGC. White-tailed deer in Pennsylvania are considered overabundant from both an ecological and cultural carrying capacity perspective. Pennsylvania has received extensive national press regarding the problem and become the center of a national debate regarding deer management. Pennsylvania annually kills more deer by accident on its highways (>80,000-100,000) than many states kill intentionally during their hunting seasons.

### **Palomino horse** (*Equus caballus*)

The Trexler-Lehigh Game Preserve currently has 6 horses ranging in age from 9 to 20 years old. There are no males and 6 females. Since 1996 the herd has been prevented from reproducing by having only female animals.

The animals are fed approximately 24 lbs. of a commercially prepared food mix and 3 bales of timothy hay daily with mineral salt blocks available and supplemental random food enrichment items. The horses receive regular veterinary care.

The horses are housed in a 4.9 acre pen over the spring and summer and have traditionally been moved to a similar size pasture on-site for winter. The current horse pen is formed by 9 gauge chain link fence of varying height (6 to 7 ft.) supported by wooden posts. The pasture is over-browsed but dragged monthly to breakup and distribute fecal material.

It was between 8,000 and 12,000 years ago, at the end of the last major ice age, that all the horse species that existed in the Americas died out as part of a mass extinction that included such animals as the woolly mammoth, sabertooth cat and giant short-faced bear. Domesticated selectively bred descendants of the original wild horse species were brought back to the continent by Europeans upon their discovery of the "new world" and are today considered domestic livestock. The horses at the game preserve were introduced 12 years after the death of General Trexler.



## Conclusions

None of the animal herds currently maintained at the Trexler-Lehigh Game Preserve are considered native wildlife but are instead viewed as livestock animals. The current captive herds have no conservation or ecological significance. Indeed, their only relevance to the property's ecological health is the negative impacts that result from their overgrazing, nutrient loading and the displacement of native habitats and the species that would normally occupy them. This is not to suggest that these animals do not have either aesthetic, recreational or romantic value. Maintaining animals for recreation, education or aesthetic purposes can be a value independent of conservation or ecological goals.

### **Current Ecological Condition of the Trexler-Lehigh Game Preserve The Goal: To Help Conserve Some of Our Wildlife In Its Proper Setting and White-tailed Deer Management**

The desire to view and appreciate the beauty and magnificence of animals is as old and as human as the ancient cave drawing that express those artists respect, awe and honor for their subjects. It may have been this strong regard for wildlife that motivated General Trexler's attempts to save the bison, elk and white-tailed deer from what seemed like certain extinction at the beginning of the twentieth century. General Trexler, with his goal of conserving these species in a captive setting, at a time when their extinction in the wild seemed a certainty, could not have envisioned the remarkable wildlife restoration effort he and men like him would inspire. The recovery of America's wildlife during the first half of the 20th century was nothing less than remarkable as species thought to be doomed were plucked from the brink of extinction by dedicated conservationists. It was during this period that the fields of wildlife and forest management first emerged in North America and organizations like the U.S. Forest Service, National Wildlife Refuges, Cooperative Wildlife Research Units, National Park Service, Cooperative Wildlife Extension and the various state wildlife agencies all came into being.

Today bison, white-tailed deer and elk once again thrive in the wild. The recovery of the white-tailed deer has been so remarkable that they are considered overabundant throughout much of the country, including Pennsylvania. The vision of conserving these species in their proper setting has been achieved far beyond the general's expectations by restoring them in the wild, making captive herds unnecessary and irrelevant from a wildlife conservation perspective. In addition, our knowledge of animal behavior, ecology and ecosystem management has grown to the point of allowing us to recognize that the goal of maintaining these animals in their "proper



setting” within the preserve is simply not possible, if “proper setting” means something representative of their original native habitat.

Elk and bison are herd animals with large home ranges, big appetites and behavioral adaptations that allow them to disperse their impacts seasonally to facilitate range recovery and maintenance. Such adaptations cannot be expressed within enclosures measured in a few acres per animal, even with rotational grazing. Professionals displaying large herbivores for recreational viewing are always challenged to balance the herd’s impacts with the goal of maintaining surroundings that are visually similar to their representative habitat. A visit to many zoos that displays cervids or bovine species speaks to this challenge.

Elk and bison can be displayed at the preserve on well managed agricultural pastures by establishing such pastures through planting, and soil amendment and rotational grazing as with any domestic livestock. However, due to the current condition of the preserve’s vegetative communities and the small scale of the facility, it is not possible to recreate something representative of their original native habitat.

In the Wildlands Conservancy’s *Ecological Inventory and Assessment of the Trexler-Lehigh Game Preserve* it is acknowledged that the facility’s landscape is dominated by exotic invasive plants. Indeed, all of the plant communities at the game preserve have been highly disturbed and negatively impacted by a history of over-grazing and over-browsing by captive herds of elk, bison and deer, resulting in extensive stands of exotic invasive plants in every community type. In 1935 when the Trexler-Lehigh Game Preserve was gifted to the county, deer, bison and elk numbers exceeded 250 animals per square mile on the property. During the 1970’s deer populations alone, based on county staff counts, reached over 200 animals per square mile. Today we know that deer densities compatible with managing native plant communities in forested habitats should be under 20 deer per square mile.

Those areas of the preserve that were cleared and plowed for agriculture in the past were most vulnerable to over-browsing and are the most seriously impacted. However, even those stands that were never plowed and have remained forest, have been extensively grazed and lack native wildflowers, shrubs and advanced regeneration while having understories that are dominated by invasive, exotic plants. Whatever the stand history, type or location, the Trexler-Lehigh Game Preserve is challenged throughout by having its vegetation extensively dominated by invasive exotics with well established seed banks. Autumn olive, stilt grass and garlic mustard are dominate throughout the property.

The current unnatural domination of the game preserve’s vegetation by invasive exotics is, in large part, the result of overgrazing by captive animals during the last century. A challenge that was neither recognized nor apparent in the early 1900’s, but which is recognized today. Indeed, the well-intended introduction of plants like autumn olive, multiflora rose, tartarian honeysuckle, Japanese barberry, privet and many other, now acknowledged, as invasive exotics, was done intentionally by wildlife agencies and landowners in an effort to “improve” wildlife habitat. These “conservation plantings” preceded our current ecological knowledge regarding the impacts these invasive species have on native plant and wildlife communities. So too, the subtle negative ecological consequences of maintaining high numbers of animal units on limited



pastures within enclosures was unforeseen and predated both the field of range management and an understanding of the role of herbivory within ecosystems.

Deer, based on their recorded numbers at the preserve, played a major role in creating the current challenges through over-browsing. Deer are perceived as overabundant when they limit the abundance or occurrence of some other valued resource or interfere with some valued ecological process or human activity. And while ecologists know that deer perform important ecological functions within the forest, the evidence is overwhelming that deer populations when unrestricted by some form of mortality have dramatic negative impacts on forested ecosystems and agricultural operations with cascading effects on wildlife, ecosystem services, biodiversity and forest sustainability. In Pennsylvania where deer have become “overabundant” they have 1) reduced or eliminated forest regeneration, 2) slowed or stopped succession, 3) eliminated or

reduced other wildlife species through direct or indirect competition, 4) shifted species dominance and equability, and 5) driven some plant species locally extinct, while facilitating the establishment and spread of invasive exotic plant species.

The primary method by which deer facilitate invasive plants is through the enemy-release principle which is based on the observation that a plant introduced to a new area outside its normal range leaves all or most of its herbivores and pathogens behind, thus releasing the species from some of the mechanisms that normally regulate their populations. Because many exotic plants are less palatable to deer than native plants or not palatable at all, they have a competitive advantage over native species where deer browsing pressure is high. By favoring native species and avoiding the exotics, deer provide a competitive advantage to the exotic plants in environments where they grow together with natives. Autumn olive, stilt grass, garlic mustard, *Ailanthus*, Japanese barberry, and oriental bittersweet are examples of non-native plants at the preserve that are avoided or not preferred by deer.

The upshot is that excessive browsing by deer, elk and bison at the preserve has facilitated the spread and current domination of the preserve’s plant communities by exotic, invasive species that has actually changed the trajectory of the native vegetation development. If the Wildlands Conservancy’s recommendation to develop strategies and priorities to monitor, eradicate and/or control these species is to be realized, deer browsing impacts will need to be controlled.

The challenge of reducing deer browsing impacts to levels that will allow the restoration of the game preserve’s native vegetation is exacerbated by the degree of dominance of the site by less palatable or not palatable at all, invasive exotic plants. Well established invasive plants can suppress native plant establishment, reproduction and expansion by competing for sunlight, growing space, water and nutrients. At the same time, as native plants attempt to become re-established, they are more vulnerable to being eaten by deer because they grow in a landscape dominated by less palatable plants. As a result, only a few deer can retard their recovery. In addition, defoliation caused by browsing can eliminate or reduce seed production of native plants which after many decades may have diminished native seed banks. The longer an ecosystem has been over-browsed the more difficult it is to restore the original vegetation and the lower deer numbers must be to facilitate the recovery.



The threshold level of deer impact required for these systems at the preserve to recover will be dependent on the strategy, methods, time frame and scale of the restoration effort itself. The various ecosystems impacted as a result of overabundant deer and the establishment of exotic invasive plants will not fully recover without intervention and restoration. Best estimates suggest that deer densities at the preserve should be well under 20 deer per square mile to facilitate the recovery of native plant communities.

Currently, no estimate of deer densities for the Trexler-Lehigh Game Preserve, Lehigh County, Wildlife Management Unit 4C or adjacent Game Lands 205 are available. The PGC, as of this year, either no longer estimates deer densities or does not make those estimates public. However, a visual inspection of the preserve reveals that the current level of deer impact is far in excess of that which will allow these habitats to recover. Deer browsing rates on both preferred and non-preferred species is high and well above levels that will allow recovery. Several approaches to balancing deer impacts with efforts to restore the health of the preserve's ecosystems and wildlife populations are possible. However, their evaluation should be in the context of the final Trexler-Lehigh Game Preserve Master Plan and vegetation restoration efforts. Only within that context can potential deer management options be evaluated for compatibility, effectiveness and efficiency with the other property uses and land management treatments.

## **Conclusions**

The vision of conserving these species in their proper setting has been achieved far beyond the general's expectations by restoring them to the wild where they can be viewed in their native habitats. Continued maintenance of these herds at the Trexler-Lehigh Game Preserve is not unlike maintaining livestock in an agricultural setting similar to scores of bison and cervid operations throughout the state. It does not represent the native plant communities in which these animals evolved.

Currently, the captive herds at the preserve are housed in overgrazed pastures that do not meet the Lehigh Valley Zoo's standards for presenting these animals to the public in an appropriate aesthetic or natural setting. Pasture quality could be improved by reducing the number of animal units per acre within existing pastures or by expanding fenced pasture areas, but deficiencies in location, fence type and quality and other infrastructure issues would remain. The display of large herbivores in fenced facilities for recreational or educational purposes is the focus of the zoo and their professional managers, not public parks that encourage open public access without supervision.

Furthermore, the game preserve is currently challenged by the dominance in its plant communities by exotic invasive plants as a result of decades of overgrazing and will require extensive restoration if it is to be returned to a healthy condition representative of the region's native plant and wildlife communities. Part of that restoration effort will require deer impact reductions which are unlikely to be achieved through traditional recreational hunting alone.



### **Options for the Maintenance or Discontinuance of the Bison, Elk and Palomino Horse Herds at the Trexler-Lehigh Game Preserve**

Option 1 In cooperation with the Lehigh Valley Zoo, maintain animal herds for public display but relocate to redesigned, and expanded facilities that meet AZA requirements for accreditation. **Not Recommended**

If the County of Lehigh decides to retain the current herds of bison, elk and horses for public viewing and wishes to upgrade its facilities for doing so it is recommended that the new facilities be designed to meet AZA standards. Furthermore, it is recommended that the ownership and responsibility of these animals be transferred fully to the Lehigh County Zoo, if they are agreeable, and moved to additional leased lands closer to the zoo and on the same side of the Jordan Creek.

Dr. Steve Marks, Director of the Lehigh Valley Zoo feels the zoo would be receptive to a facility design based on allowing the public visitor to drive through an area where bison, elk and horses ranged free within an 8' perimeter fence while the public is separated from the animals by remaining within their cars. This would require cattle guards and staff at both entrance and exit gates. The general enclosures, would be subdivided to facilitate rotational grazing and the separation of species during periods of aggressive behavior, such as the breeding season. A corral and chute system with sides 7' to 8' high equipped with catwalks, feed bunks, water, lighting, spring-loaded, locking slam gates are recommended. The squeeze chute should have a crash gate and palpitation cage.

The area of the Central Range southwest of the zoo framed by the Jordan Creek and containing the current palomino horse pen is the most logical location. This site could use the existing game preserve entrance road to below the current horse pens where the road intersects with the road leading into the zoo parking lot. With the exception of some steep slopes, which could mostly be avoided, this area does not contain any environmentally sensitive areas while providing a mosaic of upland meadows, forest and shrublands attractive to all three species. This cover with the varying topography will provide these animals with the pasture, rugged areas, thickets and woods they prefer and allow them to seek protection from the elements. The soils on site are acceptable for pasture but not highly productive due to shallow depth to bedrock, noncalcareous shale, siltstone and sandstone parent material, low available moisture capacity and low fertility. Areas with slopes over 25% should be avoided.

While the specific facility design and fence locations should be done in collaboration with zoo professionals, several suggestions are offered. Due to the modest soil quality a minimum of 2 acres per animal should be provided requiring approximately 70 acres which is



available in this area. The corral and chute system could be located in the area adjacent to the zoo parking lot

minimizing the distance power and water would need to be run. Water could be provided inside and out at the corral and chute location and at the existing horse pen where it is available today. A second water trough outside the existing horse pen should be added. Subdivisions of the enclosure should focus on the needs for rotational grazing, separation of species as may be necessary, maintaining pastures that provide reasonably predictable viewing opportunities by the public from vehicles on the road and which minimize infrastructure costs. The existing horse pen could serve as one subdivision.

