Hellam Hills Conservation Area

Master Plan

LANCASTER CONSERVANCY

LANCASTER
CONSERVANCY
50 YEARS *of* SAVING NATURE

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Anne Walko *York County Planning Commission*
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SIMONE COLLINS LANDSCAPE ARCHITECTURE

res

Re:Vision

Forested
CREATIVE ECOLOGY

This project is supported by Chesapeake Gateways funding from the National Park Service (NPS) and through DCNR's Conservation Landscape program.

June 2022

SC# 20072.10

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PROJECT BACKGROUND

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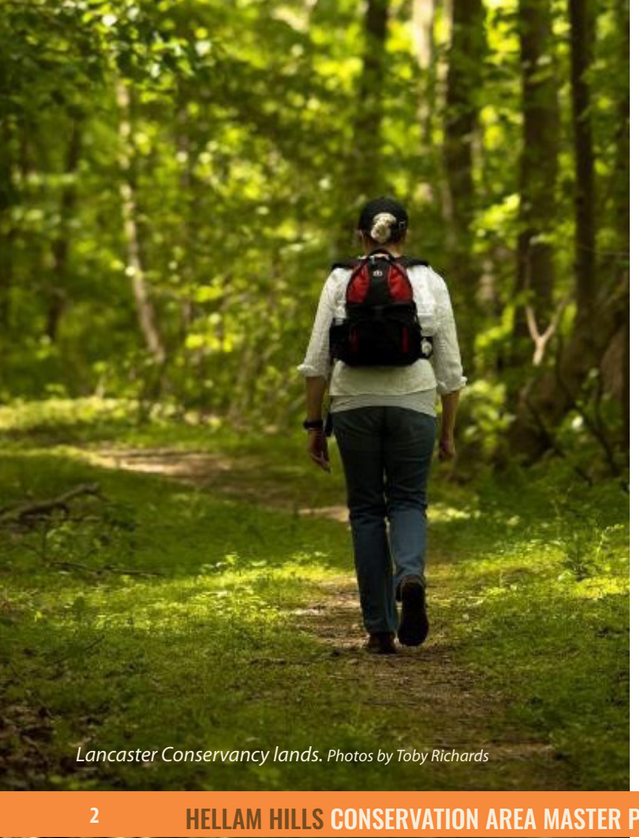
Lancaster Conservancy Background & Mission

The Lancaster County Conservancy (the Conservancy) is located in Lancaster County, Pennsylvania. Established in 1969, the Conservancy is a registered 501(c)(3) charitable organization that owns and manages preserved natural lands primarily in Lancaster and York Counties. For over 50 years the Conservancy has been working to save important natural places for people and wildlife. Today, the Conservancy maintains 50 nature preserves, protecting over 8,200 acres of land, including 40+ miles of trails.

The mission of the Conservancy,

"Providing wild and forested lands and clean waterways for our community. Forever."

In line with this mission, the Conservancy is committed to stewarding the natural lands they protect by developing robust nature preserve management plans that are influenced by a set of guiding principles and advance stewardship goals.



Lancaster Conservancy lands. Photos by Toby Richards

Lancaster Conservancy Guiding Principles for Land Management

Adhere to the Land Trust Alliance's Land Trust Standards and Practices

The Conservancy is a member of the Land Trust Alliance to ensure land trust standards and practices are met as an accredited land trust. The Land Trust Alliance's Land Trust Standards and Practices provide the ethical and technical guidelines for land trust management — striving to provide best practices to secure lasting conservation. The standards were drafted in 1989 and have been updated in 1993, 2001, 2004 and 2017. These standards outline 12 areas of practice for a land trust:

1. Ethics, Mission and Community Engagement
2. Compliance with Laws
3. Board Accountability
4. Conflicts of Interest
5. Fundraising
6. Financial Oversight
7. Human Resources
8. Evaluating and Selecting Conservation Projects
9. Ensuring Sound Transactions
10. Tax Benefits and Appraisals
11. Conservation Easement Stewardship
12. Fee Land Stewardship

General Goals of Conservancy Stewardship

- To make known and uphold the physical boundaries of Conservancy-owned lands.
- To make known and uphold Conservancy rules and regulations to ensure the protection of each nature preserve's conservation values.
- To frequently monitor and actively manage the Conservancy's portfolio of nature preserves.
- To sustain or improve the ecosystem health, function, and integrity of the Conservancy's nature preserves.
- To maintain sustainable public access and improve access to the greatest feasible and applicable extent.
- To communicate and collaborate with municipal, county, state, and federal agencies.
- To be a responsible and neighborly landowner.
- To address identified issues in a timely, responsible, and respective manner.
- To proactively plan for, prevent, and reduce conflict between preserve visitors, preserve neighbors, and municipalities within which a preserve resides.
- To be transparent in our stewardship work.
- To be inclusive in the planning and management of each nature preserve.
- To allow for and promote the use of nature preserves for scientific research and environmental education.
- To adequately fund the stewardship program and to prioritize its responsibilities, functions, needs and projects.

Nature Preserve Management Plans

Nature preserve management plans, which guide how the Conservancy stewards its preserved natural lands, are developed to be consistent with their conservation priorities and the reasons that the land was protected (i.e., for ecological, scientific, recreational and/or scenic values). Additional considerations may be made for any deed restrictions on a parcel or parcels included within the preserve that may prohibit specific uses or land management practices (i.e., a deed restriction that prohibits hunting or permits a salvage harvest).

Establish a Primary Conservation Priority. A primary conservation priority is determined by comprehensive analysis and assessment of the existing conservation values of the property. Ecosystem health, function, and integrity are the highest priorities. A secondary priority is providing passive outdoor recreational opportunities for the public.

Find a Balance Between Ecosystem Health and Public Access. The Conservancy's management goals strive to achieve a balance between protecting ecosystem and habitat health and providing passive recreational and sustainable public access opportunities. Considerations include habitat health indicators and range across a broad scale from site specific to contextual characteristics.

Provide for the Broadest Public Use Feasible. Every Conservancy-owned property within the study limits will be considered for public access in management planning and will allow for the broadest public use. Restrictions will be based on conservation values or other relevant Conservancy concerns.

Lancaster Conservancy lands. Photos by Toby Richards

Lancaster Conservacny lands. Photos by Toby Richards

Hellam Hills Conservation Area Vision

The Hellam Hills Conservation Area (HHCA) includes approximately 1040 acres of permanently protected forested natural lands and meadows. The area is characterized by steep slopes and diverse habitats that host an array of common, rare, threatened, and endangered native plant and animal species. Additionally, it contains several headwaters and first-order streams that flow directly into the Susquehanna River. Currently two nature preserves exist in the HHCA: Hellam Hills Nature Preserve (NP) and Wizard Ranch Nature Preserve (NP).

In addition to the ecological value of this region, HHCA serves an important recreational function for it surrounding community. Historically, Hellam Hills NP and Wizard Ranch NP have played a significant role as a regional hub for outdoor recreational and environmental education opportunities. Wizard Ranch NP has served as an occasional camp and Safari event for the Boy Scouts of America since the 1960s, and the former Marietta Gravity Water Company lands of Hellam Hills NP provided for informal public use, including hiking, hunting, and fishing.

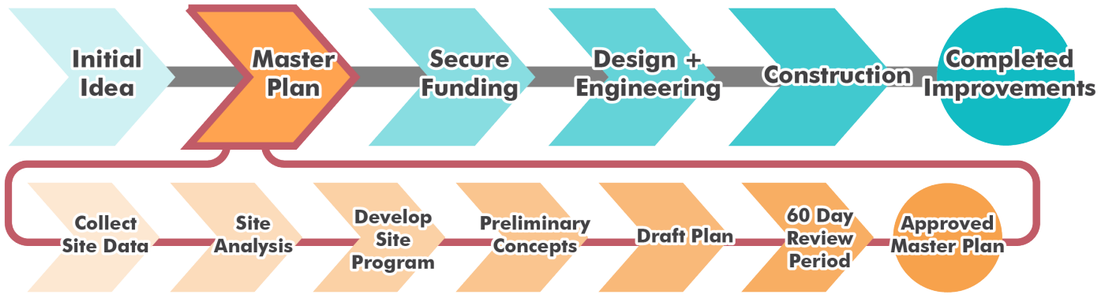
The Conservancy recognizes the area's fragile ecological diversity, irreplaceable natural beauty and its historical use as an outdoor recreational hub. The master planning process should set a course to enable the Conservancy to make thoughtful, transparent and mission-driven decisions to guide the future development of the site for public use. These uses should include new passive recreational opportunities and the potential to generate revenue to offset the site's anticipated land stewardship costs, while balancing the Conservancy's responsibility to protect wildlife habitat and ecosystem function.

The HHCA falls within Pennsylvania Department of Conservation & Natural Resources (DCNR) Susquehanna Riverlands Conservation Landscape (SRCL). The goal of the SRCL is to conserve the greenway corridor of riverlands along the Susquehanna River in Lancaster and York counties. Since 2016, the Conservancy has quickly become the largest public-lands manager in the northern region of York County within the SRCL with its acquisitions in HHCA accounting for 48% of all publicly accessible natural lands within this region.

Rather than stewarding elements of these properties as piecemeal, as is the case for lands acquired across decades, the Conservancy has the opportunity to plan for the management and use of Hellam Hills NP and Wizard Ranch NP, together, with intention and input from our neighbors, partners, and stakeholders.

Throughout 2020, the Conservancy led an initiative called the Integrated Land Management Plan (ILMP). The ILMP process developed a coalition of land management partners throughout the SRCL region such as County Parks, State Parks, Game Commission, Bureau of Forestry, and the Conservancy (among others) committed to work together to manage publicly accessible natural lands holistically (meaning across boundaries) and collaboratively (meaning across ownership). Thus, the Conservancy views the HHCA Master Plan as the first (of all ILMP partners) to plan long-term for its lands through this lens.

View of the Susquehanna River from Wildcat Bluff



Master Plan Process.

Project Funding

This project is supported by funding from the National Park Service (NPS) Chesapeake Gateways program and The Conservation Fund and through DCNR's Conservation Landscape program. Where applicable, it requires compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Project Team

The Conservancy retained the following team to assist with the preparation of the master plan: Simone Collins Landscape Architecture of Norristown, Pennsylvania; Resource Environmental Solutions of King of Prussia, Pennsylvania (formerly Applied Ecological Services); Re: Vision Architecture of Philadelphia, Pennsylvania; Forested of Bowie, Maryland; and AD Marble of King of Prussia, Pennsylvania

Simone Collins Landscape Architecture (SC) is a planning and design firm. SC served as team leader and facilitated overall Vision, Design, Planning and Community Participation.

Resource Environmental Solutions (RES) is a science driven consulting, design and environmental reclamation firm. RES was responsible for the site Ecological Assessment and ecological/ habitat recommendations.

Re: Vision Architecture (REV) is a green design firm serving as sustainability & architectural consultant. They undertook the design and programing of the site architecture.

Forested is a firm dedicated to advancing forest agriculture. With a special focus on the eastern United States where the Forested research garden is located, they bring a working knowledge of forest agriculture to the project team.

A. D. Marble (ADM) advised on permitting and compliance particularly in regard to Section 106 of the National Historic Preservation Act of 1966.

Public Input Process

The project team's technical knowledge was augmented with a public participation process including the following meetings and opportunities for public participation:

- Bi-weekly Conservancy Staff Progress Meetings
- Four (4) Study Committee Meetings
- 14 Key Person interviews
- Four (4) Public Meetings; and
- One (1) Public Opinion Survey

Study Committee

The study committee was comprised of Conservancy staff and members, key stakeholders and community members including:

- Kate Gonick – Senior Vice President of Land Protection & General Counsel, Lancaster Conservancy
- Jackie Kramer – National Park Service
- Julie Jones – Lancaster Conservancy Board member
- Fritz Schroeder – Senior Vice President of Community Impact, Lancaster Conservancy
- Brandon Tennis – Senior Vice President of Stewardship, Lancaster Conservancy
- Anne Walko – York County Planning Commission
- Phil Wenger – President & CEO, Lancaster Conservancy
- Devin Winand – Hellam Township Planning Commission
- Lori Yeich – Bureau of Recreation & Conservation, Department of Conservation and Natural Resources

Key Persons Interviews

The series of Key Person Interviews were held with identified parties to gain knowledge and ideas from key project partners. These included:

1. Conservancy Stewardship and Community Impact staff:
   - Steve Mohr (Sr. Preserves Manager)
   - Eric Roper (Forester)
   - Keith Williams (Community Engagement Coordinator)
2. Columbia Water Co
   - Dave Lewis – General Manager
3. York County Commissioner & Staff
   - Pam Shellenberger – Chief-Long Range Planning
   - Anne Walko – Senior Planner
   - Mike Fobes – Director-Parks and Recreation
   - Doug Hoke – County Commissioner
4. PA Natural Heritage Area Program
   - Rachel Goad – Botanist
   - Christopher Tracey – Conservation Planning Manager
5. Pennsylvania Game Commission
   - Clay Lutz – Diversity Biologist
   - John Taucher – Private Lands Biologist
6. YAMBA/SAMBA (York Area Mountain Bike Association / Susquehanna Area Mountain Bike Association
   - Dan Walko, YAMBA President
   - Chris Shelly, SAMBA Vice President
7. Neighbors
   - Julie Jones
   - Ray and Renee Henry
   - Toby Richards
   - Wendy Tippetts
   - Greg Smolin
   - The Tanner Family
   - Gail Lefever
   - Cindy Coyle
   - Judith Mueller
8. Pennsylvania Bureau of Forestry
   - Steve Wacker, District Forester of William Penn Forest District
9. Farm and Natural Lands Trust of York
   - Sean Kenny, Executive Director
10. Hellam Twp Planning Commission
    - Devin Winand
    - Nedette Otterbein
    - Fred Owens
11. Wrightsville Borough
    - Eric White, Borough Council President
12. Hallam Borough
    - Bill Fitzpatrick, Borough Council President
    - Harry Smith, Vice President
13. New Freedom Boy Scouts
    - Ron Gardner, CEO
14. Susquehanna National Heritage Area
    - Jonathan Pinkerton, Vice President

A summary of key person interviews can be found in the appendix of this report.

Suquahanna Riverlands Intergrated Landmangement Partners Site Walk at Wizard Ranch Nature Preseve

PROJECT SCHEDULE		
MEETING DATE	MEETING PURPOSE	
March 23, 2021	Study Committee Meeting #1	Project Overview, Project Goals & Visioning
April 14, 2021	Public Meeting #1	Project Overview / Public Visioning
April - June	Key Person Interviews	
June 1, 2021	Study Committee Meeting #2	Concept Review
September 7, 2021	Public Meeting #2	Present Analysis & Concepts
October 26, 2021	Study Committee Meeting #3	Concept Refinement & Draft Plan Overview
January 11, 2022	Public Meeting #3	Draft Plan Presentation
January - March	Public Reivew Period	
March 15, 2022	Study Committee Meeting #4	Review Comments & Plan Revisions
March 30, 2022	Public Meeting #4	Final Plan Presentation

Meetings Summary

Project meetings were held virtually via Teams and Zoom platform in accordance with COVID recommended protocols. The above table list meeting dates; a summary of each meeting is as follows.

Study Committee Meeting #1

The project team met with the Study Committee to present the project purpose and background, vet project goals and objectives and generated project facts and concepts via a brainstorming session.

Public Meeting 1

The first public meeting introduced the project team to meeting participants and provided an overview of the master plan process. Initial site inventory and analysis were presented including photographic tour of the sites. The team led a brainstorming session that gathered public opinions about goals, facts and concepts for the conservation area.

Study Committee Meeting #2

The project team reviewed the ecological assessment and recommendations from consultant RES along with initial site concepts. The study committee provide feedback on recommendations and concepts.

Public Meeting #2

The second public meeting focused on the presentation of the ecological assessment and preliminary recommendations. Concept plans identified options for site access, facilities and trail alignments. The meeting concluded with a public question and answer session.

Study Committee Meeting #3

The Concept refinements were reviewed focusing on site access, facility plans, and trail alignment refinements. The study committee provided comment and suggestions for plan refinements.

Public Meeting #3

The Draft Plan was presented to the public reviewing recommendations for site ecology, habitat, access, and facilities. The probable costs and phasing strategies for the recommendations were also presented.

Following the public meeting the public presentation was posted for a 60-day review period. After the draft plan review period, a final committee meeting will be held to review any suggested plan revisions. The plan will be presented to the community at the final public meeting.

Data Collection & Methodology

The project team made several visits to the site to gather information between October 2020 and October 2021. Field data was supplemented with information gathered from Geographic Information System (GIS) mapping, previous planning documents and data drawn from meetings and key person interviews.

FIELD VISITS	
Survey Event	Dates
1	October 26, 2020
2	March 17, 2021
3	May 13-14, 2021
4	June 28, 2021
5	July 15, 2021

The ecological assessment methodology is included in the ecological assessment report found in the report appendix. Methodology included secondary data collection, rapid ecological assessment, ecological assessment points, random opportunistic sampling, and scat and track analysis surveys to collect information on site for plants, birds, herpetofauna, and mammals. The above table lists RES site visits for data collection.

A Design Team site visit was held with Conservancy Staff in August, 2021

SITE ASSESSMENT & ANALYSIS

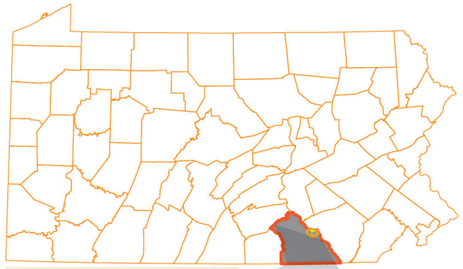
2

Hellam Hills Conservation Area

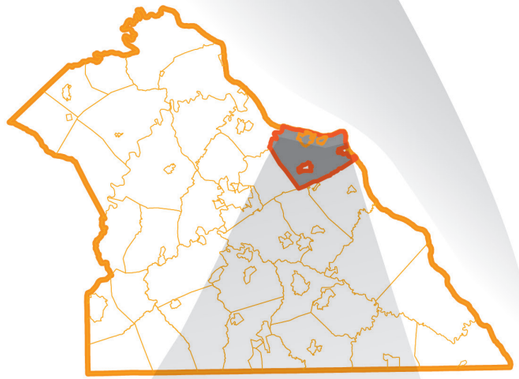
The Lancaster Conservancy works to protect and care for natural lands including habitat, ecosystem function, and passive recreation. The Conservancy land holdings are comprised of nature preserves. Often multiple nature preserves fall within a given region due to their location and common conservation characteristics and priorities. The Conservancy has developed a new management strategy of grouping nature preserves into large 'Conservation Areas'. This strategy groups together nature preserves that are adjacent and/or near one another into a larger Conservation Area (CA); this allows the Conservancy the opportunity to manage large landscapes, for both ecosystem health and passive recreation opportunities, more holistically. Typically, a CA's management is overseen by a dedicated stewardship team.

Hellam Hills Conservation Area (HHCA) is made up of the Hellam Hills Nature Preserve (NP) and Wizard Ranch Nature Preserve (NP). It is the fastest concentrated growth of preserved lands amongst all 50 of the Conservancy's nature preserves and totals 1,041 acres. The Conservancy's unprecedented rate of growth in HHCA is reflective of their success in other regions such as:

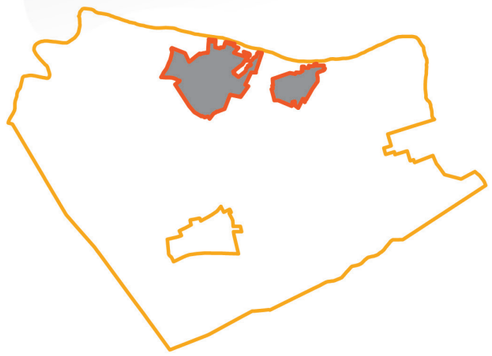
- Lancaster Riverhills CA in southwestern Lancaster County (consisting of 1,630 acres across nine preserves built out since the 1970's), and
- Welsh Mountain CA in eastern Lancaster County (consisting of 960 acres in one preserve built out over a decade)



Pennsylvania



York County



Hellam Township

Located in Hellam Township, York County, Pennsylvania the conservation priorities in the HHCA focus on stewarding woodlands, meadows, and watershed health; and balancing those resources with public passive recreation opportunities. The focus on protecting the large block of forested canopy and primary waterways are in line with local and regional planning which focuses on the protection of this unique landscape located within the Susquehanna Riverlands Conservation Landscape (SRCL).

Regional Context

Located along the western bank of the Susquehanna River HHCA is centrally located between the cities York, Lancaster, and Harrisburg. The region is one of the larger areas of intact forest in an area dominated by agricultural lands.

At a local level, the HHCA is located along the eastern edge of Hellam Township and is in close proximity to key population centers. To the north directly across the river is Marietta Borough. To the south, along the Route 30 corridor is Hallam Borough (2.5 miles). To the northeast are Manchester Borough and Mount Wolf Borough (7.0 miles). Last to the southeast are Wrightsville Borough situated on the west bank of the Susquehanna River (3.5 miles) and on the east bank of the river is Columbia Borough (4.5 Miles away).

Trails

There are five key regional trails in the area: The Mason-Dixon Trail, The Captain John Smith Chesapeake National Historic Trail, Lower Susquehanna Water Trail, the Northwest Lancaster County River Trail and the York Heritage Rail Trail.

Captain John Smith Chesapeake National Historic Trail

The National Parks Service established the Captain John Smith Chesapeake National Historic Trail in 2006 making it the nation's first water-based National Historic Trail. The Trail follows the routes of Englishman John Smith's historic voyages on the Chesapeake Bay and its tributaries in 1607-1609. The National Park Service Chesapeake Bay administers the trail. It stretches up and down the Chesapeake Bay and its tributaries in Virginia, Maryland, Delaware, Pennsylvania, New York, and the District of Columbia. Smith's map and writings influenced exploration and settlement of eastern North America for many generations. The Captain John Smith Chesapeake National Historic Trail allows users to experience and learn about the Chesapeake Bay through the routes and places associated with Smith's explorations

Lower Susquehanna Water Trail

The Lower Susquehanna Water Trail is one of four sections of the greater Susquehanna River Water Trail. The Pennsylvania Fish and Boat Commission is responsible for designating and managing state water trails. The Lower Susquehanna Water Trail is 53 miles long section. The HHCA falls in the area of the lower Susquehanna between the York Haven Dam and Safe Harbor Dam.

The closest river paddle access from the west shore of the Susquehanna to the north is Goldsboro launch. Located in about 11 miles upstream of HHCA the launch is in the Lake Frederick

portion of the river and portage is required at the York Haven Dam. To the south, approximately 4.5 miles downstream two launches exist in Wrightsville one in Wrightsville Commons Park north of the Veterans Memorial Bride and a second in Riverfront Park south of the bridge. Along the east bank of the river there is river paddle access in Falmouth, East Donegal, Marietta, and Columbia.

The Mason-Dixon Trail

The Mason-Dixon Trail (M-DT) is 199 miles long. The back county hiking trail connects the Appalachian Trail with the Brandywine Trail. The trail originates in Cumberland County PA at the Appalachian Trail and heads towards the Susquehanna River. The trail follows the west bank or the river south to Havre de Grace, MD where it crosses the river. From there the trail continues into Delaware and follows the Christina River and White Clay Creek Corridors. The final portion of the trail heads northeast in Pennsylvania where it terminates along the banks of the Brandywine River in Chadds Ford.