The enclosure should be built of 8' high-tensile, woven wire material designed for wildlife. Given the public access that is anticipated to the preserve area outside the enclosure, electric fence seems inappropriate. Interior fences should be 6.5' high tensile-electric with eight wires three of which carry high voltage. The work that will need to be completed will include the 1) clearing of areas of brush for pasture improvement, 2) refurbishing pastures by controlling invasive plant species, 3) amending soils, 4) preparing seedbeds, 5) planting, clearing and grading the fence line, 6) clearing and maintaining visual corridors along the existing road, 7) road

improvements, 8) building the exterior and interior fences, 9) installing cattle guards and electronic gates at road entrance and exit, 10) building a chute/crusher system, 11) installing watering devices, 12) extending water and electric lines, 13) building animal shelters, 14) transporting animals, 15) signage and 16) the removal and disposal of the existing bison and elk facilities. In addition, whatever facilities are desired to handle admissions, security and supervision of visitors while in the enclosure with the animals will need to be considered. The cost of these improvements, not including project design, administration and approximately 85 acres of land would be at a minimum \$150,000. If the county retains the responsibility for the cost of maintaining and operating the facility, annual costs when including operating expenses, insurance and continued herd care, could easily exceed \$250,000/year. It is recommended that the county only explore this option if the Lehigh Valley Zoo takes full responsibility for facility maintenance and animal care following improvements.

Option 2 Maintain current animals with contraception at existing facilities allowing herds to decline through attrition.- **Not Recommended**

The current herds at the Trexler-Lehigh County Game Preserve are young. Efforts to end reproduction have only recently been implemented. Over half of the bison, for example, are five years of age or younger. Bison can live for 30 years or longer. Therefore any plan to retire the herds through attrition will require decades and be quite expensive. The cost over the next ten years alone will be over \$1,000,000.

There are two basic standards for animal care facilities. The first is based on animal care guidelines set by the PGC and USDA, Animal and Plant Health Inspection Service for public menageries. The PGC for example, requires that an elk or bison be provided with 1000 sq. feet



plus 25% more area for each additional animal. The current facilities far exceed this area requirement. Fresh drinking water, wind shelter and/or woods or brushy habitat are required which are also provided. The current facilities meet the Animal Welfare Act guidelines for animal care and those of PGC. The USDA, Animal and Plant Health Inspection Service guidelines have been met but may or may not continue with increased, unsupervised, public access.

The second standard is that of the American Zoo and Aquarium Association (AZA) for animals to be displayed to the public in accredited AZA facilities. Dr. Marks observes that current AZA recommendations for exhibiting these animals include a sufficient exhibit fence (charged high tensile) enclosed with an 8 ft. chain link or woven wire perimeter fence and concludes that, “the current fence is aesthetically displeasing to the guests and should be demolished and removed completely.” His concerns are based on aesthetic issues connected with the public’s experience when viewing the animals and public and animal safety. Dr. Marks would like to see all three herds moved to new, expanded facilities, near the Lehigh Valley Zoo.

If the county, desires to retain the existing animals but not to invest in meeting AZA standards for public display, they may do so with the current facilities. The current facilities at the Trexler-Lehigh County Game Preserve are adequate based on current standards for animal care and have been used for public display for over a decade. The appearance, quality and maintenance of these existing pastures could be improved by soil testing, amendments, re-seeding and/or reducing animal units. If each herd were to be cut by half, pasture quality and appearance would increase dramatically with no other treatment. The cost for pasture upgrading would be under \$5,000.

Currently there is no quantitative evidence of significant water quality degradation to the Jordan Creek as a result of the existing pastures and no Department of Environmental Protection regulations that would preclude their continued use if the pastures are well maintained. Adult herds of cervids that are neither reproducing, lactating or growing young animals produce dramatically less excrement than production agricultural animals. However, allowing livestock access to streams is generally discouraged according to best management practices due to the potential nutrient and sediment problems that can result.

It should be recognized and considered that while both elk and bison, when satisfied regarding the availability of food and water, are relatively easy to contain, they are extremely powerful animals and can jump and break through barriers. Issues connected to liability should be investigated and clarified by the county through an attorney. Currently, the County of Lehigh appears to own these animals and the land on which they are kept while the Lehigh Valley Zoo, a 501(c)(3), has the permits for the animals displayed from the PGC and USDA under which the zoo appears to be responsible for the animals care and maintenance including their facilities. Who



bears what responsibility should an animal injure a park visitor who enters an unsupervised pasture or through an animal escaping into the park or highway is unclear. The relevance of these issues will increase as the game preserve allows greater public access without supervision.

The cost of maintaining the current animals in the existing facilities would continue at the same level as it is today, adjusted for inflation. Current annual cost runs approximately \$70,000 for personnel, \$26,000 for feed and \$8,600 for veterinary care. No estimate of facility maintenance cost was available. Thus, the total cost of maintaining these herds with no improvement to the facilities, would be in the range of \$105,000/year eventually declining as the herds shrink through attrition. In addition the current facilities take approximately 30 acres of park land that could be used for recreation.

Option 3 Discontinuance of the Elk and Horse Herds but maintain current bison herd at existing facilities using contraception to allowing herd to decline through attrition.- **Not Recommended**

The ability to view bison at the Trexler-Lehigh Game Preserve is a long held tradition of the Lehigh Valley and one many citizens may be reluctant to see come to an abrupt end. One option would be the discontinuance of the Elk and Palomino Horse Herds while retaining the bison and allowing the herd to decline through attrition using contraception to prevent any increase.

This option may be more palatable to those in the community who wish to maintain the herd at least in the short term. It does not however, address concerns regarding the obstacle it presents to the zoo in obtaining AZA accreditation, the current lack of adequate facilities in which to display the animals and the liability to the county of increased public access without upgrading the systems that protect both the bison and public. One possible option that could be explored would be if the zoo could incorporate the bison on their current property.

Option 4 Discontinuance of the Bison, Elk and Palomino Horse Herds - **Recommended**

General Trexler's goal of protecting bison, elk and white-tailed deer from near-certain extinction at the turn of the 20th century has been achieved through their successful restoration to the wild. Their continued maintenance as agricultural animals at the Trexler-Lehigh Game Preserve along with horses obtained over a decade following the General's death has no conservation or ecological significance. Indeed, the only relevance these herds have to the property's ecological health is the negative impacts that result from their over-grazing, nutrient loading and the displacement of native habitats and the species that would normally occupy them.

The display of large herbivores for recreational or educational purposes is a valid goal but remains the focus of zoos and their professional staffs not public parks or game preserves that, due to their success, have outlived the need for captive herds. In addition, the current facilities at the Trexler-Lehigh County Game Preserve are not well suited to the public display of the existing animals and will not be so without a substantial public investment in facilities and personnel.



Given the availability and proximity of the Lehigh Valley Zoo and other high quality zoo facilities as exist in Philadelphia, Hershey and New York, the continued maintenance of the bison, elk and horses by the county at the Trexler-Lehigh County Game Preserve may be difficult to justify. If the county wishes to see a representative sample of these animals retained for education and recreation purposes, the county may wish to facilitate such an effort through negotiations with the zoo. It is noted that the zoo currently includes the bison, elk and horse pens on its wagon ride tours as well as in its adopt an animal program. Otherwise, it is recommended the animals be sold or gifted.

It is difficult to transfer these animals to accredited AZA facilities since they are common and not in demand. However, Pennsylvania has over a 1,000 captive cervid herds in the state and many commercial bison operations. As livestock animals the sale of the current stock would not be difficult and should produce adequate revenue to dismantle and dispose of the existing facilities, while saving the county approximately \$105,000 per year. If the elk, for example, were CWD Qualified (Pennsylvania Department of Agriculture program to monitor Chronic Wasting Disease) they would sell for \$400 to \$900 per animal and may be used by buyers for breeding stock, velvet production, antlers or for meat. Limitations can be placed on their end use but may effect their value and marketability.

Maintaining the current herds in facilities that do not meet AZA accreditation standards while the animals are listed on PGC and United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service permits for public menageries by the Lehigh Valley Zoo does create an obstacle for the Zoo in acquiring AZA accreditation. The sale of the animals would remove this obstacle while reducing costs, opening up land for public recreation and allowing for the restoration of the preserve to native plant and wildlife populations.



OPTION	RECOMMENDATION	ACRES	ESTIMATED COST	
			Initial	Annual
<u>Option 1</u> In cooperation with the Lehigh Valley Zoo, maintain animal herds for public display but relocate to redesigned and expanded facilities that meet AZA requirements for accreditation.	<b>Not Recommended</b>	<b>- 85</b>	<b>\$150,000</b>	<b>\$250,000</b>
Advantage : -Animals are maintained by zoo professionals for public viewing  Disadvantage: -Increased financial burden to new Lehigh Valley Zoo -Risk that 501(c)(3) defaults and County has responsibility for animals -Loss of 85 acres of park land				
<u>Option 2</u> Maintain current animals with contraception at existing facilities allowing herds to decline through attrition.	<b>Not Recommended</b>	<b>- 30</b>	<b>N/A</b>	<b>\$105,000</b>
Advantage : -Animals are not moved to new location  Disadvantage: -Burden to Lehigh Valley Zoo -Facilities not well suited for displaying animals -Liability to County -Cost of ~ \$105,00/year to County -Loss of ~ 30 acres of parkland -Obstacle to AZA accreditation				
<u>Option 3</u> Discontinuance of the Elk and Horse Herds but maintain current bison herd with contraception at existing facilities allowing herds to decline through attrition..	<b>Not Recommended</b>	<b>-9</b>	<b>N/A</b>	<b>\$35,000</b>
Advantage : -Bison remain available for public viewing -Immediate cost reduction -No additional annual costs				



Disadvantage: -Loss of local public display of elk and horses  
 -Facilities not well suited for displaying animals  
 -Liability to County  
 -Cost of ~ \$105,00/year to County  
 -Loss of ~ 9 acres of parkland  
 -Obstacle to AZA accreditation

Option 4 Discontinuance of the Bison, Elk and  
 Palomino Horse Herds.

**Recommended**

**0**

**(\$105,000)**

**(\$105,000)**

Advantage : -County no longer stretching expertise  
 -Lehigh County Zoo not overextended  
 -Immediate cost reduction  
 -No additional annual costs

Disadvantage: -Loss of local public display of animals



## **Appendix B**

### **PROJECT MANAGEMENT GROUP**

- Jan Creedon, Director of General Services, Lehigh County
- Tom Gettings, Director of Special Projects, Wildlands Conservancy
- Phillip Hunsberger, Executive Vice President, Urban Research and Development Corporation
- Michael Kaiser, Executive Director, Lehigh Valley Planning Commission
- Bob Kriebel, Project Manager, Urban Research and Development Corporation
- Debra Lermite, Director of Land Conservation and Planning, Wildlands Conservancy
- Levi Price, Chief of Staff, Lehigh County
- Dale Prinkey, Director, Jacobsburg Environmental Education Center
- Janet Roth, Senior Program Officer, Trexler Trust

former members:

- Robert Korp, (former) Director of Planning, Lehigh County
- Larry Hilliard, (former) Director of Administration, Lehigh County



## **Appendix C**

### **INTERVIEWEES**

- Dexter F. Baker, Trustee, Harry C. Trexler Trust
- Thomas Christman, Executive Director, Trexler Trust
- Don Cunningham, Lehigh County Executive
- Percy Dougherty, Lehigh County Commissioner
- Tom Elias, Finance Manager, Lehigh Valley Zoo
- Jane Ervin, (former) Lehigh County Executive
- Kurt Fenstermacher, (former) Manager/Game Preserve Maintenance, Lehigh County
- Daniel G. Gambet, O.S.F.S., Trustee, Harry C. Trexler Trust
- Malcolm J. Gross, Trustee, Harry C. Trexler Trust
- Kathy Grube, member, Lehigh Valley Horse Council
- Jean Hubler, member, Citizens Task Force on the Trexler Game Preserve
- Shawn Hubler, member, Citizens Task Force on the Trexler Game Preserve
- Jerry Hunsicker, Supervisor, Lowhill Township
- Peter Karch, biology professor, Lehigh Carbon Community College
- James Kelly, Lehigh County Commissioner
- Michael Kilgore, (former) Manager of General Services, Lehigh County
- John Laub, member, Lehigh Valley Horse Council
- Carol Loomis, member, Friends of the Game Preserve
- Dr. Steven Marks, President/CEO, Lehigh Valley Zoo
- Leah Yaw McKernan, Vice President of Strategic Advancement, Kidspace
- David Mitchell, Supervisor/Southeast Region, Pennsylvania Game Commission
- Carl Peck, Manager of Physical Plant, Lehigh Carbon Community College
- Levi Price, Chief of Staff, Lehigh County
- Sterling Raber, Lehigh County Commissioner
- Andy Roman, Lehigh County Commissioner
- Arthur Schmidt, developer
- Donald Snyder, President, Lehigh Carbon Community College
- Ronald Stahley, Director of Public Works, North Whitehall Township
- Kathryn Stephanoff, Trustee, Harry C. Trexler Trust
- Bob Stiffler, Director of Recreation, Lehigh County
- Henry Stoudt, Game Preserve Maintenance, Lehigh County
- Joe Transue, Eastern PA representative, International Mountain Bicycling Association
- Don Wehr, Lehigh Valley Horse Council (son of former TLCPG groundskeepers)
- Robert C. Wood, Trustee, Harry C. Trexler Trust



## Appendix D

### **Recommendations from the report, *Trexler-Lehigh County Game Preserve, Ecological Inventory and Assessment***

The following recommendations are taken from the report, *Trexler-Lehigh County Game Preserve, Ecological Inventory and Assessment*, Wildlands Conservancy, draft, 3-30-05, and are incorporated into the *Trexler-Lehigh County Game Preserve Master Plan* by reference. The recommendations are categorized by subject in the report, with a page reference in the Wildlands document.

#### Physical Setting (p. 8)

- Consider the expansion of the Game Preserve by including adjacent Lehigh County-owned properties, as well as other properties as they become available.
- Conduct a feasibility study of a Jordan Creek greenway and trail system that would connect the Game Preserve south to the City of Allentown and north to the Appalachian Trail on the Blue Mountain.
- Protect the aesthetic viewsheds.

#### Management Issues (pp. 14–24)

- Remove the cabin (high point north of zoo). In Phase II planning, integrate vantage point into recreational activities and supporting amenities.
- Clean up farm equipment, small tanks, fuel tanks, fencing, and surrounding debris (North Range). In Phase II planning for recreational activities, determine best possible reuse of the structures.
- The old foundations and springhead on the North Range (remnants of the Hunsicker Valley Homestead) have historical value. Remove the overgrown vegetation, stabilize the stonework, and screen the spring opening to prevent entry so viewers can safely visit the site. Explore destination/educational value in Phase II planning.
- The block springhouse and stone walls (remnants of the Hunsicker Valley Homestead) have historical value. Removal of overgrown vegetation, stabilization of the stonework, and securing the door opening to prevent entry should take place for the safety of visitors to the site. Explore destination/educational value in Phase II planning.
- Remove the collapsed pavilion and other small structure on the South Range, restoring the site to a natural state.