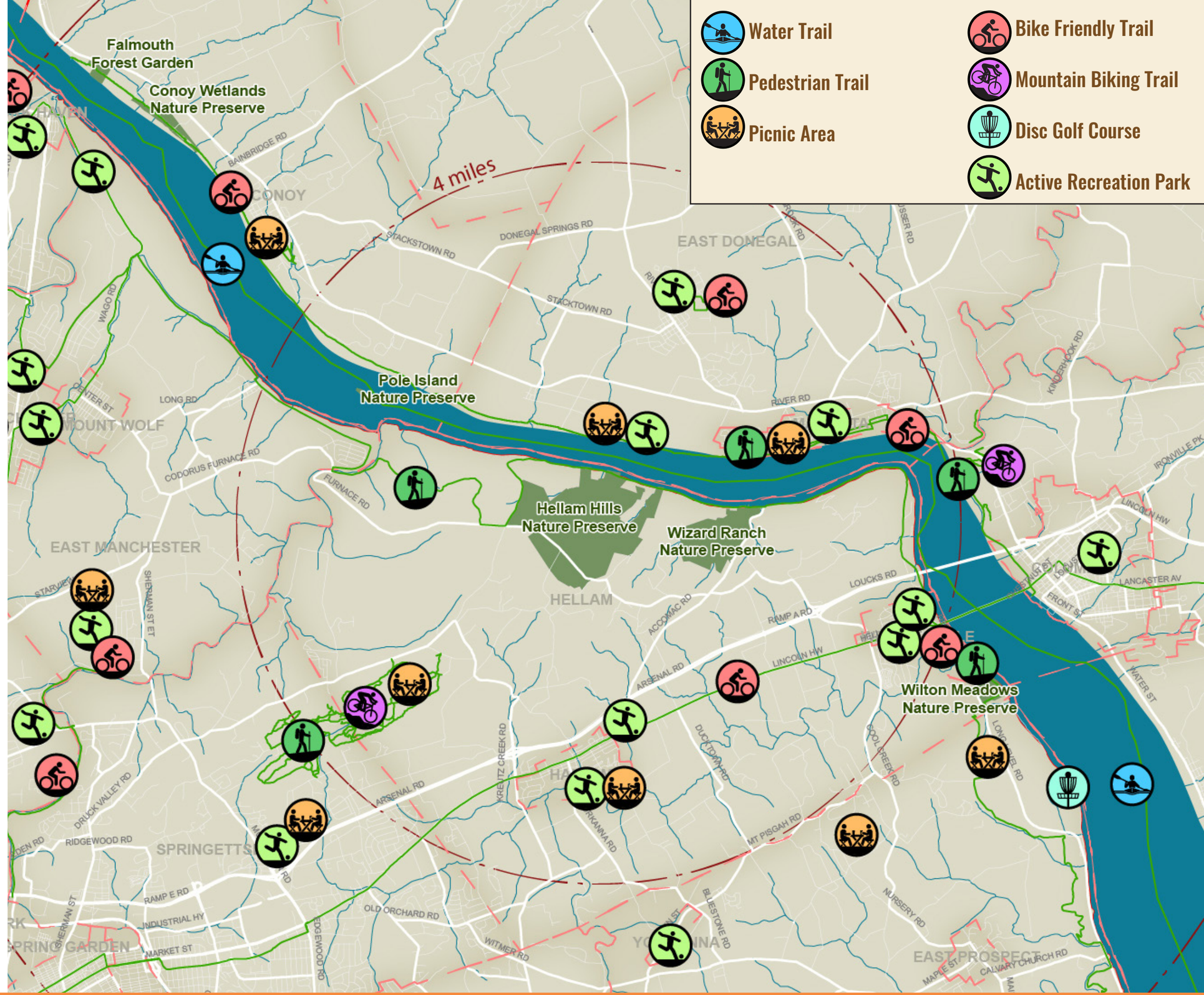
The M-DT currently traverses three Conservancy-owned nature preserves McCalls Ferry NP, Otter Creek NP, Wilton Meadows NP and passes near another three Conservancy Nature Preserves: Conowingo Pond NP, Reist NP, Indian Steps NP with opportunities for future traverse.

In 2019, a portion of the River Drive on road trail was rerouted through Hellam Hills NP. The trail connects the HHCA to Wrightsville to the south via a 4.2 mile on road section of the trail. Regional partners recognize the M-DT as an important regional amenity however, the trail corridor was developed via handshake deals with landowners and substantial portions of the corridor are not protected by permanent easements.

Northwest Lancaster County River Trail

Located along the east bank of the Susquehanna River in Lancaster County, Northwest Lancaster County River Trail is locally referred to as the River Trail. The trail is a 14-mile-long paved multi-use trail that connects Columbia Borough to Falmouth. The trail passes through the Conservancy's Conoy Wetlands NP, home of Falmouth Forest Garden and offers views out to the Conservancy's Pole Island NP. The trail is open to walking, jogging, cross-country skiing and bike riding. The trail follows the route of the Pennsylvania Mainline Canal and portions of its historic tow path. Along the trail, users can observe industrial relics from the canal era.

The Veterans Memorial Bridge (SR 462) connects Columbia to Wrightsville. PennDOT is in final stages of rehabilitation plans for the bridge that will provide a safer corridor by addressing structural deficiencies, improving vehicular traffic approaches, and providing upgraded pedestrian and bicycle facilities. The Columbia trailhead of the Northwest River Trail is located at the Columbia Crossing River Trails Center. Bridge bike facilities will connect into the River Trail at this location. On the Wrightsville side of the river, bike facilities will tie into the M-DT corridor that runs through the Borough. Construction of this project is slated to start in 2023 with a planned completion date 2026. The improvements will provide for a 5.5-mile-long route for bike and pedestrian connections from HHCA to the Columbia Crossing River Trails Center



View of the Susquehanna River Valley from Chickies Rock Overlook looking upstream. Round Top is in the Foreground and River Drive and HHCA in the background.

York Heritage Rail Trail

York Heritage Rail Trail is a 21-mile-long trail connecting Maryland's Torrey C. Brown Trail at the state line to John C. Rudy County Park in the City of York. The 10-foot-wide multi-use trail is open to hiking, biking, running, horseback riding, and winter sport trail use. The newest portion of the trail follows the Codorus Creek north out of York terminating in John Rudy Park. This portion does not allow horseback riding. Future planning efforts look to extend the trail an additional four miles to connect to the M-DT trail where it crosses the Codorus Creek. This future connection would provide for pedestrian connection into the HHCA.

Parks, Nature Preserves, & Heritage Sites

There are a wide range of regional and local recreation and cultural destinations within close proximity of HHCA.

York County Regional Parks

York County has an exceptional county park system. Located two miles west of HHCA is Rocky Ridge Park. Established in 1968, Rocky Ridge was the first York County Park. The 750-acre park offers playground, picnic pavilions, and an extensive trail network for wildlife viewing, hiking, and mountain biking.

Located six miles south of HHCA along the M-DT is Highpoint Scenic Vista and Recreation Area. The 79-acre area dominated by native meadows offers commanding 360 views of the river and surrounding region. Continuing south along Long Level Road (Rt 624) is Native Lands Park. Located eight miles from HHCA the 187-acre passive park offers mown walking trails.

Located directly adjacent to Native Lands Park is Klines Run Park and the Susquehanna National Heritage Area Zimmerman Center. Klines Run Park is a 70-acre park maintained by Brookfield Energy Corporation. The Park offers river frontage, playgrounds, picnic pavilions, and a disc golf course. The Zimmerman Center of Heritage serves as the headquarters for the Susquehanna National Heritage Area. The building and surrounding site offer a range of heritage exhibits and art collections. Along the river the site operates a public canoe / kayak boat launch.

Lancaster Conservancy Nature Preserves

Located opposite from Highpoint Scenic Vista and Recreation Area is Wilton Meadow NP. Owned by Lancaster Conservancy, the 70-acre nature preserve is hike in only via the M-DT. The M-DT trail connects from Wrightsville's River Front Park to the north and Highpoint Scenic Vista to the southwest. An under-road culvert provides a safe grade separated trail crossing of Long Level Road.

Located north of Hellam Hills is the Conoy Wetlands NP. Owned by the Lancaster Conservancy the 70-acre nature preserve protects key wetland habits along the Susquehanna River and is home to the Falmouth Forest Garden. The food forest functions as a floodplain forest and serves to enhance wildlife through plantings selected as sources for pollen, nut, and berries. Public access is via the River Trail and the garden serves as a highlight along the trail. In close proximity to Conoy Wetlands NP is Lancaster Conservancy's Pole Island NP. Located within the Haldeman Riffles, the three-acre island can be accessed by paddle craft and serves both the Susquehanna Water Trail and Capt John Smith Trail.

Heritage Sites

Codorus Furnace is located four miles north of the HHCA along the banks of the Codorus Creek. William Bennet constructed the furnace in 1765, providing for one of the earliest industries in Hellam Township. Workers mined raw materials of iron ore, and limestone in the region and harvested local timber to create charcoal to fuel the furnace. The stone furnace was fed charcoal, iron ore and limestone to create pig iron. The pig iron was used by area black smiths to forge iron goods. During the Revolutionary War, cannons and cannon balls were casted directly at the furnace site for use by the Continental Army. The furnace stopped operation in 1850. The Conservation Society of York County has owned and maintained the site since 1949. The Codorus furnaces is listed on the National Register of Historic Places.

Horn Farm Center for Agricultural Education is located off of Accomac Road 1.50-miles south of HHCA. 186-acre farm is a regional leader and educator in regenerative agriculture practices. Their mission is to, "… connects soil, food, and people in ways that improve the health and resilience of our community…We build community resilience by demonstrating holistic land management practices that provide food along with ecological and economic benefits."

Lancaster County Area Parks

A mix of municipal recreational opportunities exist along the east bank of the Susquehanna River. Many of these parks can be accessed via the River Trail. The Columbia River Park is home to the Columbia River Trails Center and serves as a regional trailhead and water access for canoe and kayaks.

Chickies Rock Lancaster County park is a 422-acre park offering a network of hiking trails and is home to the River Trail. Lancaster Conservancy preserved the initial land holdings of the park and still holds the conservation easement for that portion to this day. Located opposite the river from Round Top the park offers commanding views up and down the river.

Located north of Chickies Rock along the River Trail is East Donegal River Front Park. The Conservancy preserved this land that is now part of the East Donegal Township's park system. The Park serves as a major hub for the River Trail providing ample parking, playground, restrooms, a pavilion and boat launch for river access.

Local Parks

Hellam Hills Township, Hallam Hills Borough, and Wrightsville Borough all offer a wide range of parks serving their communities with playgrounds, ball courts, sports fields, and other recreational amenities.

Relevant Planning Documents

Hellam Township Comprehensive Plan 2002

The goals for HHCA fall in alignment of local planning initiatives. The 2002 Hellam Township Comprehensive Plan serves as the community vision and road map for development within the Township. The plan recommends focus growth around the boroughs of Hallam and Wrightsville in order to maintain the rural character of the greater Township. The plan identified the pressures of regional growth facing the communities between York and Lancaster along the RT 30 corridor and identifies the importance of responsible growth and the protection the Township's forest, streams, groundwaters and agricultural lands. A major recommendation of the plan was the development of an Official Environmental Resource Inventory and Comprehensive Natural Features Map to identify for protections woodlands and wooded corridors, steep slopes, stream corridors, floodplains, sensitive wildlife, and unique geological features. The Township implemented these recommendations. Today, the zoning ordinance and official map identify and protect these key community resources.

York County Open Space and Greenways Plan 2006

The York County Open Space Plan two goals are:

- To provide a vision for a coordinated and comprehensive system of open space and greenways
- To support the maintenance and enhancement of open space and greenways throughout York County in an effort to improve the quality of life for County residents.

The Plan acknowledges the important of local municipalities to provide for the active recreational needs of communities. Noting that the County's role in recreation and planning is to emphasize important connections and identifies significant land resources that may lend themselves to different recreational uses at the discretion of York County municipalities.

In the region of HHCA, the plan identifies the following Priority Natural Areas for York County: Wildcat Run Falls and Gorge and a portion of Susquehanna River frontage referred to a Accomac Riverbank. The report appendix includes excerpt of the 2004 Natural Areas update describing these areas and species of concern.

Susquehanna Heritage Park Master Plan 2010

In 2010 study included the nexus of recreation amenities along Long Level Road including Highpoint Scenic Vista, Native Lands Park, Klines Run Park, Zimmerman Center, M-DT, and Wilton Meadows NP. The plan brought together numerous land managers with the common goal to,

"Create a signature park, heritage site and conservation center that showcases

the historic, cultural and environmental resources of the Lower Susquehanna

River and the Chesapeake Bay and welcomes residents and visitors to enjoy

our region's remarkable heritage and spectacular scenic vistas."

The plan focuses on providing public access, protecting the environment, and protecting the archaeological and historical integrity of the properties.

Hellam Township & Hallam Borough Comprehensive Recreation, Park and Open Space Plan 2014

The Hellam Township & Hallam Borough Comprehensive Recreation, Park and Open Space Plan's vision statement and primary goal are:

The parks, recreation, and open space system of Hellam Township and Hallam Borough enriches the community through the conservation of natural resources, recreation opportunities that support active, healthy lifestyles, and the preservation of our rural scenic character.

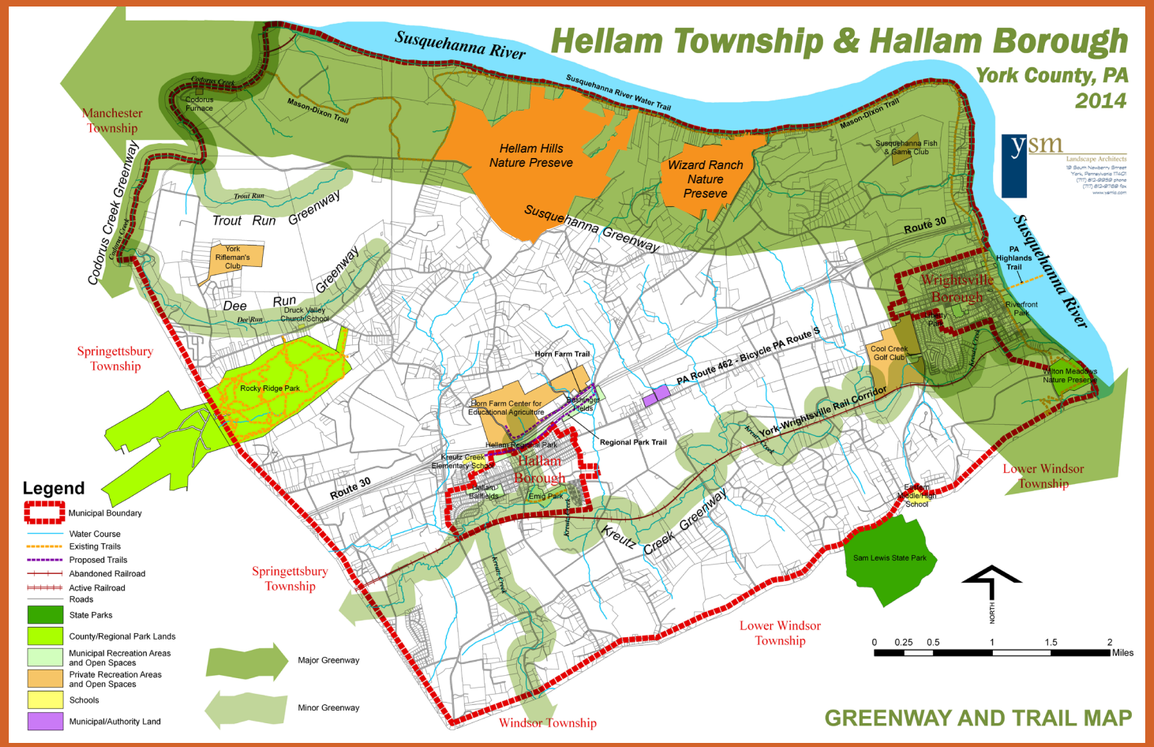
Protect our open space, natural resources, and scenic rural character.

The plan focuses of the development of three greenway corridors through the township along the Susquehanna River, the Codorus Creek, and Kreutz Creek. The plan identifies three regional trail planning efforts that could play a part in linking the HHCA to the greater region

York-Wrightsville Rail-Trail. A former rail corridor follows the Kreutz Creek. The Plan along with York County plans (York-Wrightsville Rail-Trail) identifies it as a potential trail corridor to connect the City of York to Hallam and Wrightsville Borough.

Codorus - Rocky Ridge Trail. Planning efforts to link Rocky Ridge park and the M-DT. The proposed trail corridor would be developed within the road right of way departing Rocky Ridge Park and following Druck Valley Road and Tower Road to Codorus Furnace Road to deliver trail users to the where the M-DT crosses the Codorus Creek.

Horn Farm Trail – Identified in their master plan, the Horn Farm Center proposes a trail along Horn Road. The trail would extend to Accomac Road, cross under route 30 and connect to Barchinger Fields and Hallam Borough Regional Park.



Susquehanna Riverlands Conservation Landscape Strategic Plan 2019

The Susquehanna Riverlands Conservation Landscape (SRCL) is one of eight DCNR designated Conservation Landscapes. The goals and mission to the SRCL are:

To protect, preserve, and steward the natural lands along the Lower Susquehanna River, emphasizing connectivity, eco-system health, and sustainable public access.

Protecting land is related to policy and zoning.

Preserving land is through land acquisition and easements.

Stewarding land is caring for and maintaining land.

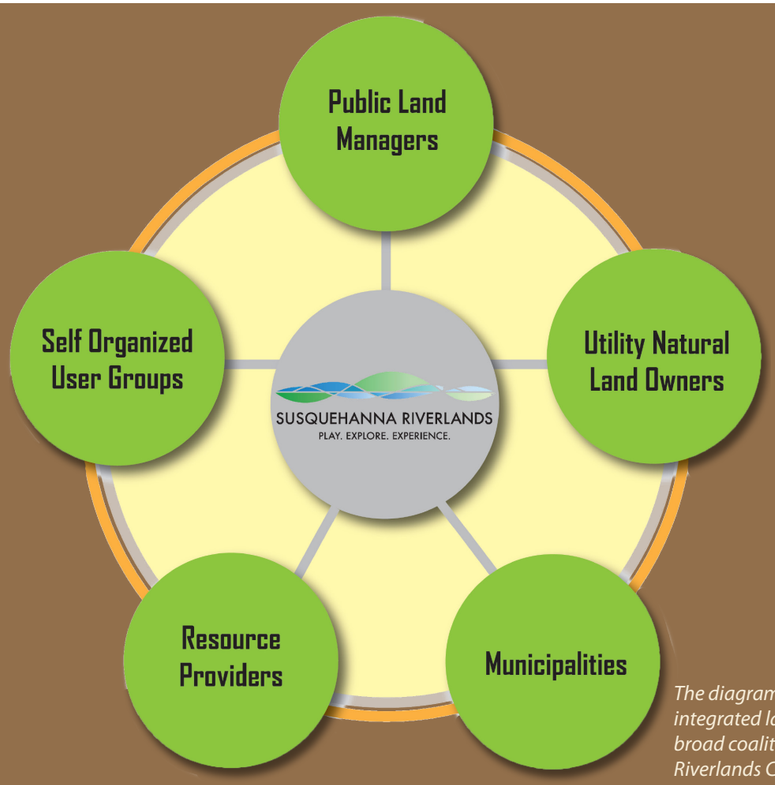
The strategic plan laid out three strategic initiatives of work to move forward the mission for the SRCL partners.

- Strategic initiative #1: seize opportunities for the Susquehanna Riverlands partnership to protect, preserve and steward
- Strategic initiative #2: plan for long-term sustainability of the Susquehanna Riverlands
- Strategic initiative #3: position the Susquehanna Riverlands within the framework of the statewide conservation landscape program

Susquehanna Riverlands Conservation Landscape and Integrated Land Management Plan. 2021

The development of the SRCL Integrated Land Management Plan (ILMP) reflect the completion of first initiative of the 2019 Strategic Plan. The plan identifies and coordinates land management partners within the SRCL region including. Public Land Managers, Utility Natural Landowners, Self-Organized User Groups, Resource Providers, and Municipalities. The plan works to analyze barriers and needs to integrated land management; provide an inventory of Natural lands and recreational asset and divide the SRCL into sub-region for further analysis.

The report is the first step in the Integrated Land Management Plan. The plan implementation recommends two following steps. The completion of two regional comprehensive plans that focus on natural resource protection and passive recreation. The HHCA Master Plan is the first planning project within the SRCL to utilize the framework of the ILMP. The ultimate step will be the development of the final ILMP based upon the information and guidance from the step two plans. Together the work of the three phased plan will serve to guide SRCL land protection and stewardship work. The plan structures itself around five key implementation action: Coalition Building, Regional Planning, Resource Sharing, Volunteer Coordination, Funding



The diagram to the left shows the different types of integrated land management partners that are part of the broad coalition of the SRCL. Graphic From Susquehanna Riverlands Conservation Landscape, 2021

Susquehanna Discovery Center and Mifflin House, Concept Plan 2022

In collaboration with partners the Susquehanna National Heritage Area (SNRA) have been working since 2017 to preserve the Mifflin house and surrounding land. The historic Mifflin house circa. 1800 served as a stop along the underground railroad and the surrounding lands are a Civil War historic site. The adaptive reuse of the site's barn would be home to the Susquehanna Discovery Center and serve as SNRA visitor and interpretation center. The restored Mifflin House would serve to tell the story of the key role that the surrounding communities played in the underground railroad. The surrounding 79 acres Heritage Park would have a series of trails interpreting the Civil War skirmishes and the Underground Railroad trail to the river. A proposed greenway trail would connect Heritage Park to River Front park. The 4-acres park will include picnic areas, a kayak launch, fishing access and connect directly to the M-DT. The Mifflin House is located 1.5 miles south of HHCA.

The 2018 storm event, left the damaged Accomac Road limited to one lane of traffic. Photo Credit Bill Kalina, The York Dispatch

Existing Conditions

Hellam Hills Conservation Area Climate

Located in the southeast portion of Pennsylvania, according to the Köppen climate classification methods, the HHCA falls within the 'Humid subtropical' climate (Cfa). The area lies within the northern realm of the classification that extends through the Southeastern United States. Within Pennsylvania areas such as the Philadelphia metropolitan area and the low-lying areas of the Susquehanna River basin are more typical of the Cfa region. Cfa is a temperate climate with the coldest months temperatures averaging above 27^0 F, at least one month's average temperature of 71.6^0 F and at least four months with average temperatures above 50^0 F. There is no defined dry season for the classification with winter and summer precipitations being similar. These climate regions are often located on the eastern sides of continents and during summer months the northernly flow of warm moist air from the tropics lead to frequent but short-lived summer thunderstorms, which are common to the southeastern portion of the United States.

Historic 1971-2004 climatological data for Harrisburg, located 20 miles upriver from HHCA, shows normal annual rainfall of 41.45 inches per year evenly distributed throughout the twelve months. The maximum monthly rainfall of 9.71 inches took place in May of 1989. The minimum monthly rainfall of 0.31 inches took place in December of 1998. Thunderstorm events are concentrated in the months of May through August with a total of 29.9 days with thunderstorm events. The number of days with snow or ice events greater than 1.0 inches per year is 12.8 days with an average of 32.1 inches annually. The maximum snowfall event within 24 hours took place on January 1996 totaling 21.7 inches.