- Remove all remnants of the old farm structure on the South Range, and restore the site to a natural state.
- Remove the old farm shed on the Central Range, and restore the site to a natural state.
- Remove the metal (vehicular) bridge crossing a tributary in the South Range, and restore the site to a natural state.
- Regrade trails and install water bars to prevent future erosion.
- Clean up the area (approximately  $\frac{1}{4}$ -acre) used for dumping concrete, stone, and ball-and-burlap plant material. Designate an area close to the maintenance building to store material that can be re-used.
- Clean up the area southeast of the ford used for dumping cinder block, stone, logs, metal, and wood. Designate an area close to the maintenance building to store material that can be re-used.
- Remove the concrete, metal, and bricks from the swale above the palomino horse enclosure, regrade the swale to allow for appropriate stormwater dispersal, and establish an herbaceous cover.
- Clean up and dispose of glass bottles, plastic, tires, and wood scattered throughout the preserve.
- Post and monitor Game Preserve boundaries. Although piles of branches often have wildlife benefits, permission should be granted by the Game Preserve staff before such activities take place on the Game Preserve. This will help prevent use as a dumping site for unwanted materials (invasive plants, trash).
- Post and monitor Game Preserve boundaries. Convert and maintain open areas as meadow. Maintain a mowed buffer between the Game Preserve and adjoining residential lots where possible.
- Remove the permanent tree stand with steps in the southwest section of the Game Preserve.
- As part of the Phase II planning process, determine the condition of fencing, need for fencing, and locations where it may be useful.

#### Natural Communities (p. 47)

- Protect, restore, and maintain natural, healthy, and functioning forest plant communities.
- Assign responsibility to specific staff for plant communities, plant species, as well as special-habitat stewardship, function, and protection.



- Develop strategies to protect each plant community and special habitat area.
- Create a five-year schedule for implementing protection strategies for each plant community and special habitat.
- Utilize Game Preserve staff as well as partners and/or outside experts (e.g., Pennsylvania Bureau of Forestry and Pennsylvania Game Commission) to implement this protection and monitoring program.
- Coordinate monitoring efforts with other entities so Game Preserve data are comparable and consistent among agencies and conservation organizations to enable better indications of forest function and health across the entire Commonwealth.
- Observe and assess the impact of humans on plant communities and special habitat areas over time. Quickly respond appropriately (e.g., moving trails, limiting access, reducing activities) with measurements (sic) that are necessary for long-term protection.
- Monitor the hemlocks in the hemlock-white pine forest and hemlock-white pine-red oak-mixed hardwood forest for wooly adelgid.
- Monitor and protect the rare plant located on the calcareous cliffs. Investigate for additional rare, threatened, and/or endangered species on the cliffs.
- Protect any trees planted in canopy gaps with wire cages or choose to plant larger trees whose crown are above the browsing height of deer, and protect the stems from antler ribbing with the use of tree-wrapping tape.

#### Invasive Plant Species (p. 53)

- Work with Lehigh County's Penn State Cooperative Extension office as it fulfills the last two years of its three-year contract with Wildlands Conservancy to test methods of controlling autumn olive.
- Develop strategies and priorities to monitor and eradicate and/or control exotic, invasive plant species found on the property.
- Develop a five-year strategy to monitor and eradicate/control each exotic, invasive plant species in the Game Preserve, focusing particularly on autumn olive.
- Assign responsibility to specific staff for invasive-plant species management.
- Utilize Game Preserve staff as well as partners and/or outside experts (e.g., Pennsylvania Bureau of Forestry and Pennsylvania Game Commission) to implement this monitoring and eradication/control program.



- Retard the spread of existing masses of autumn olive by monitoring the perimeter and removing (chemically or mechanically) newly sprouted shrubs. Mow meadows under siege twice annually.
- Consult with a local farm supply or gardening store (e.g., Agway) for more information on appropriate herbicides and application measures for specific species.
- Where appropriate, minimize human disturbance to curtail the spread of invasive plant species.
- Take caution to use uncontaminated construction materials. Materials such as soil and mulch can contain seeds, roots, and plants of invasive species. All areas that receive imported material must be monitored to quickly identify and address the new establishment of any invasive species.
- Utilize Integrated Pest Management (IPM) practices where appropriate.
- Develop a hazard-tree policy and program in an effort to protect visitors and staff from falling trees and limbs, particularly in high-risk areas. Include training of the staff in the identification and safe removal of hazard trees.

#### Deer (p. 60)

- Conduct an official deer count (i.e., “deer pellet” and/or “infrared” method) coupled with systematic observations to help determine the size, age, gender, and health of the deer herd.
- Work with the Pennsylvania Game Commission to determine the best deer-herd management techniques based on the difference between actual and target deer-herd size and composition.
- Reduce deer herd to a density of 5 to 10 per forested square mile and then maintain it at an ecologically sustainable level to allow the recovery of the plant communities, especially forest regeneration.
- Monitor the effects of deer population on the forest plant communities.

#### Bison, Elk, Palomino Horses (p. 63)<sup>1</sup>

- Manage pasture space at least 1–2 acre (sic) of good quality pasture per large animal.
- Move current animal enclosures onto pastures between the Game Preserve entrance and the zoo parking lot to:

---

<sup>1</sup> The wildlife herds are the only areas where the *Trexler-Lehigh County Game Preserve Master Plan* differs in recommendation from the ecological inventory/assessment. The master plan, through the NRC report that appears in Appendix A, assesses the biological/ecological significance of the herds, and concludes that the herds should be removed. If the herds are maintained, the recommendations of the Wildlands study should be followed.



- provide better pasture and easier access for management by the zoo staff,
  - expand viewing opportunities, and
  - protect water resources.
- Rotate pasture space on a predetermined, regular basis to provide better pasture management and to reduce feeding costs.
- Utilize partners and/or outside experts (e.g., Penn State Cooperative Extension) for pasture and animal management.
- Explore options (i.e., solar panels) for providing electricity to new animal enclosures for electric fencing and water de-icer.
- Explore using solar wells to provide water.

#### Amphibians, Reptiles, Birds, Mammals, Other Wildlife (pp. 79–80)

- Maintain plant communities as habitats and for food sources for birds (migrating and resident), amphibians, reptiles, mammals, fish, macro-invertebrates, insects, and other wildlife, especially rare, threatening (sic), endangered, and special concern species.
- Develop a five-year strategy to monitor and manage amphibians, reptiles, birds, mammals, and other wildlife.
- Assign responsibility to specific staff for management of amphibians, reptiles, birds, mammals, and other wildlife.
- Utilize Game Preserve staff as well as partners and/or outside experts (e.g. Pennsylvania Bureau of Forestry, Pennsylvania Game Commission, and Pennsylvania Fish and Boat Commission) to implement this monitoring and management program.
- Work with neighbors, municipalities, and conservation organizations to promote wildlife corridors along the Jordan Creek, south to the City of Allentown and north to the Blue Mountain (part of the larger Kittatinny Ridge).
- Work with neighbors, municipalities, the Pennsylvania Game Commission, and conservation organizations to promote wildlife corridors between the Game Preserve and State Game Lands (SGL) #205.
- Preserve and protect continuous, unfragmented forest cover on the North Range in conjunction with SGL #205.
- Conserve forest cover along streams to improve and expand habitat protection along the Jordan Creek, thus enhancing water quality and habitat for wildlife, including fish.



- Improve riparian habitat along the Jordan Creek, especially in the Central Range.
- Designate the Game Preserve as a national and Pennsylvania *Important Mammal Area*.
- Observe and document migratory birds annually as baseline information (using volunteers).
- Conduct turkey census and develop management strategies based on this census information.
- Designate the Game Preserve as a national and Pennsylvania *Important Bird Area (IBA)*.
- Limit pesticide and herbicide applications, except when deemed necessary, (i.e., autumn olive control) to provide resource protection.
- Utilize native shrubs that provide food for migrating birds and other wildlife around existing and new facilities, openings, and access routes.
- Utilize native grasses as a seed source for seed-eating birds and other wildlife in existing and new parking areas and other necessary open areas.

#### Deer Exclosures (p. 82)

- Monitor the three existing deer exclosures monthly during the growing season (April through October) and record all pertinent information on appropriate forms.
- Consider installing additional, larger deer exclosures in the remaining eight plant communities to use as research and educational tools, and to document the level of deer impact.

#### Jordan Creek (pp. 90–91)

- Minimize impacts to soils, native plant communities, and water resources, especially within areas identified as “Environmentally Sensitive Lands”.
- Incorporate Structural and Non-Structural Best Management Practices (BMPs) into proposed future site development and/or improvements to achieve comprehensive storm water management and minimize runoff and impacts to soils and native plant communities.
- Establish a series of designated stream-access locations to the Jordan Creek at various locations. Designated stream-access locations should be designed to accommodate water-based recreational activity needs in such a way that minimizes runoff and impacts to soils, native plant communities, and water resources, especially within areas identified as “Environmentally Sensitive Lands”.
- Investigate ways to reduce the negative environmental impacts and safety hazards associated with the automobile ford across the Jordan Creek to:



- Create a safer environment for the general public by limiting the potential for people and vehicles to be swept downstream as a result of crossing the ford during high-water conditions.
- Minimize water pollution resulting from leaking vehicle fluids (fuel and oil) to the Jordan Creek.
- Minimize aquatic-habitat impacts to the Jordan Creek, including sedimentation, thermal pollution, and fish-passage obstruction.
- Work with the Pennsylvania Fish and Boat Commission to determine if the existing water quality and physical habitat characteristics of the Jordan Creek are conducive to supporting trout stockings, and if so, what species and biomass that (sic) would be most appropriate to stock.
- Conserve forest cover along the Jordan Creek to maintain cooler water temperatures and enhance water quality.
- Develop a working relationship with the Pennsylvania Game Commission to coordinate management strategies of water quality of Mill Creek.

#### Educational Programs (p. 92)

- Develop and utilize an effective educational program that establishes the Game Preserve as an educational resource for the Lehigh Valley community.
- Include recreational activities in the educational programming, such as guided hikes, bird watching, fishing, wading in the Jordan Creek, night observation, and forest management.
- Collaborate with local universities, educational institutes, and local conservation groups to manage the property and to provide educational opportunities (i.e., Lehigh County Zoo, Lehigh Carbon Community College, the National Trails Training Partnership, Pennsylvania Recreation and Park Society, Lehigh County Conservation District, the local chapter of the Sierra Club, and others).
- Monitor recommended educational and recreational activities on an on-going basis to identify unexpected impacts or conditions.
- Develop educational/interpretive signage and other educational tools to educate the public about the various natural features of the Game Preserve.

#### Recreation (p. 103)

- Consider providing appropriate programming and facilities for the following recreational activities (in alphabetical order):

- biking/mountain biking
  - camping
  - cross-country skiing
  - fishing
  - hiking
  - horseback riding
  - nature watching, including viewing the bison, elk, and palomino horses
  - picnicking
  - wading in the Jordan Creek
  - walking
- Monitor recommended educational and recreational activities on an on-going basis to identify unexpected impacts or conditions.
- Consider reusing and improving the existing roadway/trail remnants for recreational activities.
- Work with federal, state, and local organizations to provide specific funding for recreational opportunities and appropriate facilities.
- Work with the International Mountain Biking Association (IMBA) guidelines and procedures to design single-track, trails, and multi-use trails that include biking and mountain biking.
- Work with local mountain biking associations to determine the best trail solutions for protecting the environment and providing biking opportunities.
- Work with partners, such as the Lehigh Valley Convention & Visitors Bureau, to develop recreation programming that will attract visitors to the Lehigh Valley.
- Work with the Pennsylvania Fish and Boat Commission to determine best fishing areas along the Jordan Creek, explore stocking the stream, and develop specific policies for the Game Preserve.
- Work with [the] Lehigh Valley Horse Council to determine best trail locations and solutions for protecting the environment and providing horseback riding opportunities.

#### Red oak–mixed hardwood forest and hemlock (white pine) forest (p. 107)

- Concentrate disturbance (buildings, roads, campgrounds) along edges and not within the forest interior.
- Allow for some breaks in the canopy to permit sunlight to reach the forest floor to support the growth of understory plant species.
- Plant appropriate native plants in wooded plant communities (understory trees, shrubs, perennials, and ferns) to provide wildlife food and shelter. (Provide deer fencing for newly planted vegetation.)



- Plant appropriate native trees to expand narrow wooded areas as circular wooded plots offer more forest interior habitat and less access to the interior for predators and nest parasites, therefore maximizing habitat for forest-interior-area-sensitive species.
- Consider minimizing isolation of forest patches by promoting reforestation of successional fields that will provide wildlife corridors between forest tracts.
- In forested areas, leave:
  - All snag, cavity, and den trees for wildlife.
  - On average, one large and three small cavities per acre (different species prefer different types and sizes).
  - Four to six trees in the form of culls or dying trees as potential cavity trees.
  - Dead and downed woody debris.

Floodplain meadow and swamp rose palustrine shrubland and wet meadow and sycamore (river birch)—box-elder floodplain forest and general riparian habitat (pp. 109–110)

- Manage the woody vegetation (e.g., red maple) so this species does not take over the meadow, as it will close the canopy and greatly alter the hydrology.
- Leave woody debris and brush piles in the wet meadow.
- Erect nest boxes for bats, wood ducks, and prothonotary warblers.
- Plant native trees and shrubs in degraded riparian buffer zones.
- Maintain existing and newly planted native trees and shrubs in these areas.
- Leave large trees overhanging the water, fallen trees, branches, snags, and leaves unless considered a safety hazard.
- Protect sandy soils with good sun exposure used by turtles as nesting areas.

Skunk cabbage seep (p. 110)

- Favor native, mast trees, shrubs, and vines (i.e., pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), hawthorn (*Crataegus spp.*), winterberry (*Ilex spp.*), viburnums (*Viburnum spp.*), serviceberries (*Amelanchier spp.*), and American bittersweet (*Celastrus scandens*)) for the food they provide well into the winter.
- Encourage herbaceous vegetation around all spring seep perimeters.
- Protect these valuable wetlands from any disturbance that could degrade the seep, especially timbering operations and agricultural pollution.