Following one of the wettest summers in recent history a rain event on August 31, 2018, estimated at 8-14 inches of rainfall in a 4-hour period. Due to the already saturated ground conditions and the high rate of rain fall a flash flood along local streams led to the washout of Accomac and River Drive. Scientists anticipate that the current climate trends will lead to an increase in these types of storms.

Hellam Hills Conservation Area Physiological Region & Underlying Geology

The HHCA lays in the Piedmont Upland Section of the Piedmont Province of Pennsylvania. The area of upland is referred to as Hellam Hills and is a bit of an anomaly because it is separated from the greater Piedmont Upland Section. A portion of Piedmont Lowland Section stretching along the Route 30 corridor from York to Lancaster separates Hellam Hills from the greater Piedmont Upland Section.

The main ridge line of Hellam Hills starts in the west near North York at Codorus Creek with Mt Zion Hill and Pleasureville Hill and continues east towards the Susquehanna River. In the region of the HHCA and to the north the Upland Section ends at the river's edge and overlooks the Piedmont Lowlands located in Lancaster County across the river. Along this boundary the river runs from west to east with dramatic bluffs existing along the Hellam Hills Ridge Line.

To the south of the HHCA between Accomac Road and Wrightsville the Upland Section continues across the river into Lancaster County forming Chickies Ridge before terminating at Chestnut Ridge near Rohrerstown. In this area the river turns and flows north to south. On the York County side of the river the ridge forms a point in this area referred to as Round Top. To the north of the Codorus Creek Valley a series of fragmented ridges exist prior to transitioning into the Gettysburg-Newark Lowland Section of the Piedmont Province north of Saginaw.

The Piedmont Upland has low to moderate relief with elevations ranging from 100 to 1220 feet above sea level. Broad, rounded to flat-topped hills and shallow valleys define the terrain. Underlying geology is comprised of schist, gneiss and quartzite and the structure is complexly folded and faulted. Due to the homogeneous condition of the underling material and its similar resistance to weathering the stream drainage patterns are dendritic, similar to the branching pattern of tree roots.

The Highest point in Hellam Hills is located west of the HHCA along Tower Road, is 1054 feet above sea level and home to the WGAL Radio Tower. Additional high points include the eastern foothill in Rocky Ridge Park (1017 ft), Buzzard Roost in Hellman Hills NP (840 ft), Round Top (800 ft) and Chickies Rock Summit (587 ft) located in Lancaster County.

The underlaying base geology specific to Hellam Hills NP is the Chickies Formation (Cch). Developed during the Cambrian Period (541-485 million years ago) and is predominantly quartzite bedrock. Geologic Map of Pennsylvania describes Chickies Formation as follows,

"The Chickies Formation consists of light-gray to white, hard quartzite and quartz schist containing "Skolithos" tubes, and some slate. Bedding is thick and moderately to well developed. Where the Hellam Member is not present, it is about 400 feet thick. The Hellam Member, found in York County at the base of the Chickies, is a coarse cobble conglomerate composed of well-rounded cobbles 3 to 6 inches in diameter in a finer quartz matrix that firmly cements them. It also contains milky-white quartz pebbles up to 0.5 inch in diameter. Quartzite is interbedded with the conglomerate. Beds are thick to massive and moderately well to well developed. The Hellam Member is approximately 600 feet thick (Geyer and Wilshusen, 1982; Rodger Faill, personal communication, 2001)."

Portions of the Wizard Ranch NP are also comprised of the Chickies Formation. These include the north facing slope along the northern ridge line and a portion of the southwest corner of Wizard Ranch NP. Metarhyolite (mr) geology dominates the central portion of Wizard Ranch NP. It developed in the Precambrian Period (4,600-541 million years ago) and is the predominantly Metarhyolite bedrock. Geologic Map of Pennsylvania describes it as follows,

"Metarhyolite is moderate bluish gray to grayish blue and grayish red. Some of it is banded, and some of it is porphyritic, containing phenocrysts of quartz and feldspar. It is uniformly fine grained, exhibits no banding, and is at least 1,000 feet thick (Geyer and Wilshusen, 1982).

The last geological area of Wizard Ranch NP is located along the stream valley running parallel to Accomac Road and is Metabasalt (mb). Also developed in the Precambrian Period (4,600-541 million years ago) Geologic Map of Pennsylvania describes it as follows,

"Metabasalt is characteristically green, greenish gray, and dark gray, and is fine to medium grained. Color banding is medium to coarse. The unit contains veins and masses of quartz. Its estimated thickness is more than 1,000 feet (Geyer and Wilshusen, 1982).

Exposed bedrock at Hellam Hills NP

Hellam Hills Nature Preserve Site Analysis

History

The Hellam Hills NP is comprised of 794-acres acquired by the Conservancy between 2017-2021. The majority of Hellam Hills NP has contiguous tree canopy. The Hellam Hills NP is comprised of multiple parcels acquired from various landowners. However, the Conservancy acquired the majority of Hellam Hills NP from Marietta Gravity Water Company. The Columbia Water Company bought out Marietta Gravity Water Company 2013. Established in 1892, Marietta Gravity Water Company maintained four wells in the Hellam Hills area that supplied water to Marietta Borough via a pipeline laid in the bed of the Susquehanna River. During Hellam Hills NP time as a private utility, the lands owned by Marietta Gravity Water Company served as pseudo-public recreation areas and local committee members accessed the area for hiking and hunting.

Wildcat Falls is located on private lands adjacent to the northwest corner of the Hellam Hills NP. This site and the surrounding area were a popular day trip destination for hiking and picnicking throughout the 1800 and early 1900's. The falls are located two miles north of the Accomac Inn and Anderson's Ferry. Visitors would take the ferry across the river from Marietta to enjoy the day at the falls. A series of stairs and catwalks allowed visitors to climb along the falls and gorge up to the bluffs summit to take in the dramatic regional views. A private hotel existed at the base of the falls until 1920 when it burned down. During the second half of the 1900's both the area of the falls and the bluff were developed as private residences. The Wildcat Falls areas remain a private property today, however, a private funder donated funding for the Conservancy to purchase the Wildcat Bluff residence so that its views could once again be enjoyed by the public.

One of the earliest industries in Hellam Township was the Codorus Furnace located on the south side of the Codorus Creek on Furnace Road about four miles east of Hellam Hills NP. The forge and furnace operated from 1765 until 1850. The surrounding Hellam Hills region furnished iron ore, lime, and charcoal from timber for the furnaces' production of pig iron. The 1932 Geological Map and Sections of the Middletown Quadrangle, Pennsylvania denotes the location of a closed iron ore pit within Hellam Hills NP, the pit most likely delivered ore to Codorus Furnace. The pit can still be seen in the landscape today located near the intersection of River Drive and Furnace Road. Though the Codorus Furnace stopped production in 1850, the Hellam Hills area timber would have continued to serve as a source of charcoal production for furnaces in Columbia and Marietta.

Soils

Hellam Hills NP soils are comprised of Edgemont channery loam (Ed & Ee), Glenelg channery silt loam (Gb), and Glenville silt loam (Gd). None of the soils are classified as Hydric Soils. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The majority of Hellam Hills NP is comprised of Edgemont channery loam (Ed & Ee) which is a well-drained soil, with low to medium runoff dependent on field slope and falls within Hydrologic soil Group A. Soils in this group have low runoff potential when thoroughly wet and water is transmitted freely through the soil.

Portions of Hellam Hills NP near stream headwaters are home to Glenelg channery loam, which is a well-drained soil, with medium runoff dependent on field slope and falls within Hydrologic soil Group B. Soils in this group have low runoff potential when thoroughly wet and water is transmitted freely through the soil. Soils in this group have moderately low runoff potential when thoroughly wet and water transmission through the soil is unimpeded.

The final soil type on is also associated with headwaters and is Glenville silt loam (Gd). Typically found in swales and drainageways, Glenville silt loam is a moderately well drained soil, with medium runoff dependent on field slope and falls within Hydrologic soil Group C/D. Group C soils have moderately high runoff potential when thoroughly wet and water transmission through the soil is somewhat restricted. Group D soils have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Topography

Hellam Hills NP topography is defined by a saddle that runs along Furnace Road southwest to northeast between two ridges. The portion of Hellam Hills NP west of Furnace Road slopes gently in the area south of Chimney Rock Road at the heart of the saddle, and the portion north of Chimney Rock Road has steeper slopes as the regional highpoint located west of Hellam Hills NP along Tower Road slopes down towards Furnace Road. The change in elevation for the area west of Furnace Road is from 800 ft at the north end of Hellam Hills NP to 640 ft at the headwaters of Dugan Run.

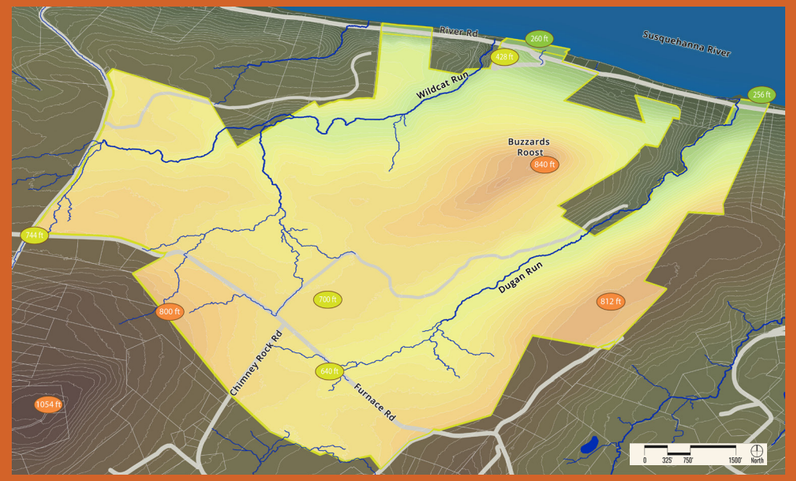
The area east of Furnace Road is defined by the two stream valleys, Wildcat Run and Dugan Run and a central ridge between the two. The elevation at the intersection of River Drive and Furnace Road is 744 ft near the headwaters of Wildcat Run. The western portion of Hellam Hills NP slopes towards Wildcat Run with slopes becoming steeper as you approach the mainstream valley. Wildcat Run exits off site prior to reaching the Susquehanna River. However, a portion of Hellam Hills NP referred to as Wildcat Bluff is located in the northern limits of Hellam Hills NP. The Bluff overlook Wildcat Run to the west and the Susquehanna River to the north. With a highpoint elevation of 428 ft the bluffs quickly drop in almost sheer fashion to River Drive elevation of 260 ft providing for dramatic views across the adjacent valleys.

The eastern portion of Hellam Hills NP is defined by Dugan Run. The steam valley divides the eastern portion of Hellam Hills NP in half with the gentle slopes near the headwaters transitioning to steep valley slopes as its traverses north across Hellam Hills NP towards River Drive. In all the elevation along Dugan Run starts at 740 ft at Furnace Road with Hellam Hills NP low spot of 256 ft where Dugan Run exits Hellam Hills NP at River Drive. The steep

SOILS LEGEND

- EdC
- EdD
- EeB
- EeD
- EeF
- GbB
- GbC
- GdB

Figure 2.1 Hellam Hills NP Soils Map

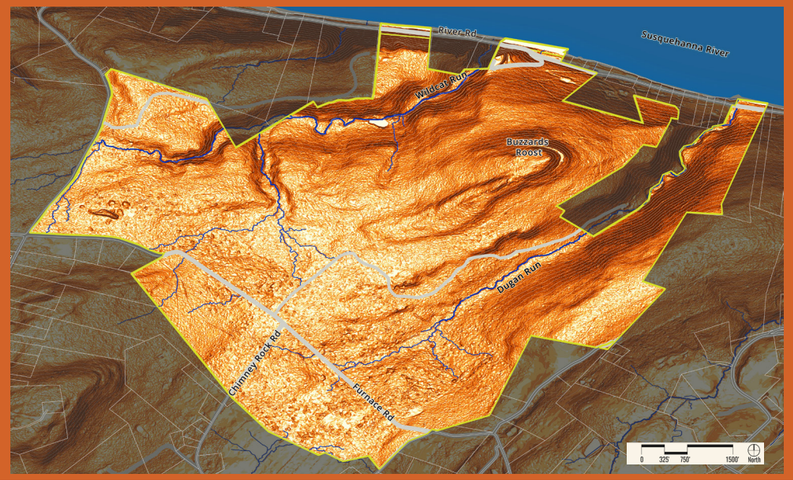


ELEVATION LEGEND

150' 400' 600' 800' 1050'

- Elevation Hight Point
- Elevation Point
- Elevation Low Point

Figure 2.2 Hellam Hills NP Elevation Map



SLOPE LEGEND

- 25+%
- 15-25%
- 8-15%
- 5-8%
- 3-5%
- 0-3%

Figure 2.3 Hellam Hills NP Slope Map

west facing slope of Dugan Run valley climbs towards the adjacent ridgeline reaching an elevation of 812 ft. The level top of the ridge continues off site arching northeast towards the northwest corner of Wizard Ranch NP.

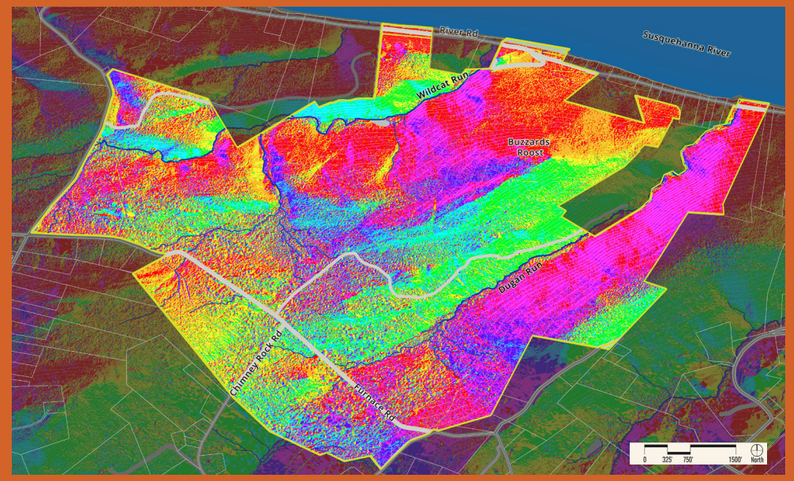
The area closest to Furnace Road between the two streams valleys is gentle terrain with elevations ranging from 740 ft to 680 ft. As you approach the interior of Hellam Hills NP another ridge line emerges terminating at Hellam Hills NP's highpoint of 840 ft located at Buzzards Roost. The western approach towards Buzzard Roost has more gentle terrain; upon reaching the highpoint the topography quickly drops off with steep slopes running down towards the river and two stream valleys.

Hydrology

Two stream corridors exist in Hellam Hills NP. Wildcat Run is located in the western portion of Hellam Hills NP and Dugan Run is located in the eastern portion of Hellam Hills NP. Both streams run southeast to northeast prior to turning north as they converge into the Susquehanna River. The headwaters of both reaches have low lying areas home to flora and fauna indicative of wetland habitat. As the stream headwaters converge the stream valleys become steep with limited floodplain areas adjacent to the streams. As the streams turn north towards the Susquehanna River they transition towards the river in a series of cascades or waterfalls. The Wildcat Falls are located on private property adjacent to the Hellam Hills NP and the Dugan Run Falls are located along the Hellam Hills NP property line. During the time of the Marietta Gravity Water Company (Est. 1892), both streams had served as water sources with dammed reservoirs located centrally along the streams. The dams were removed by then owner, Columbia Water Company, prior to the Conservancy acquisition. The remnants of the Wildcat Run dam and reservoir can still be seen on site. The Dugan Run reservoir and dam existed on the parcel maintained by Columbia Water Company.

Wildcat Run is comprised of two branches that converge in the northern part of Hellam Hills NP. The headwaters of the western/main branch originate both on and off site. The on-site portion originates near the intersection of River Drive and Furnace Road and runs parallel to River Drive until converging with other western headwaters that originate on a private parcel west of River Drive. The southern headwaters originate from the portion of Hellam Hills NP located southwest of Furnace Road and in the area northwest of the water utility access road. These two headwater areas converge into a defined stream valley that runs north before converging into the western/main branch of Wildcat Run. In the central part of Hellam Hills NP a series of springs underlying areas of boulder fields converge and feed into Wildcat Run. This area is located just east of the former reservoir

Dugan Run headwaters are completely contained within Hellam Hills NP. The main headwaters originate across Furnace Road on the Kinsley parcel with supporting headwaters located along the southeastern portion of the main parcel. The central portion of Dugan Run exits Hellam Hills NP into the parcel maintained by Columbia Water Company. As Dugan Run continues toward the Susquehanna River it serves as the boundary between the Hellam Hills NP, the Columbia Water company, and a private residence.



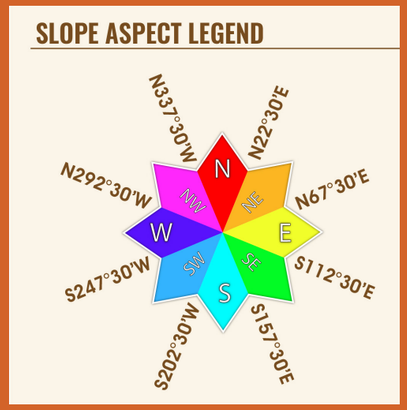
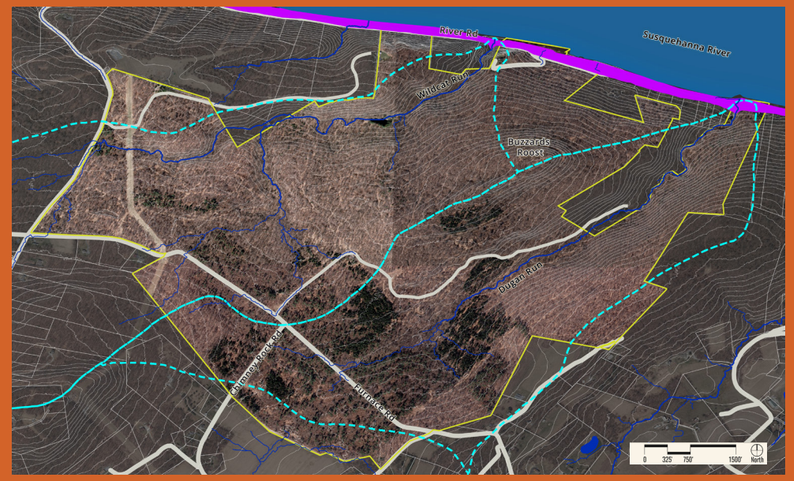


Figure 2.4 Hellam Hills NP Slope Aspect Map



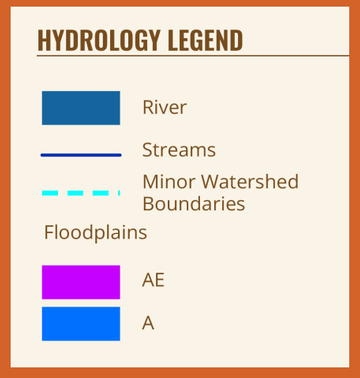


Figure 2.5 Hellam Hills NP Hydrology Map

Flora & Fauna

Plants. A total of 148 plant species have been observed over five site visits. While just 30 of the species are considered invasive, many of these are dominants (most dense within communities as well as most widely distributed in some instances). Consistently pervasive invasive species throughout Hellam Hills NP include Japanese stilt-grass (Microstegium vimineum) and Tree of Heaven (Ailanthus altissima). Please see the full Ecological Report for breakdown of plant communities by management unit and a full species list.

Birds. A total of 144 bird species were observed via point count on site (see Ecological Report Appendix II for the full species list) out of 318 individual birds observed. These observations were made during fall migration, spring migration, and breeding season. Of the species observed, 65 were confirmed or probable breeders per the PA Breeding Bird Survey behavior codes. The most frequently observed birds were red-eyed vireo, ovenbird, eastern towhee, scarlet tanager, and wood thrush. Hellam Hills NP is supporting a relatively robust interior forest breeding bird community. Worm-eating warblers are maintaining territories along the ridge lines and steep slopes. Kentucky warblers and hooded warblers are occupying bottomlands and lower elevation shrub thickets in impressive densities for the region. Acadian flycatchers are breeding in the forested sections of Dugan Run. Edge habitat associated with the gas pipeline ROW and roads on site are also providing critical nesting habitat for indigo buntings, great-crested flycatchers, brown thrashers, common yellowthroats, and blue-winged warblers (in addition to hooded and Kentucky warblers).

Table 1. Hellam Hills Vegetation			
	Native	Invasive	N/I
Tree	25	6	0
Shrub	11	5	0
Forb	58	13	7
Graminoid	11	2	2
Vine	4	4	0
Sub-Total	109	30	9
TOTAL			148

Table 3. Mammals Observed at Hellam Hills During Ecological Assessment			
Size	Common Name	Scientific Name	Notes
Small	deer mouse	Peromyscus sp.	under natural cover
Small	short-tailed shrew	Blarina brevicauda	found along trail
Small	eastern chipmunk	Tamias striatus	common
Small	eastern red squirrel	Tamisciurus hudsonicus	in spruce areas
Small	eastern gray squirrel	Sciurus carolinensis	common
Medium	Groundhog	Marmota monax	open edges
Medium	Virginia opossum	Didelphis virginianus	common
Medium	Raccoon	Procyon lotor	common
Medium	eastern striped skunk	Mephitis mephitis	2 individuals observed
Medium	red fox	Vulpes vulpes	scat, tracks, and 2 individuals observed
Large	eastern coyote	Canis latrans	scat and tracks
Large	white-tailed deer	Odocoileus virginianus	dense population
Large	black bear	Ursus americanus	scat

Table 2. Herpetofauna Observed at Hellam Hills During Ecological Assessment		
Animal Group	Common Name	Scientific Name
Salamander	Eastern redback salamander	Plethodon cinereus
Salamander	Northern two-lined salamander	Eurycea bislineata
Salamander	Northern dusky salamander	Desmognathus fuscus
Salamander	Northern slimy salamander	Plethodon glutinosus
Salamander	Spotted salamander	Ambystoma maculatum
Salamander	eastern newt	Notophthalmus viridescens
Anuran	American toad	Anaxyrus americanus
Anuran	spring peeper	Pseudacris crucifer
Anuran	gray treefrog	Hyla versicolor
Anuran	pickerel frog	Lithobates palustris
Anuran	wood frog	Lithobates sylvaticus
Anuran	Northern green frog	Lithobatesclamitans melanota
Turtle	eastern box turtle	Terrapene carolina
Lizard	Northern five-lined skink	Plestiodon fasciatus
Snake	Northern brown snake	Storeria dekayi
Snake	northern ringneck snake	Diadophis punctatus edwardsii
Snake	eastern garter snake	Thamnophis sirtalis
Snake	northern black racer	Coluber constrictor
Snake	eastern ratsnake	Pantherophis alleghaniensis

Herpetofauna. Hellam Hills NP is mostly forested with significant coarse woody debris, leaf litter, and small canopy breaks/disturbances. There are two streams that are both supported by seepage wetlands. A rocky outcrop runs the primary ridge on Hellam Hills NP as well. These are all critical habitat features for regional herpetofauna. To date, our team has observed a total of seven reptiles and 12 amphibians at Hellam Hills (Table 2). We suspect the actual diversity to be greater despite observed impacts to critical habitat on site (i.e., logging roads, erosion, invasive plants, damming in streams, shading of exposed rock outcrops by paw-paw and tree-of-heaven), and population imbalances of keystone species.