### Vernal pool (p. 111)

- Protect the critical terrestrial habitat by limiting disturbances or development to happen in less than 25% of this critical habitat.
- Protect by limiting disturbance, especially in the vernal pool depression. Protect the vernal pool “envelope” by:
  - Leaving the forested habitat intact.
  - Avoiding barriers to amphibian movement.
  - [P]Reverting alteration of the hydrology and water quality.
  - [P]Reverting or limiting disturbance or development.
- Protect the critical terrestrial habitat by limiting disturbance or development to happen in less than 25% of this critical habitat.
- Avoid disturbance of wet areas (wetlands, springs, and vernal pools) even when they appear to be dry.

### Calcareous opening/cliff (p. 112)

- Ensure that rocky outcrops can be used by salamanders by maintaining adequate shade to retain moisture in the outcrops.
- Daylight a few areas of the rocks by felling or girdling trees to enhance their use as thermal habitat by garter snakes, black rat snakes, eastern hognose snakes, eastern fence lizard, and other reptiles.

### Young miscellaneous forest/woodland and successional field (p. 113)

- Create a soft transition from successional fields to forested habitat by cutting down trees along the border until the maximum forest tree height (in feet) is equal to the distance within the forest (in feet). For example, three feet into a forest, a properly created soft edge will have no vegetation or trees higher than three feet tall.
- Provide additional food sources by planting native shrubs and small trees, including American crabapple (*Malus coronaria*), blackberry/rasp[berry (*Rubus spp.*), serviceberry (*Amelanchier spp.*), blueberry (*Vaccinium spp.*), elderberry (*Sambucus canadensis*), hawthorn (*Crataegus spp.*), black huckleberry (*Gaylussacia baccata*), and witch hazel (*Hamamelis virginiana*). Protect these plants from deer browsing by caging or using tree tubes.
- Establish a population of American woodcock by first stocking and then managing the habitat areas found on the South Range (i.e., meadow, shrubland, early successional habitat forest, riparian zone) for the American woodcock (a species in decline).



- Manage for the American woodcock by planting a dense thicket of hawthorn, alder, birch, and/or aspen in this area, as woodcock are often associated with young thickets of these tree species.
- Inventory successional fields and document areas and stages of succession.
- Compare inventory of the successional fields with that of the forested plant communities to determine if, and which, successional fields should [be] allowed to revert to forest in order to provide interior habitat and less access to the interior for predators and nest parasites (e.g., brown-headed cowbirds).
- Promote reforestation of successional fields that will provide wildlife corridors between wooded tracts.

#### Upland meadow (p. 115)

- Convert some of the upland meadows to native warm season grass meadows, and convert some smaller areas to cool season grasses.

#### Environmental impact of educational and recreational activities (p. 120)

- Limit public use in the following areas to scheduled guided tours and educational and other appropriate activities to prevent undue disturbance of these critical resources:
  - South Range.
  - Shale cliffs/outcroppings in various areas of the Game Preserve.

#### Management Models (p. 121)

- Conduct a phase II master site planning process to develop a comprehensive plan for integrating the environmental, ecological, and physical features of the Game Preserve with appropriate educational and recreational activities.
- Provide a full-time, on-site Game Preserve manager with appropriate supporting staff.
- Develop outreach activities that include identifying, contacting, and enrolling community and volunteer organizations as key partners for assistance in land management and maintenance, wildlife research and protection, education, and recreation.

## **APPENDIX E**

### **DETAILS**

Gravel Pave Section for Handicapped Trail

Pathway Cross Section

Pathway on Slope Area

Road Crossing (1)

Road Crossing (2)

Road Entrance (3)

Road Entrance (4)

Post (for Guide Rail)