Rocky outcrops on site could be critical denning and gestation sites for regionally present venomous species (northern copperhead and timber rattlesnake). Neither species were observed on site, but a targeted survey for these species may reveal an extant population. We recommend assuming these species as present in order to enact habitat restoration that would benefit these species. Habitat restoration could also benefit the ecosystem and viewsheds on Hellam Hills NP (ex. removing colonies of paw-paw and canopy trees that are currently shading these boulder fields and outcrops).

Mammals. Particular groups of mammals can prove difficult to locate due to nocturnal/crepuscular activity periods, secretive movements, and other factors. Therefore, we rely on a variety of methods to locate evidence of mammals, such as dens, tracks, scat, and hair. A total of 13 mammal species have been observed on Hellam Hills NP during this effort (Table 3). Evidence of a significant

overpopulation of white-tailed deer (Odocoileus virginianus) is evident throughout Hellam Hills NP. It is highly likely that other species, including bobcat (Lynx rufus), fisher (Pekania pennanti), and gray fox (Urocyon cineroargenteus) may currently occupy Hellam Hills NP along with additional small mammals.

Access & Circulation

There are currently five vehicular access points and two pedestrian access points in the Hellam Hills NP. The most prominent vehicular driveway into Hellam Hills NP is the water utility access road. Its entrance is located along Furnace Road just north of the intersection with Chimney Rock Road. The driveway is 10-12 feet wide with a gravel surface and the entrance is currently gated. The driveway runs northeast through Hellam Hills NP towards the Marietta Water Company Parcel. An access easement grants the Marietta Water Company rights to use the driveway.

A private gravel driveway originates along the western edge of Hellam Hills NP from River Drive providing access to private properties located along the ridgeline. An access easement grants the adjacent property owners use of this driveway. Signage at this location clearly marks that this is not a public access point.

A paved asphalt driveway 8-10 feet wide provides access to the Conservancy Wildcat Bluff house. Originally developed as a single-family residence, the parcel is now part of the Hellam Hills NP.

Adjacent to the Wildcat Bluff parcel an additional parcel has a gravel access drive ten-foot-wide that originates at the entrance of the neighboring private property driveway along River Drive. The former landowner recently improved the first portion of the driveway adjoining River Drive. The upper portion of the gravel drive transitions into a former logging road that terminates near the Wildcat Bluff House.

Located along the eastern edge of the Hellam Hills NP is a logging road entrance originating from the end of Dugan Lane, a private road. The area is gated, there may have been a gravel surface on the road at one point, but little has been done to maintain the road in recent years

Pedestrian access into Hellam Hills NP is via the existing Mason-Dixon Trail (M-DT) alignment, blazed in the field as light blue. Following the Conservancy's acquisition of the site, they worked with the Mason-Dixon Trail System (M-DTS) to transition a portion of the on-road trail along River Drive into Hellam Hills NP. The M-DTS does not intend the new trail alignment to be the permanent M-DT alignment for Hellam Hills NP. The Trail enters Hellam Hills NP from the west at the intersection of Furnace Road and River Drive. It follows along a dirt hiking trail crossing the eastern branch of Wildcat Run with a low flow grade crossing before meeting up with the water utility access road. It then continues east along the gravel water utility access road. At the water company boundary, the trail leaves the gravel driveway crossing Dugan Run with a steppingstone crossing and transitions into a hiking trail that follows along the eastern side of Dugan Run until exiting Hellam Hills NP at River Drive.

Interior to the Hellam Hills NP is the Overlook Trail, blazed in the field as white; and a series of cultural trails and logging road. The Overlook trail originates from the Wildcat Bluff driveway and runs along the eastern bank of Wildcat Run prior to turning east to run upslope to meet the M-DT. As a former logging road, the trail bed is fairly even and six-feet-wide to eight-feet-wide. Two portions of the trail are a concern for continued use. The first is the area just east of former Wildcat Run reservoir. In this location the trail is directly adjacent to the stream. A section of the streambank has a severe vertical 'cut' threatening the stability of the trail. In this same area, an adjacent boulder field conveys subsurface spring water towards and under the trail before exiting into the streambank. The Second area of concern is where the trail turns east and proceeds up the steep slope toward the M-DT trail. Recent storm events have led to concentrated runoff along the trail bed creating rills and gully washout. The severity of the washout leads us to believe that this trail corridor is not a sustainable route.

The additional unmarked trails and logging roads offer a variety of conditions from stable dirt trail beds ranging from four-feet-wide to eight-feet-wide to unsustainable bed cuts that run directly down slope or lead to neighboring private lands. These trail beds offer opportunities to limit site disturbance by incorporating sustainable corridors into a comprehensive trail network for both hiking and emergency site access. The Conservancy should clearly sign abandoned trail beds as closed and implement restoration measures to stabilize and re-established vegetative growth. During interim use, the Conservancy should clearly post signage at the M-DT entrances into Hellam Hills NP informing trail users to stay on blazed trails.

Infrastructure & Utilities

There is extremely limited infrastructure on site. The only intact structure is the Wildcat Bluffs residence. Throughout Hellam Hills NP are ruins of former structures. A 1908 USGS map shows three structures on site: one at the entrance of the water utility drive, a second located along Wildcat Run just east of the current day gas line right of way, and a third located along the eastern bank of Dugan Run.

The Wildcat Bluff residence has electrical service, water service, and on-site septic. This portion of the Township is not serviced by sanitary sewer. Within the greater Hellam Hills NP there are no known septic facilities, water service or electrical service. Overhead utility lines run along River Drive and Furnace Road. Power lines enter Hellam Hills NP at the Furnace Road driveway continuing along the driveway into the site to provide electrical service to the Columbia Water Company parcel.

The Columbia Water Company provides water service to the homes along River Drive from the Lancaster County Side of the Susquehanna River. They still maintain water service facilities on the York County side of the Susquehanna River for emergency service should the pipeline across the Susquehanna River require repairs. Waterlines maintained by the Columbia Water Company run directly in the Dugan Run streambed.

Use Agreements, Easements & Right-of-Ways

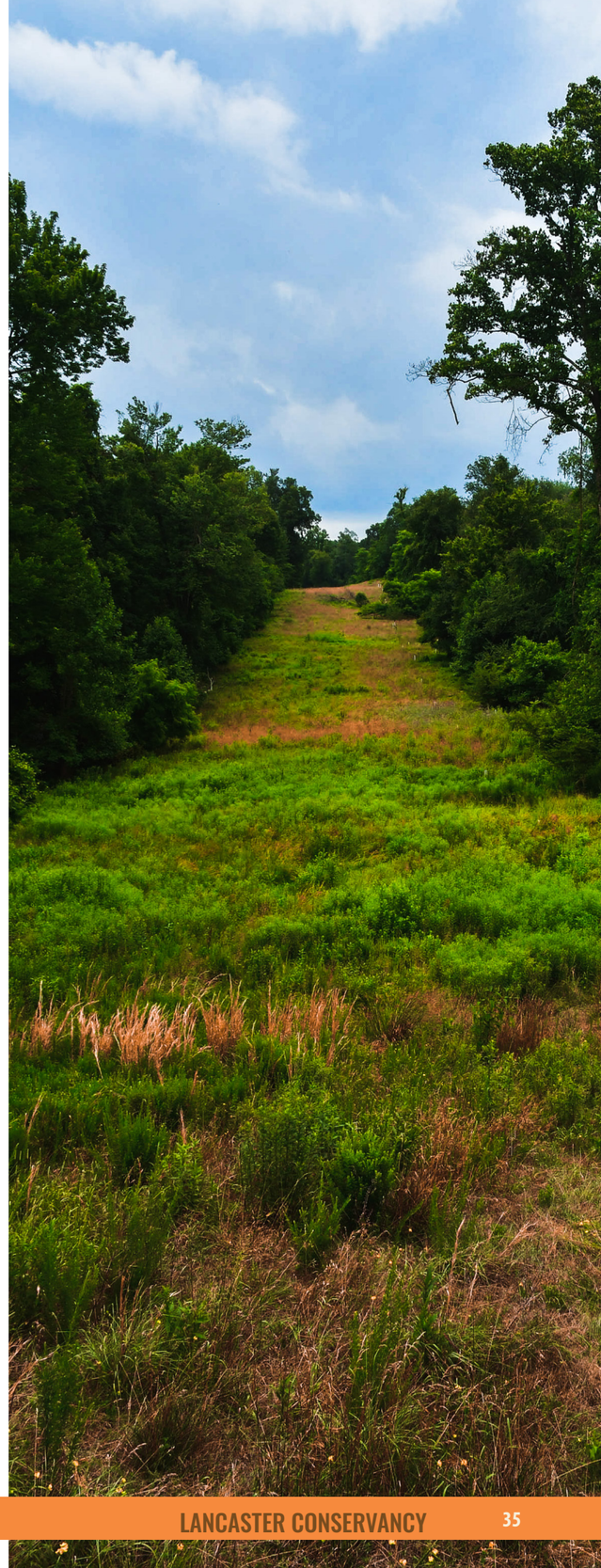
Texas Eastern Transmission, LP (Spectra Energy) has a 50' wide permanent and non-exclusive easement running through the western portion of the Hellam Hills NP in a north- south direction. They maintain a 30" gas line within the easement area.

Columbia Water Company maintains a right of way and easement agreement originating from Furnace Road continuing to the Columbia Water Company parcel along the existing gravel driveway. The Easement is 15-feet wide and follows the exsiting gravel access drive.

A final easement of varying width is an existing access easement. It follows the gravel driveway originating from River Drive providing access to private properties located along the ridgeline.

In 2019 the Conservancy entered into a Hunter Access Program Cooperative Agreement with the Pennsylvania State Game Commission (SGC) for the 104-acre Kinsley Tract located south of Furnace Road. The Hunter Access Program "creates a partnership between the Game Commission and landowner whereby they work in concert to improve public hunting and trapping opportunities and wildlife habitat on the property enrolled." Hunters and trappers help to manage game and furbearer populations through lawful hunting and trapping. In exchange for this access, the Game Commission provides a variety of benefits and incentives to the cooperating landowner. These benefits include:

- Access to free tree and shrub seedlings for restoration plantings through the Game Commission's Howard Nursery.
- Free and reduced-cost wood products for sign backer boards and artificial nest boxes through the Game Commission's Howard Nursery.
- Free Habitat Technical Assistance and Management; as funding allows, the agency offers free habitat improvement and management implementation including, but not limited to, invasive species management, young forest management, native grassland establishment, and healthy forest management.
- Law Enforcement in the form of patrolling and enforcement of game law by Pennsylvania Game Wardens. These patrols reduce illegal ATV use, littering and dumping, and various other game law violations.
- Liability Protection through the Recreational Use of Land and Water Act.



Wizard Ranch Nature Preserve Site Analysis

History

The Wizard Ranch NP is comprised of 248 acres acquired by the Conservancy in 2019 from New Birth of Freedom Council, Inc., Boy Scouts of America. Mahlon N. Haines donated the land to the Scouts in 1960. Haines was a York County Businessman and philanthropist. Nicked-named the "Shoe Wizard" in 1931, he owned the largest store chain in the United States. Haines' extensive land holdings throughout York County included the Wizard Ranch NP lands. He operated the land as a farm and had plans to build an estate home near the farm along Accomac Road.