Wood Guide Rail

Identification Sign Detail

Stop Sign

Vehicles Excluded

Warning Sign

Pedestrian Crossing Sign

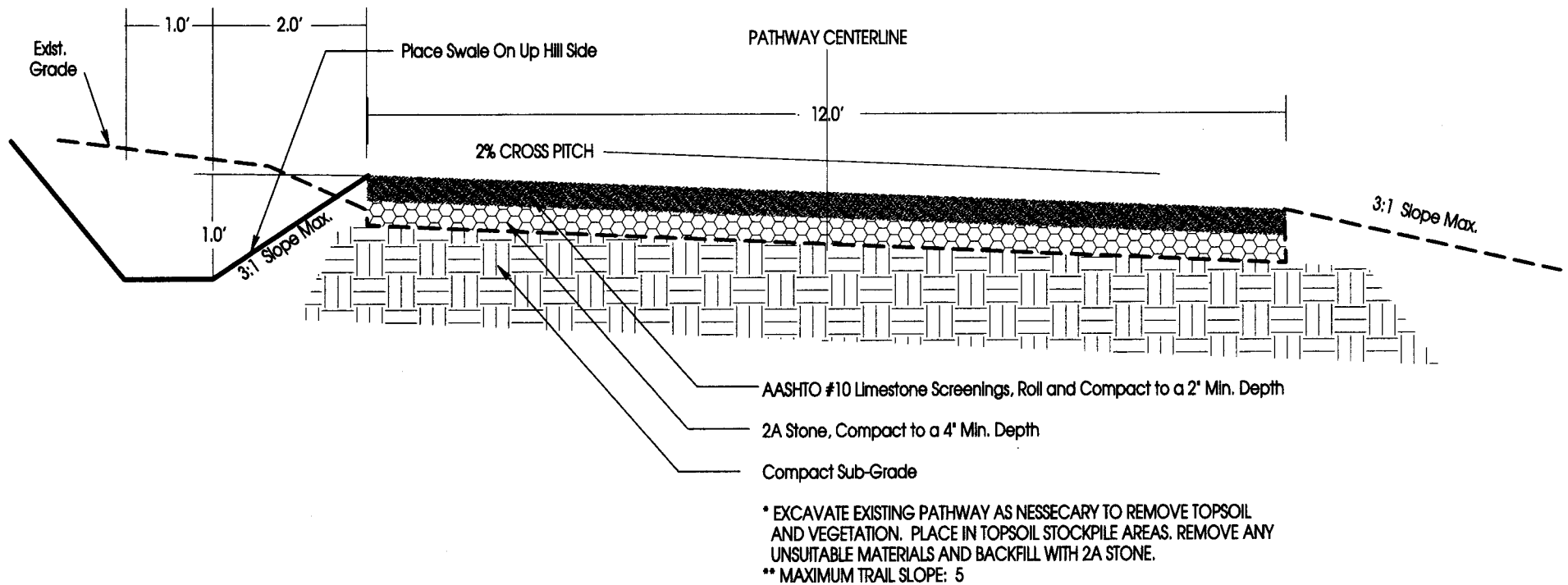
Sign Post

Metal Gate

Post and 3-Rail Fence

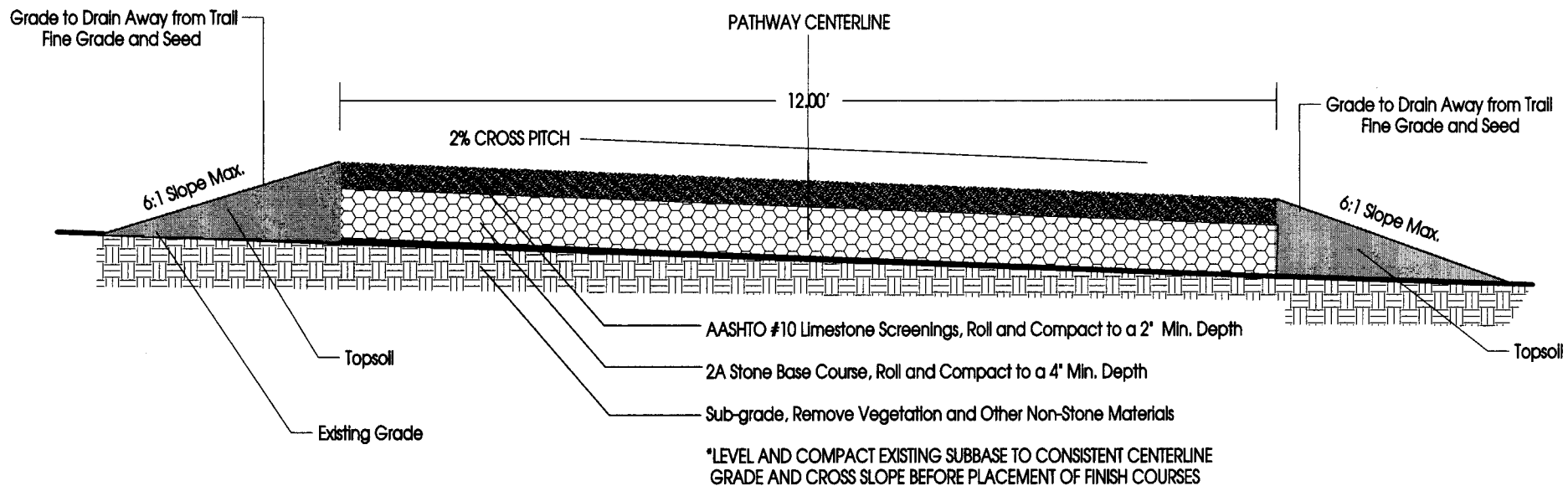
Kiosk





## Gravel Pave Section for Handicapped Trail

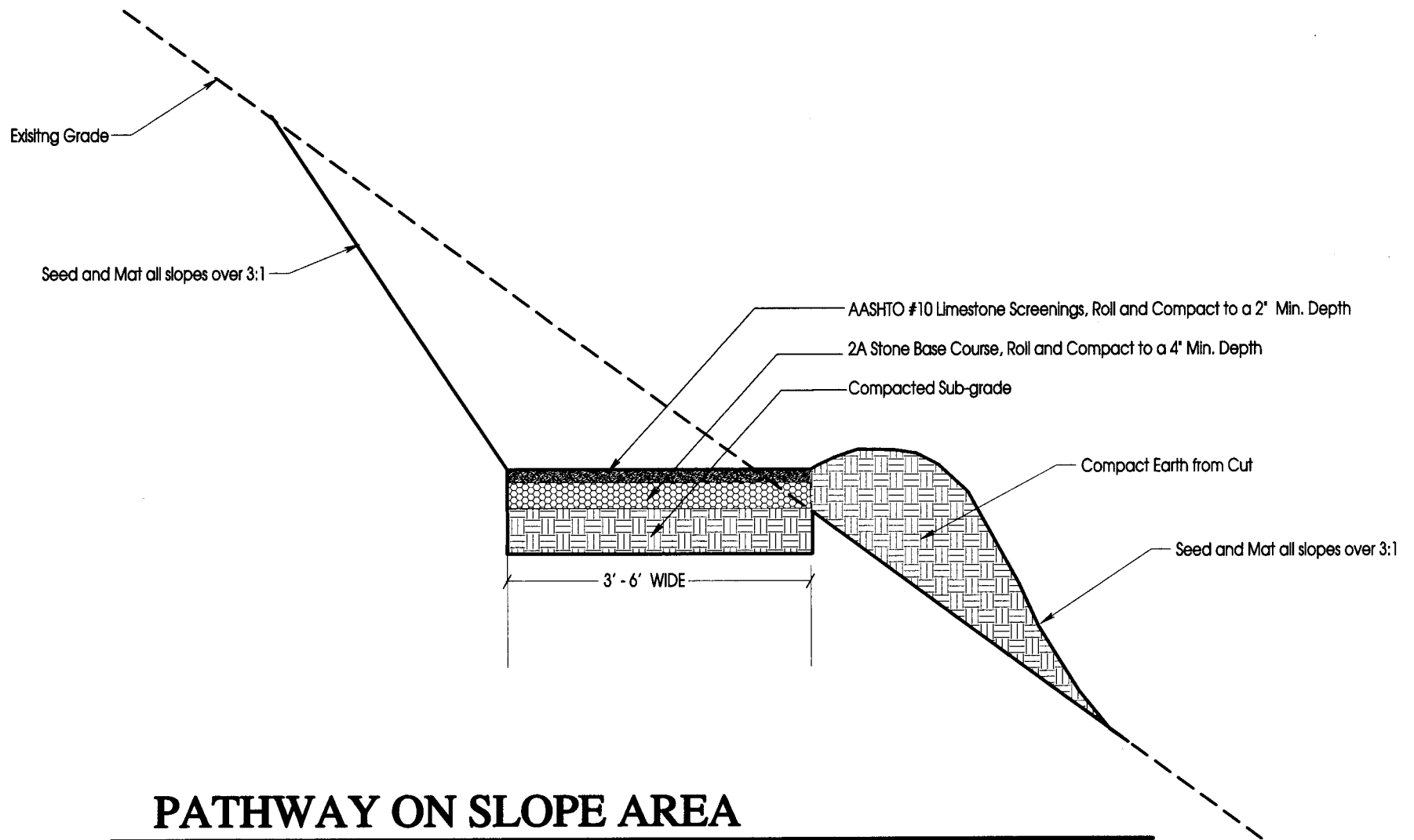
NOT TO SCALE



## PATHWAY CROSS SECTION

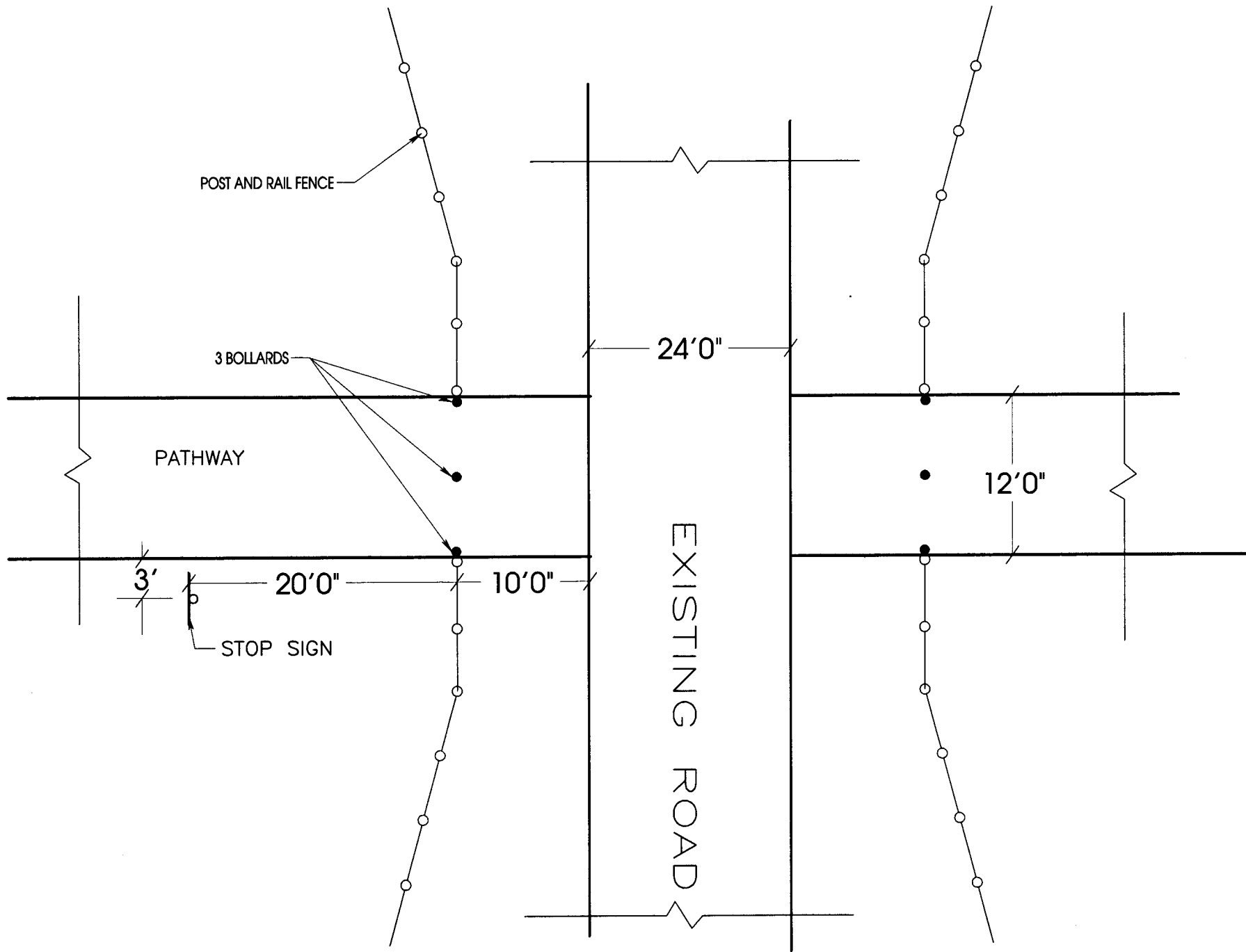
NOT TO SCALE





## PATHWAY ON SLOPE AREA

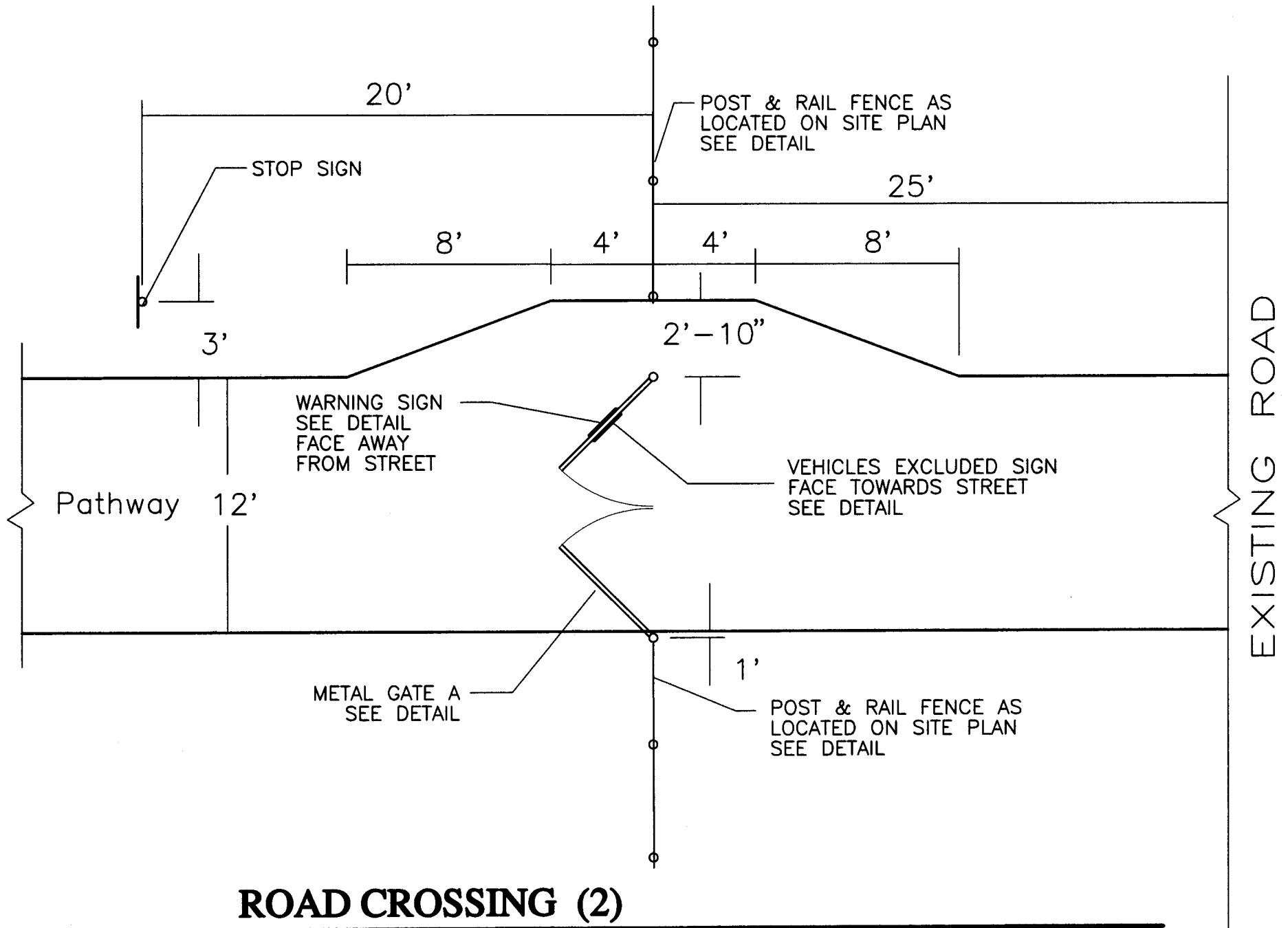
NOT TO SCALE



## ROAD CROSSING (1)

NOT TO SCALE





## ROAD CROSSING (2)

NOT TO SCALE





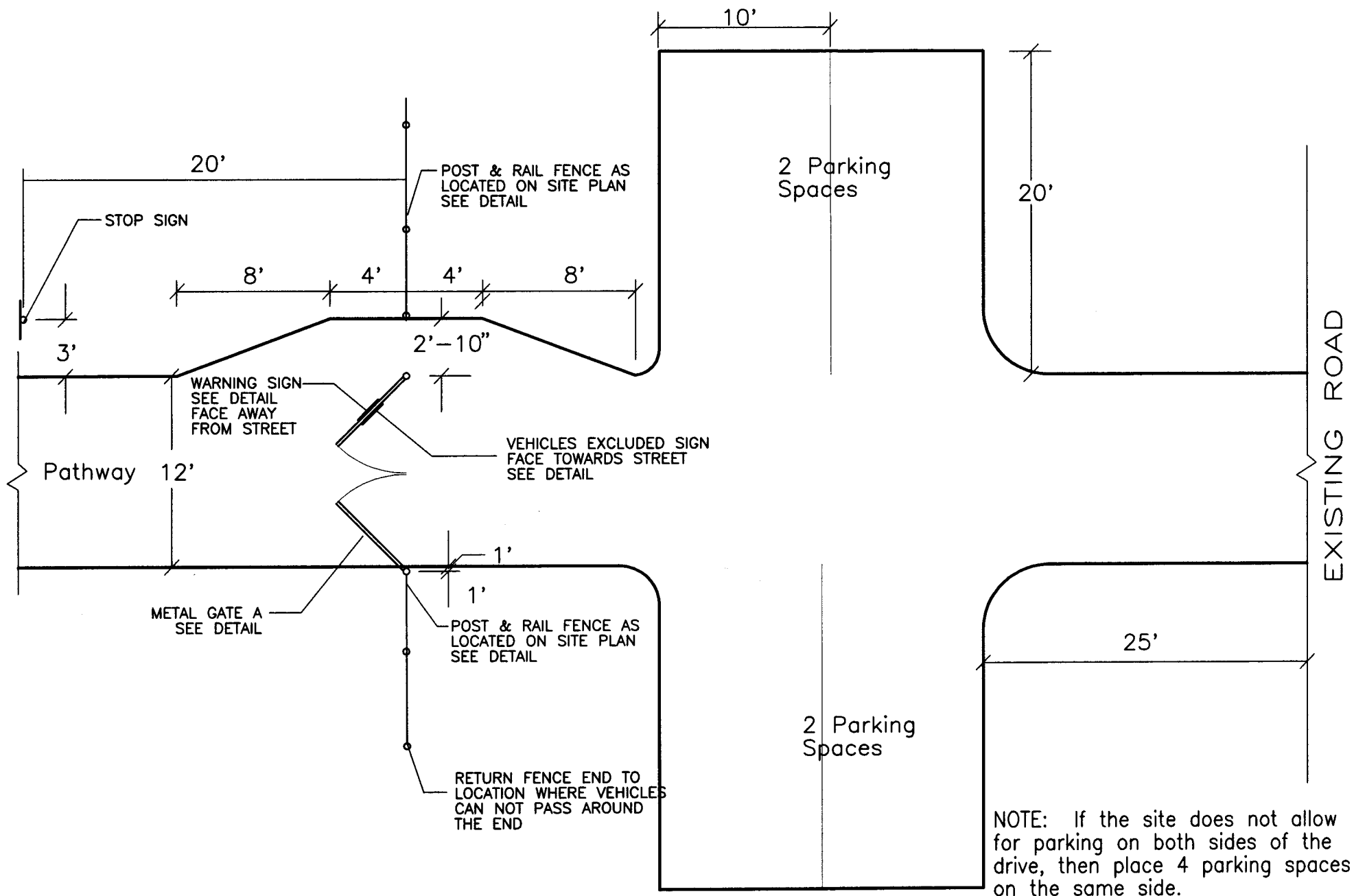
Road Crossing (1)





Road Crossing (1)



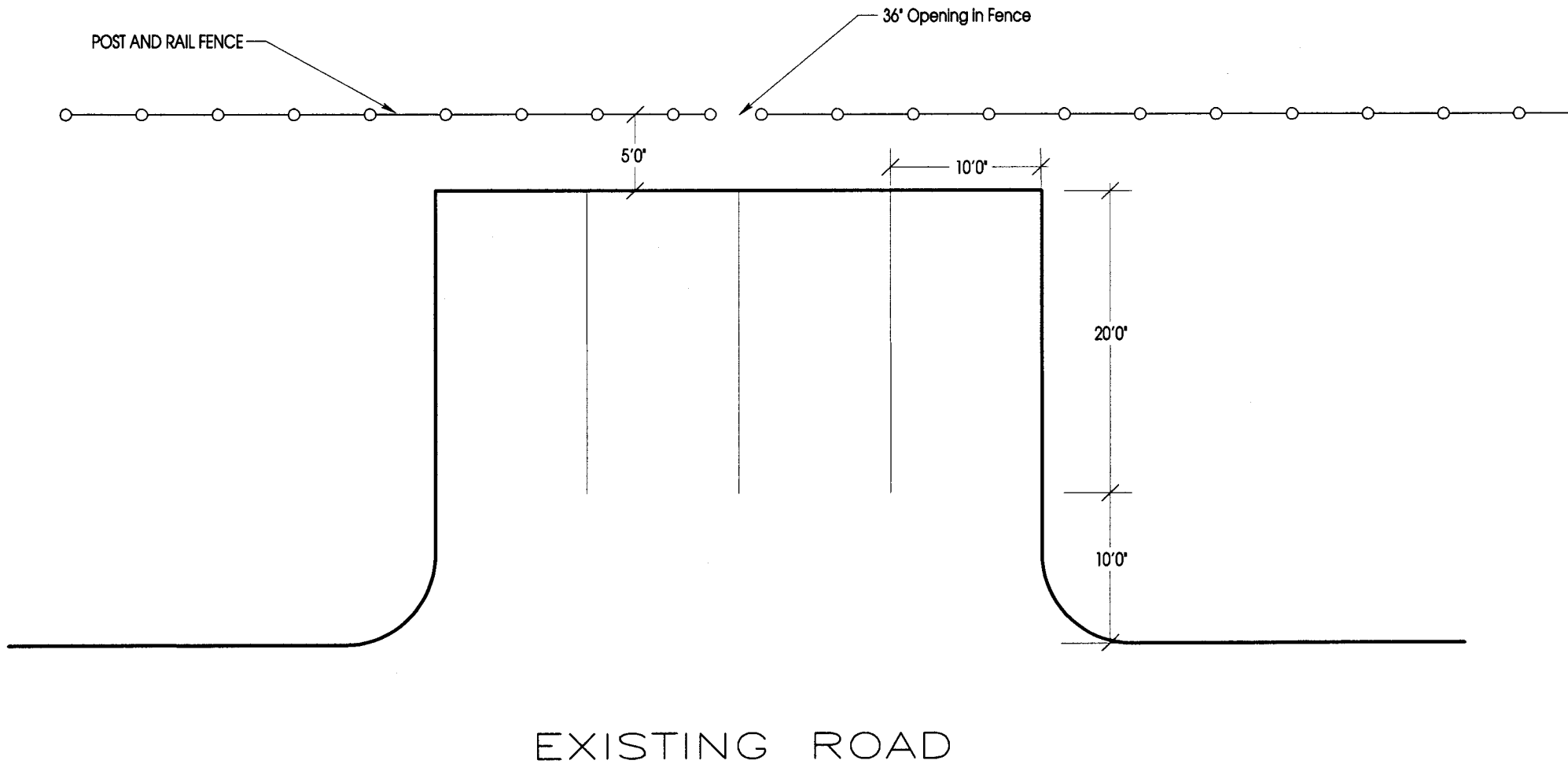


NOTE: If the site does not allow for parking on both sides of the drive, then place 4 parking spaces on the same side.

# ROAD ENTRANCE (3)

NOT TO SCALE

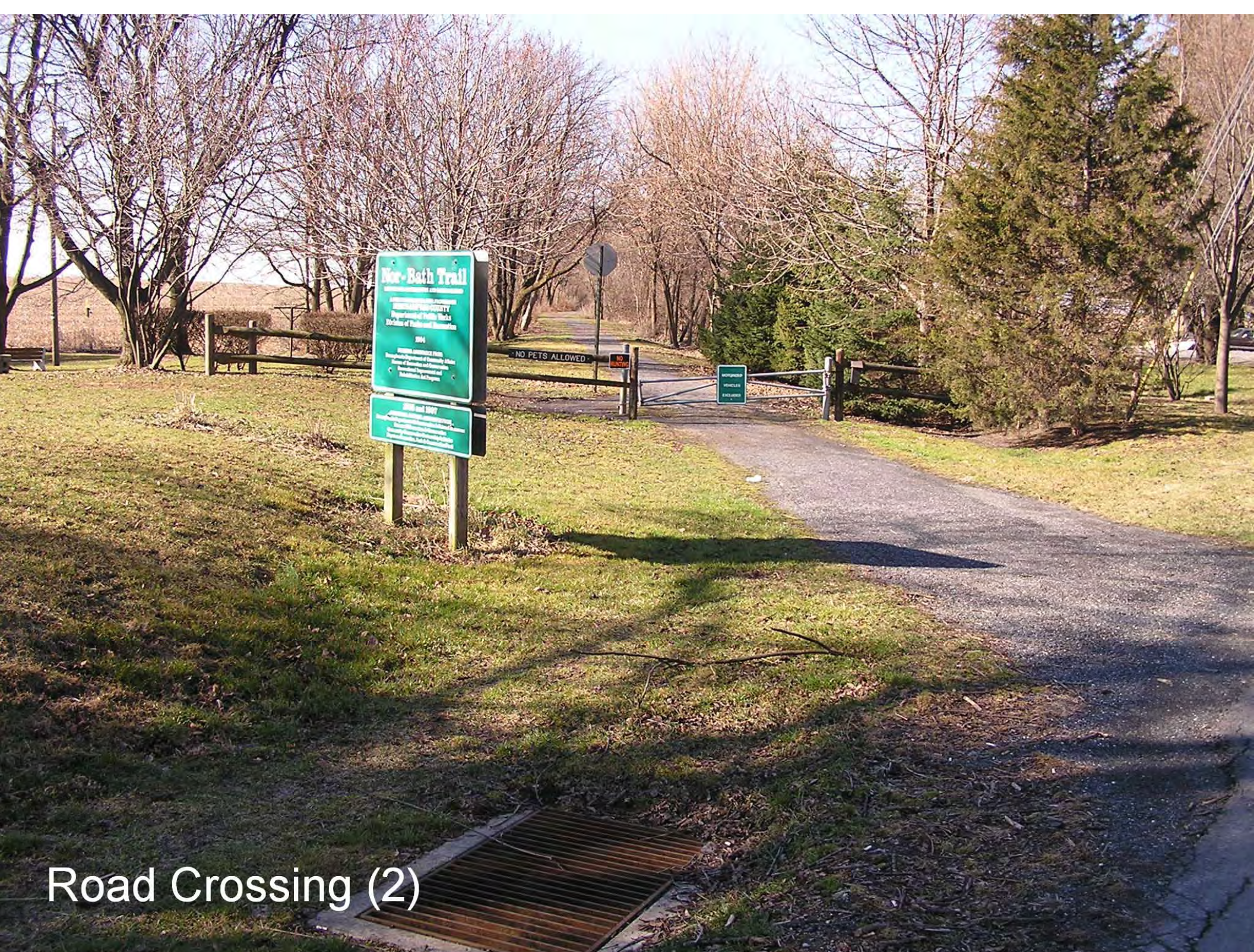




## **ROAD ENTRANCE (4)**

NOT TO SCALE





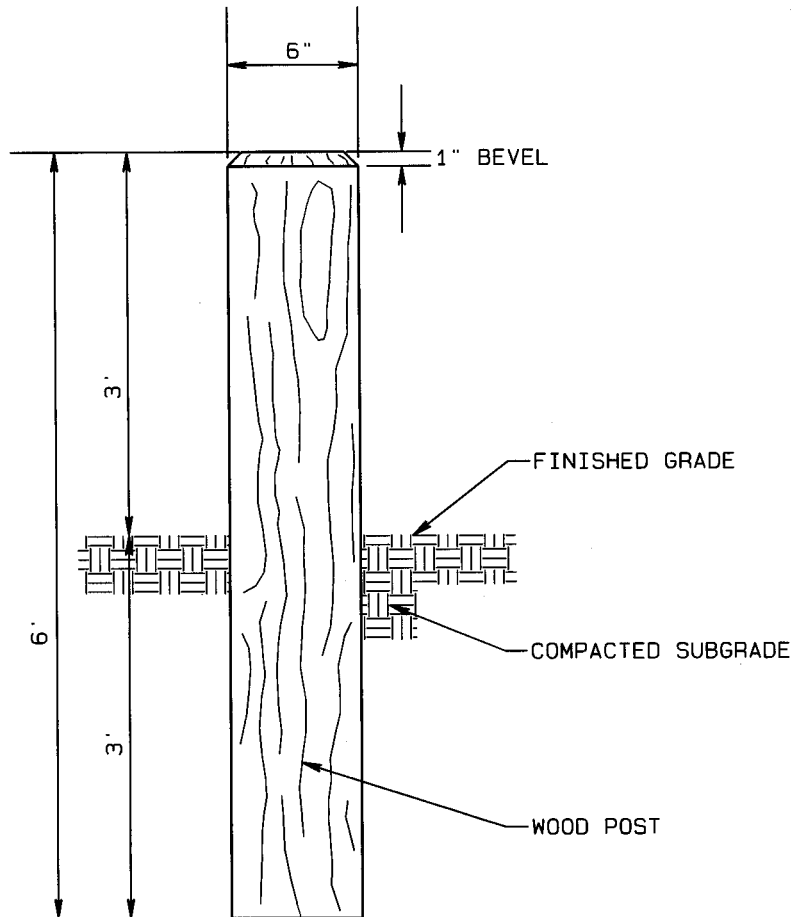
Road Crossing (2)





Road Entrance (4)

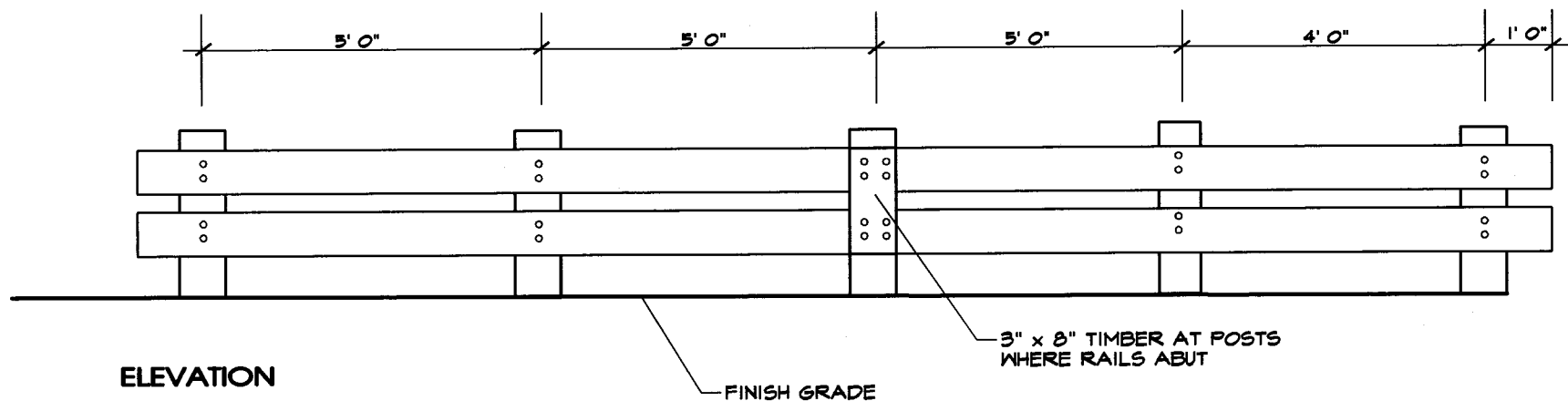




## POST

NOT TO SCALE





## WOOD GUIDE RAIL

**Scale: 3/8" = 1' 0"**

NOTE: ALL METAL FASTENERS TO BE HOT  
DIPPED GALVENIZED





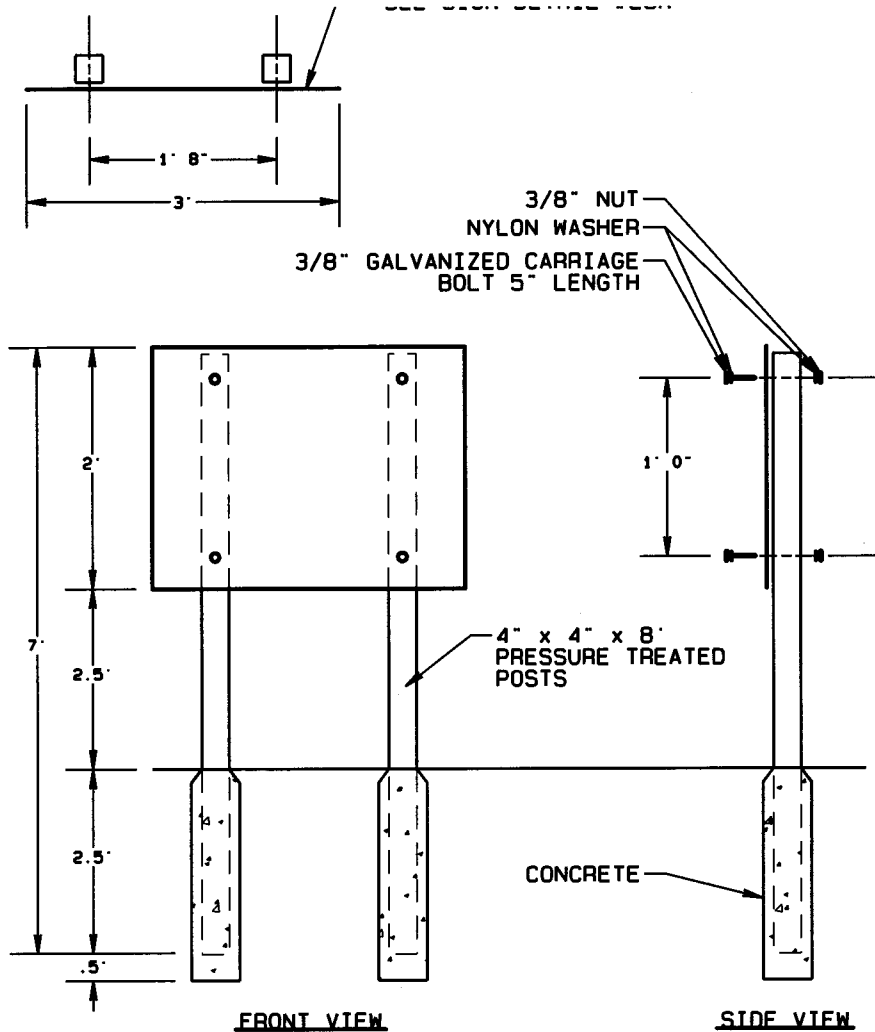
Post Guide Rail





Wood Guide Rail

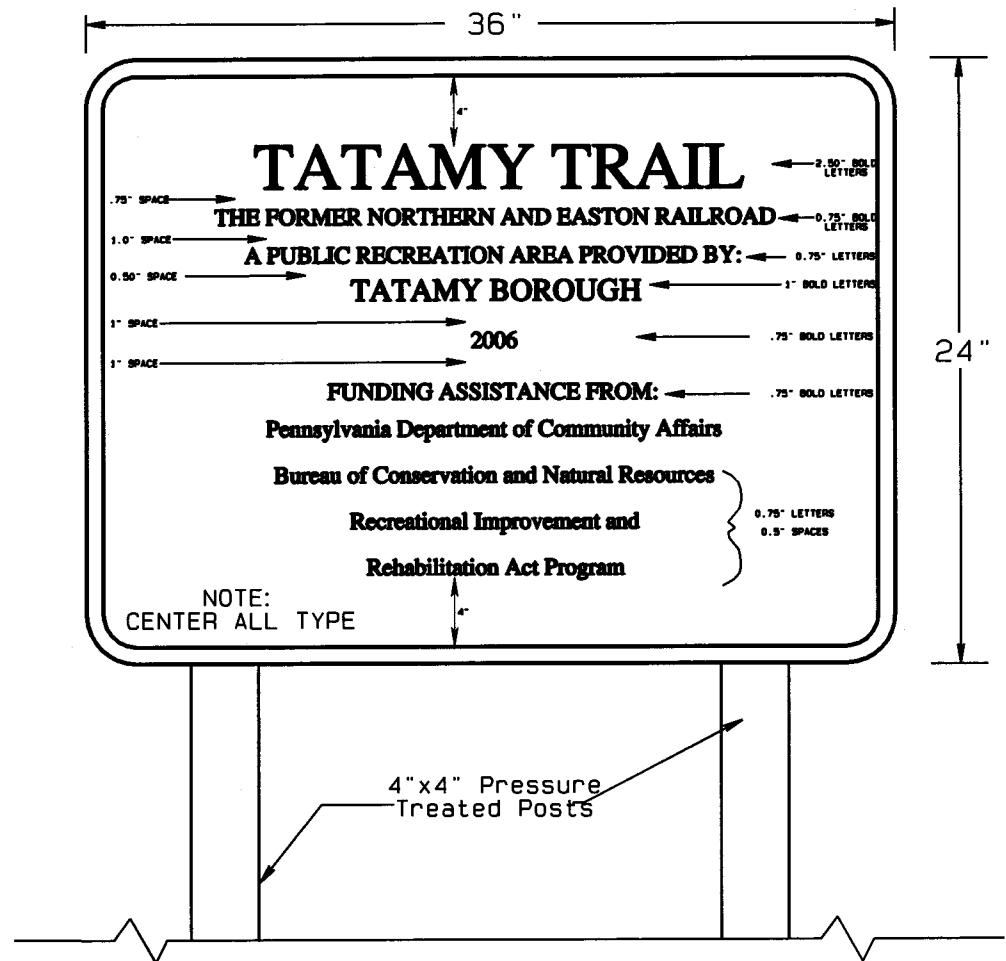




NOTE:  
1. TIGHTEN NUT, CUT BOLT OFF FLUSH STRIP NUT.

## XX IDENTIFICATION SIGN POST AND MOUNTING

NOT TO SCALE



### NOTES:

1. 0.08 GAGE ALUMINUM SIGN
2. WHITE LETTERING ON GREEN BACKGROUND WITH WHITE BORDER
3. LETTERING STYLE -- TIMES ROMAN
4. SHOP DRAWING REQUIRED / TO MATCH EXISTING SIGN

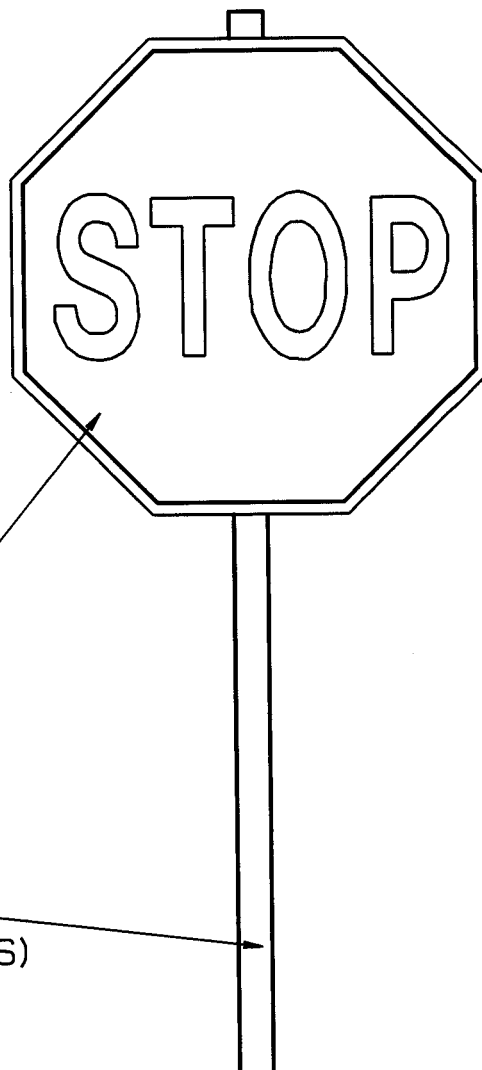
## XX IDENTIFICATION SIGN DETAIL

NOT TO SCALE



STANDARD ALUMINUM  
STOP SIGN  
R1-1 24' x 24"

MOUNT ON SIGN  
POST AT LOCATION (S)  
SHOWN ON PLAN  
(SEE SIGN POST  
DETAILS 30 & 31)



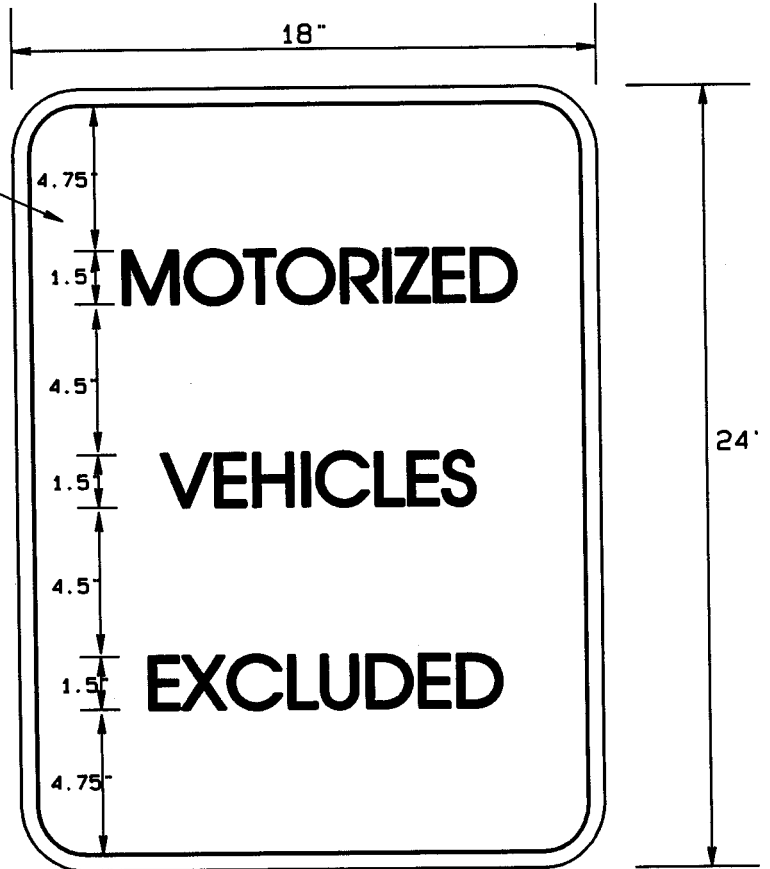
**STOP SIGN**

NOT TO SCALE

CUSTOM ALUMINUM SIGN  
R7-114 18"-24"  
WHITE LETTERS ON  
GREEN BACKGROUND

ATTACH TO GATE(S)  
FACING STREET AT  
LOCATIONS SHOWN  
ON PLAN

NOTE: CENTER ALL TEXT  
TEXT STYLE-HELVETICA



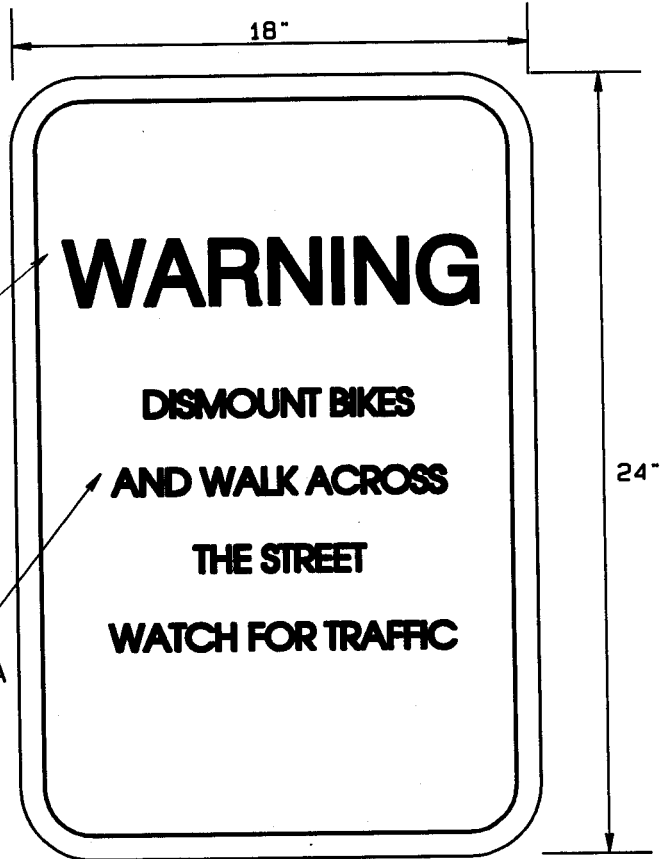
**XX** **VEHICLES EXCLUDED**  
**SIGN** NOT TO SCALE



CUSTOM ALUMINUM SIGN  
R7-114 18" x 24"

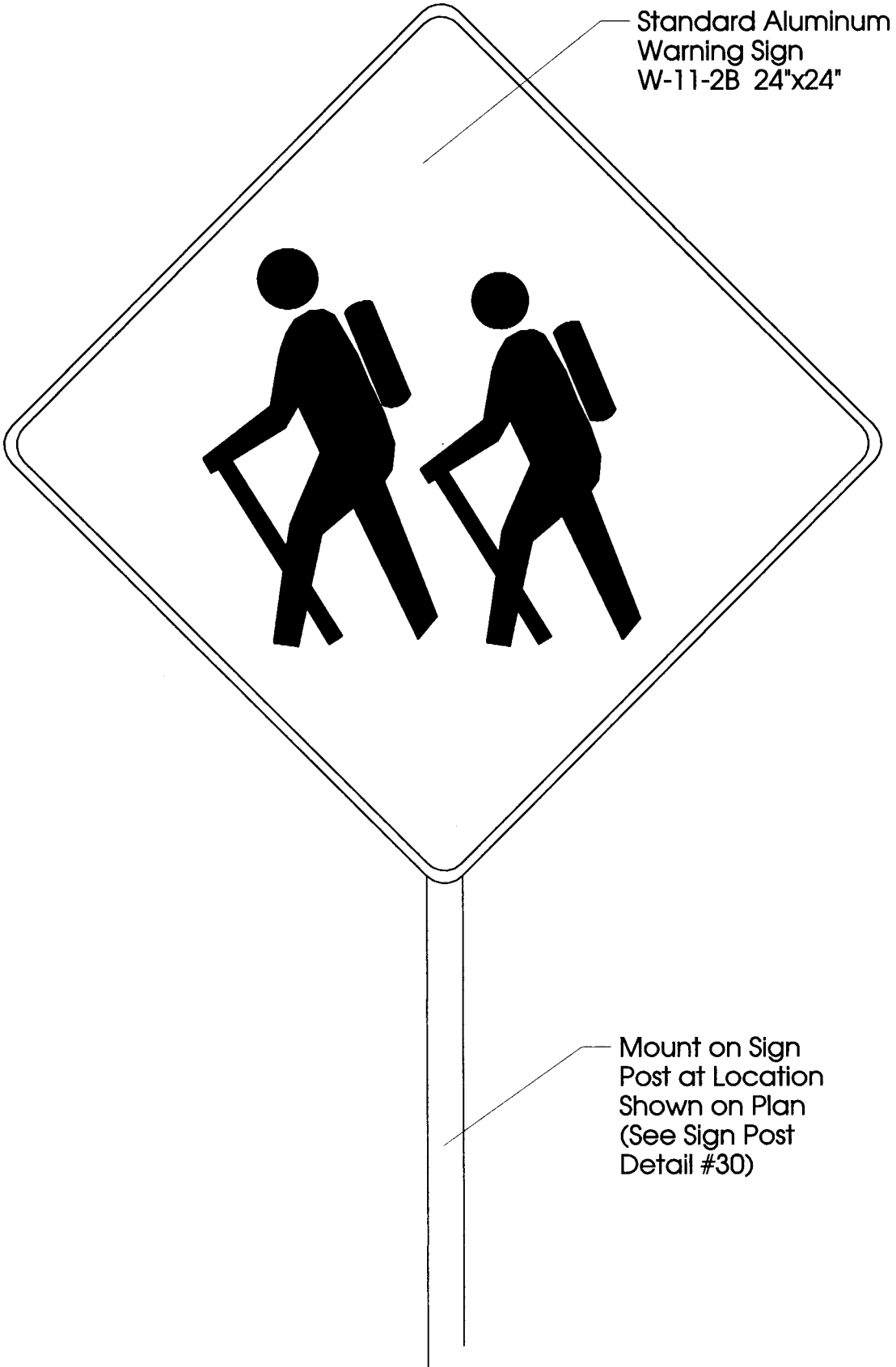
RED LETTERS CENTERED  
ON WHITE BACKGROUND  
TEXT STYLE - HELVETICA

NOTE:  
MOUNT ON GATE (S)  
AT LOCATIONS SHOWN  
ON PLAN



**WARNING SIGN**

NOT TO SCALE



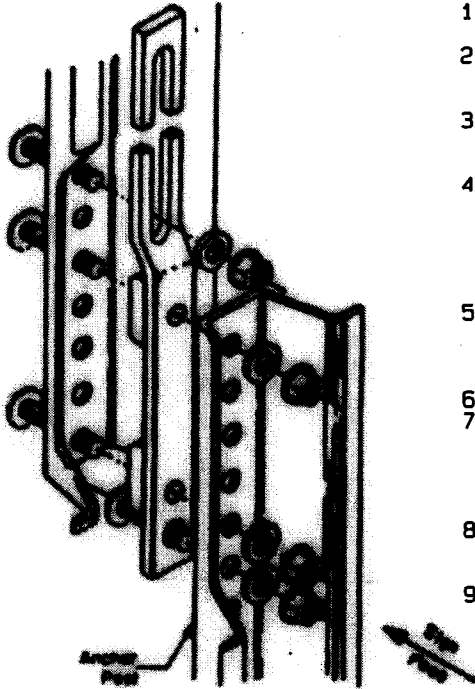
Standard Aluminum  
Warning Sign  
W-11-2B 24"x24"

Mount on Sign  
Post at Location  
Shown on Plan  
(See Sign Post  
Detail #30)

## PEDESTRIAN CROSSING SIGN

Not to Scale





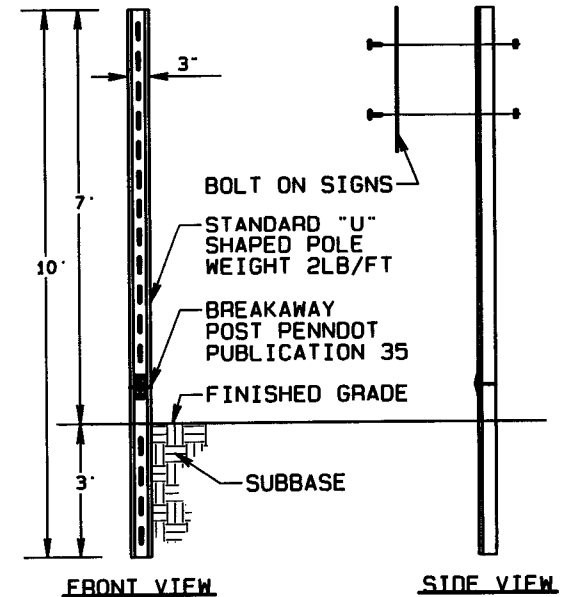
**NOTES:**

1. Determine the proper size signpost and anchor from the appropriate graph.
2. Remove a shovel of dirt at the post location to allow for final attachment to post anchor.
3. Drive the anchor into the ground with a drive cap until only 10" of the anchor is above ground.
4. Align the hole closest to the long slot in the retainer space strap with the top hole in the anchor. Attach strap by making a bolted connection through the bottom hole in the strap and the hole it aligns with in the anchor.
5. Rotate the strap 90 degrees to the left or right and drive the anchor into the ground until only 4" remain above ground level to enhance the breakaway features of the sign.
6. Rotate the strap back to vertical position.
7. Place the sign post against the anchor and the strap. Align the bottom hole in the signpost with the lowest open hole in the strap. Insert two anchor bolts through the common holes in the signpost, strap and anchor.
8. Complete the construction by attaching the strap to the signpost with a bolt and nut at the bottom of the long slot in the strap.
9. Tighten the bolts and nuts by the turn-of-the-nut method, i.e., bring nut to a snug tight condition to insure that all parts are brought together into full contact with each other, then tighten an additional 1/2 turn.
10. Restore the dirt around the anchor.



## BREAKAWAY SIGN POST

NOT TO SCALE



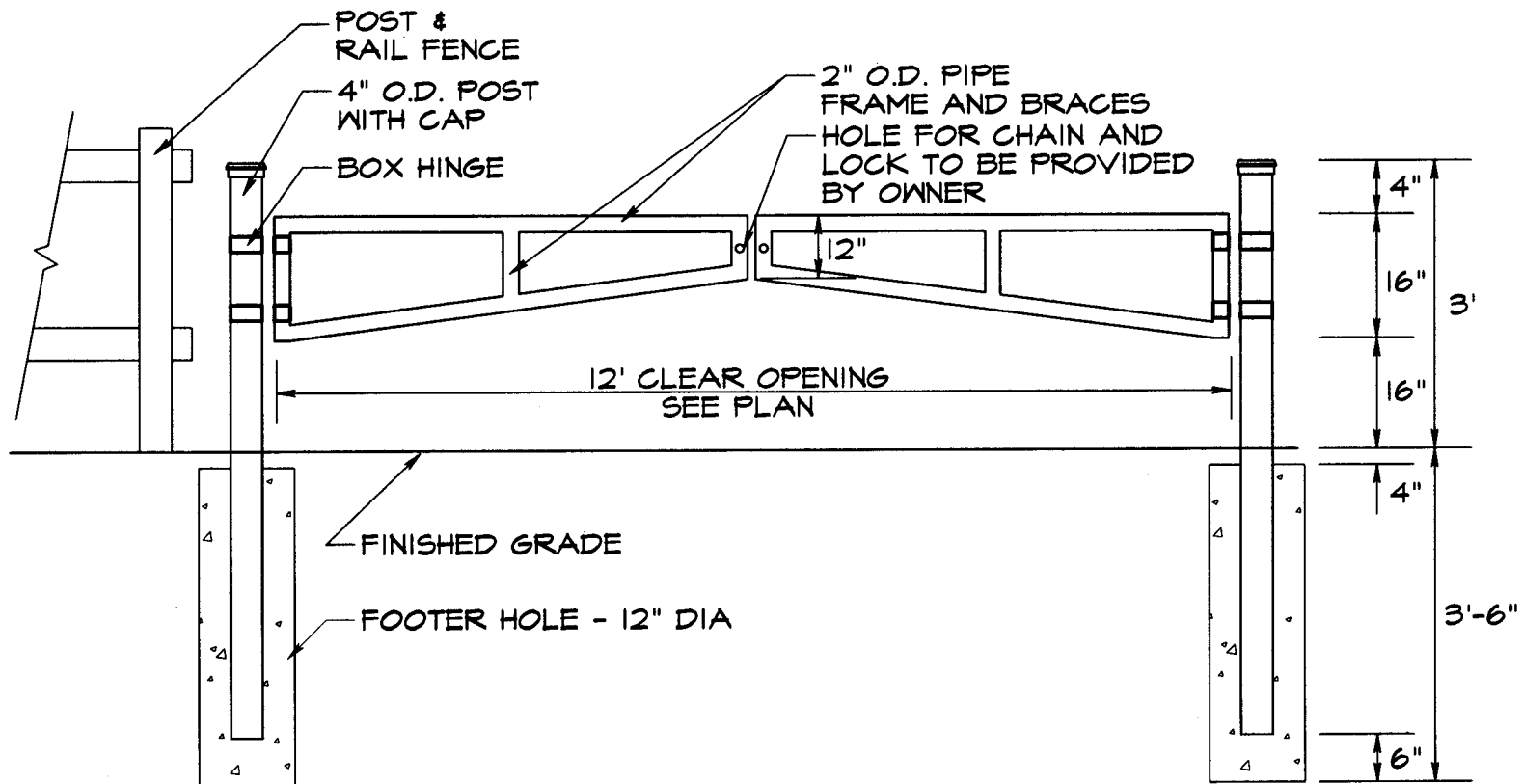
**NOTE:**

1. THIS POST IS TO BE USED ON ALL SIGNS EXCEPT HANDICAPPED PARKING SIGNS WHICH SHALL BE MOUNTED ON A 7' POST WEIGHT OF 1.12 LB/FT
2. INSTALL AS PER PENNDOT SPECIFICATIONS.



## SIGN POST

NOT TO SCALE



NOTES:

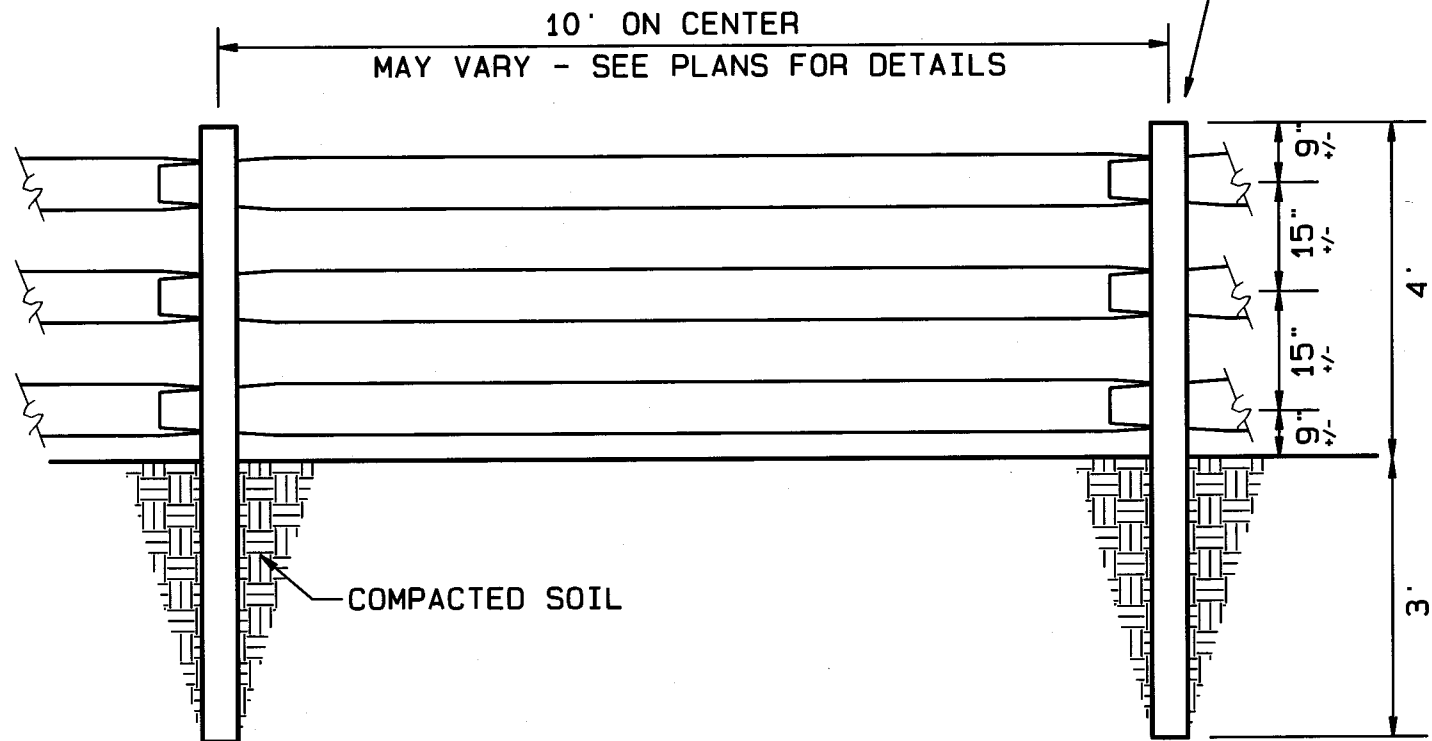
1. WELD PIPE AND GRIND ALL WELDS SMOOTH.
2. ALL GATE MATERIALS, WELDS AND CONNECTIONS TO BE GALVANIZED STEEL.
3. SEE SITE PLAN FOR HINGE AND SWING SIDE OF GATE.
4. SEE SITE PLAN FOR ABUTTING WOOD POST AND RAIL FENCE.
5. PROVIDE CLOSING HASP & PROVISION PADLOCK USE.
6. PROVIDE SHOP DRAWINGS OF GATE FOR REVIEW AND APPROVAL BY OWNER.

## METAL GATE

NOT TO SCALE



ALL TURNS IN FENCE LINE SHALL  
BE IN 45 OR 90 INCREMENTS



NOTES:

1. WHITE CEDAR 6" THREE (3) RAIL FENCE  
(PADDLED OVERLAP)

## **POST & 3 RAIL FENCE**

NOT TO SCALE





MOTORIZED  
VEHICLES  
EXCLUDED

Metal Gate

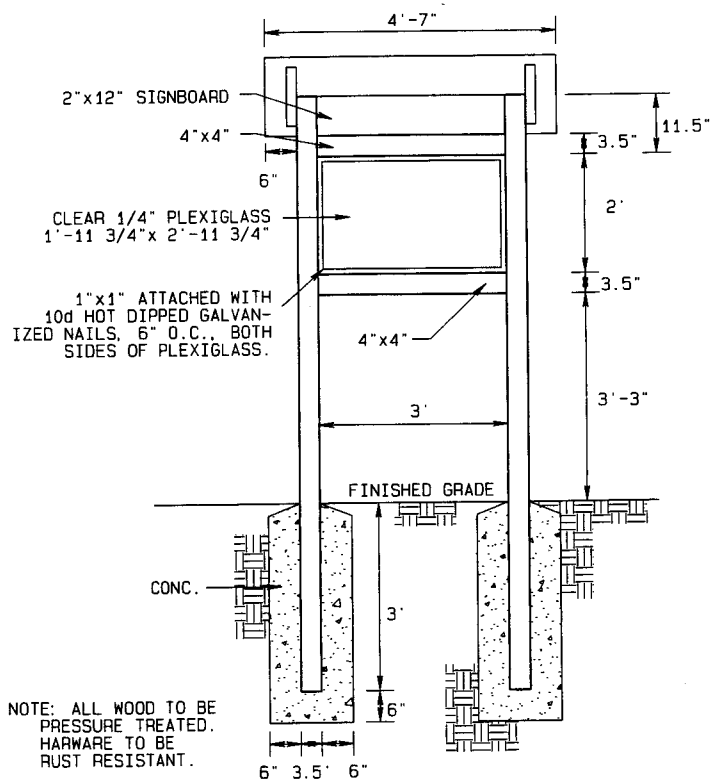




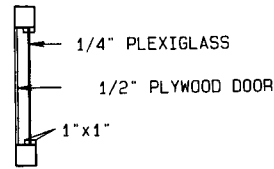
Post and Rail Fence

Gravel Pave Pathway- 12'



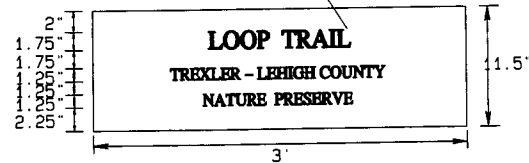


SIGN FRAME

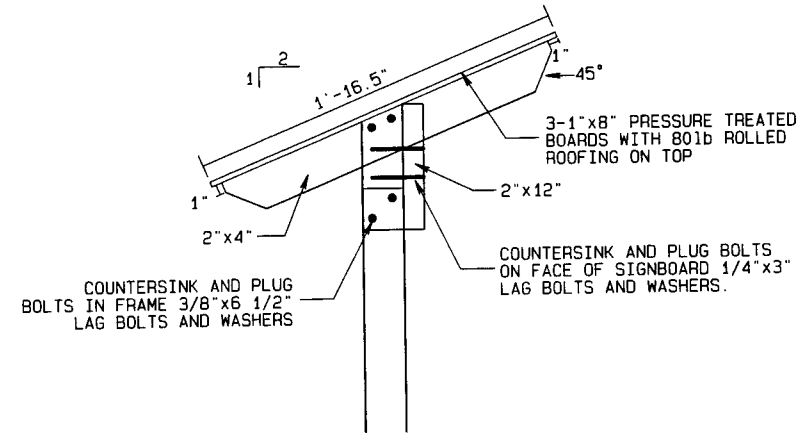


SECTION

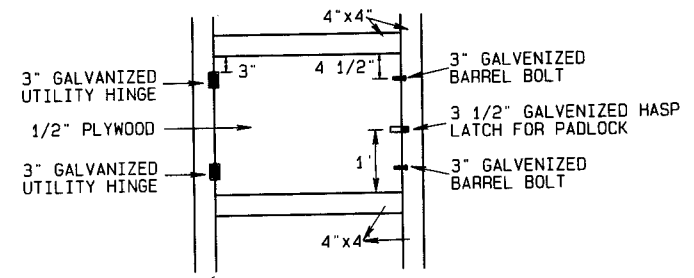
TEXT TO BE DONE IN  
TIMES ROMAN FONT AND  
SHALL BE CENTERED.



SIGN BOARD



SIGN ROOF



SIGN DOOR  
(Rear of Sign)

# Kiosk

NOT TO SCALE





Kiosk



NOR-BATH TRAIL  
COUNTY OF NORTHAMPTON  
DIVISION OF PARKS AND RECREATION

**\$500 Reward**

To the person or persons providing information leading to the arrest and conviction of the person or persons defacing County-owned property.

Glenn F. Reilman  
Northampton County Executive

**ALCOHOLIC  
BEVERAGES  
PROHIBITED**

NOTICE

THE NOR-BATH TRAIL WILL BE  
CLOSED TO EQUESTRIANS  
EFFECTIVE MARCH 15, 1999.  
THIS IS DUE TO REOCCURRING  
TRAIL SURFACE DAMAGE.  
FOR PARK & PERMIT INFORMATION  
PLEASE CALL 610-766-1978.

**NOTICE**  
PEDESTRIANS  
BICYCLES  
&  
EQUESTRIANS  
ONLY

**THIS IS A  
NON-MOTORIZED  
TRAIL SYSTEM**

NO ATVs ALLOWED  
NO MOTOR BIKES ALLOWED  
NO SNOWMOBILES ALLOWED  
NO SPORT UTILITY VEHICLES ALLOWED  
Violators Will Be Prosecuted

Kiosk