Haines was an avid supporter of scouting and starting in 1941, he hosted the "Haines Safari" for local scouts on his farmland in celebration of his birthday. He held the events every five years in celebration of his birthday up to 1960. In his 1960 letter to the scouts Haines refers to Wizard Ranch as, "the Yellowstone Park of the East," and he hoped, "… to live long enough to see this one of the great Scout reservations in America, which will add much to making better boys, better men and better people in our community, by enjoying the privileges of being out of doors …". Haines passed away at the age of 87 in 1962. The New Birth of Freedom Council, Inc., started up the modern era of the "Wizard Safari" in 1987 and they have continued to the hold the event quadrennially. The Boy Scouts hosted their most recent safari in the fall of 2019.

Soils

Wizard Ranch NP soils are comprised of Catoctin channery silt loam (Cc), Chester silt loam, (Ce), Codorus silt loam (Cm), Edgemont channery loam (Ed & Ee), Glenelg channery silt loam (Gb), Glenville silt loam (Gd), Highfield and Catoctin channery silt loams (HHD), and Mt. Airy and Manor soils (MOB). None of the soils are classified as Hydric Soils. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The majority of Wizard Ranch NP is comprised of Edgemont channery loam (Ed & Ee) which is a well-drained soil, with low to medium runoff dependent on field slope and falls within Hydrologic soil Group A. Soils in this group have low runoff potential when thoroughly wet and water is transmitted freely through the soil.

The steeper portions of the field near Accomac Road contain Glenelg channery loam, which is a well-drained soil, with medium runoff dependent on field slope and falls within Hydrologic soil Group B. Soils in this group have low runoff potential when thoroughly wet and water is transmitted freely through the soil. Soils in this group have moderately low runoff potential when thoroughly wet and water transmission through the soil is unimpeded.

Two areas of Glenville silt loam (Gd) exist on site: one along the western edge of Wizard Ranch NP at the toe of the forest slope and the second area dominating the smaller southwestern field. Typically found in swales and drainageways, Glenville silt loam is a moderately well drained soil, with medium runoff dependent on field slope and falls within Hydrologic soil Group C/D. Group C soils have moderately high runoff potential when thoroughly wet and water transmission through the soil is somewhat restricted. Group D soils have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Codorus silt loam can be found along the majority of the stream corridor prior to its transition into steeper gradients as to approaches the Susquehanna River. Codorus silt loam is typically of floodplains, a moderately well drained soil, with low runoff potential and falls within Hydrologic soil Group C. Group C soils have moderately high runoff potential when thoroughly wet and water transmission through the soil is somewhat restricted.

Central to Wizard Ranch NP on both sides of the stream corridor are areas of Highfield and Catoctin channery silt loams and Catoctin channery silt loam. Typical of mountainsides, both are well drained soils and fall within hydrologic soil group B. Highfield and Catoctin channery silt loams have a high runoff potential and no runoff potential is listed for Catoctin channery silt loam.

Central to the interior site meadow is an area of Mt. Airy and Manor soils. Typical to hillslopes, these soils are somewhat excessively well drained and fall withing Hydrologic soil Group C.

Last a small areas of Chester Silt loam exist near Accomac Road. Typical to Hillslopes, these soils are somewhat moderately well drained and fall within Hydrologic Soil Group B.

Topography

The regional ridgeline and the central stream valley dominate Wizard Ranch NP topography. Located along the northern site boundary, the ridgeline runs parallel to the Susquehanna River, running west to east. Along the southeastern property line Accomac Road follow a regional saddle that runs northeast to southwest. The elevation at Wizard Ranch NP entrance drive along Accomac Road is 512 ft.

Wizard Ranch NP has two dominant high points. The first is located in the large western field along the western tree line. At approximately 570 ft, it provides a dramatic view towards the east of Round Top. The second high point located in the smaller northern field is at 600 ft and falls along Wizard Ranch NP's northern ridgeline. Views of the upper meadow are less dramatic due to the enclosed nature of the area. Wizard Ranch NP high points are separated by the central stream valley that enters Wizard Ranch NP at the western boundary at 480 ft and transverse Wizard Ranch NP at a gentle gradient prior to transitioning into a steeper grade and existing Wizard Ranch NP at 260 ft. Wizard Ranch NP low point is an area where the property abuts the Susquehanna River and is estimated to be around 256 ft

SOILS LEGEND

- CcC
- CeB
- Cm
- EdB
- EdC
- EdD
- EeD
- EeF
- GbC
- GdB
- HHD
- MOB

Figure 2.6 Wizard Ranch NP Soils Map

ELEVATION LEGEND

150′ 400′ 600′ 800′ 1050′

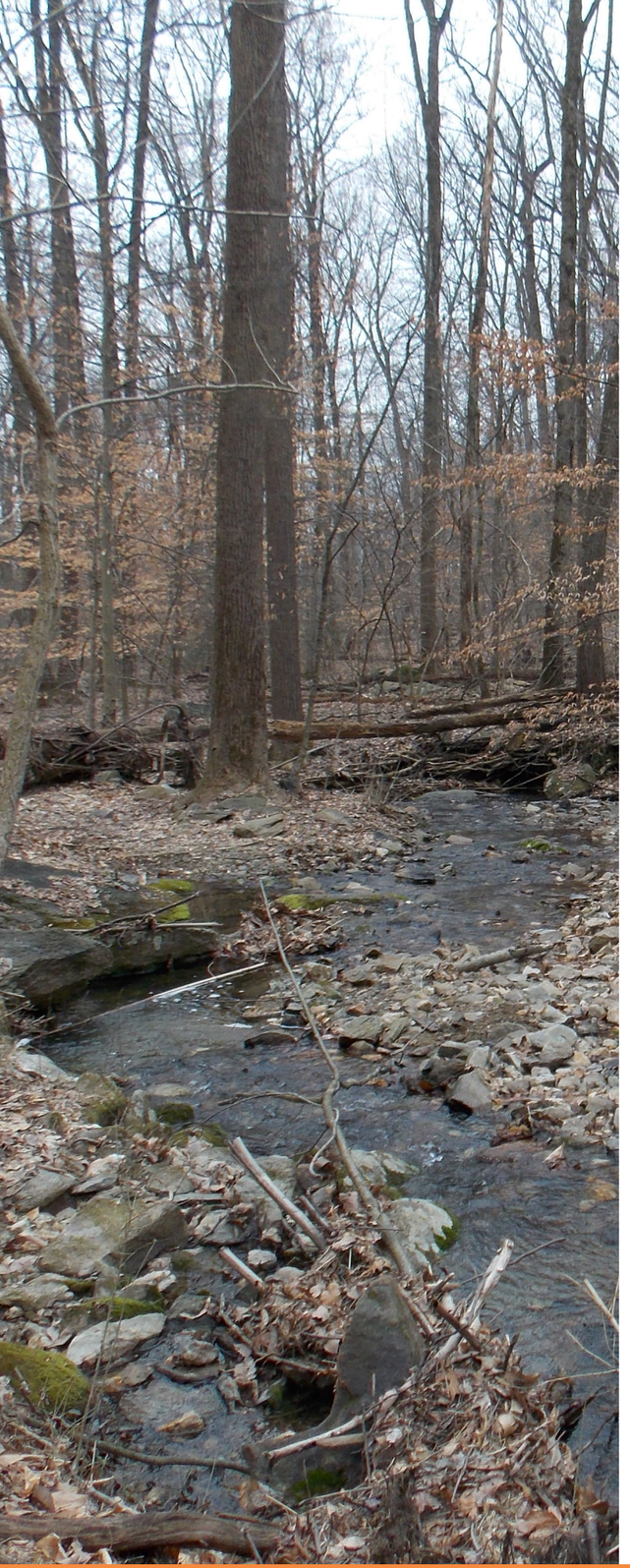
- Elevation Hight Point
- Elevation Point
- Elevation Low Point

Figure 2.7 Wizard Ranch NP Elevation Map

SLOPE LEGEND

- 25+%
- 15-25%
- 8-15%
- 5-8%
- 3-5%
- 0-3%

Figure 2.9 Wizard Ranch NP Slope Map



Hydrology

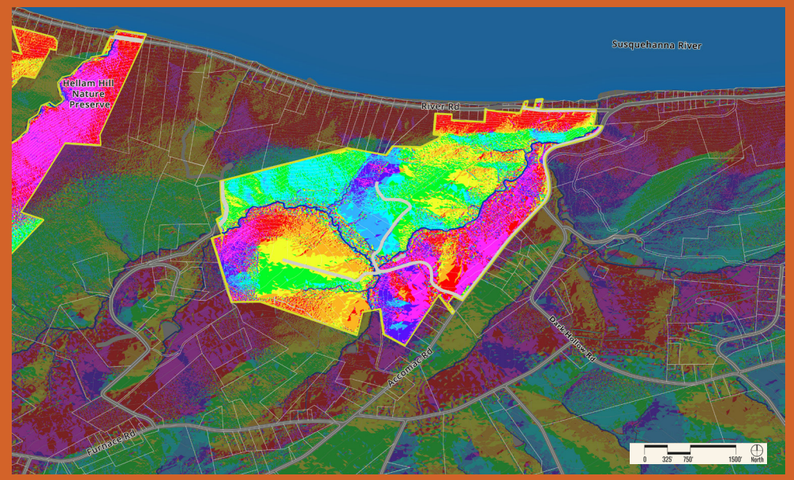
Central to Wizard Ranch NP is an unnamed tributary to the Susquehanna River that flows west to east across the site. Two smaller branches of the site's stream originate to the west of Wizard Ranch NP in adjoining farmland. They converge in the central portion of Wizard Ranch NP to form the main stream.

In the western and central portion of Wizard Ranch NP the streambed has a gentle grade and a supporting flood plain that meanders through Wizard Ranch NP. Where the two streams converge a wider floodplain and wetlands are present. However, re-grading evidence near the northern stream approach and three culverted stream crossings have impacted the functioning of the floodplain and health of the adjoining wetlands.

As the stream continuous east through Wizard Ranch NP, the morphology changes. The floodplain diminishes and gives way to a stream gorge with a rocky stream bed. Remnants of a dam are located in the area of this transition. As the stream turns north on its decent towards the Susquehanna River, a third tributary joins the stream from off site. A culvert under Accomac Road conveys this tributary into Wizard Ranch NP. From this area of Accomac Road to its confluence with the Susquehanna, a mapped zone A floodplain exists. This designation indicates an annual one-percent chance of flooding (formerly referred to as the 100-year floodplain).

Other hydrological features on site include a constructed pond situated just east of the stream convergence along the southern bank of the stream. An upslope spring feeds the pond. An open swale and culverted pipes along the entry road convey this water into the pond. A pond standpipe discharges pond overflow into the stream. The retaining berm of the pond is integral to the southern stream bank and continued erosion in this area over time could lead to the failure of the pond embankment. There does not appear to be an emergency overflow built into the pond retaining berm.

Wizard Ranch NP has a series of natural stormwater drainage ways. Springs and natural drainage ways are located along the northern ridgeline of the site. These fed springtime vernal pools in the healthier forested areas to the west. Further to the east, however, where the forest floor is more fragmented these natural drainage ways are creating erosion problems. Lastly, drainage swales associated with the former agricultural fields are evident. The most predominant of these swales is located in the Accomac field running west to east from the entrance drive towards the forested area.



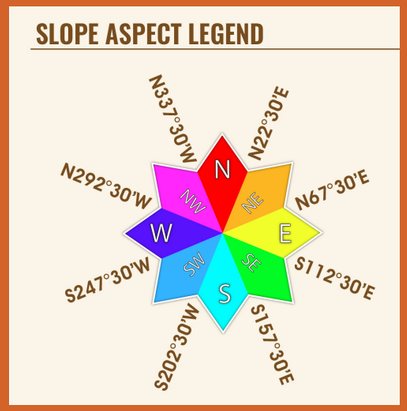
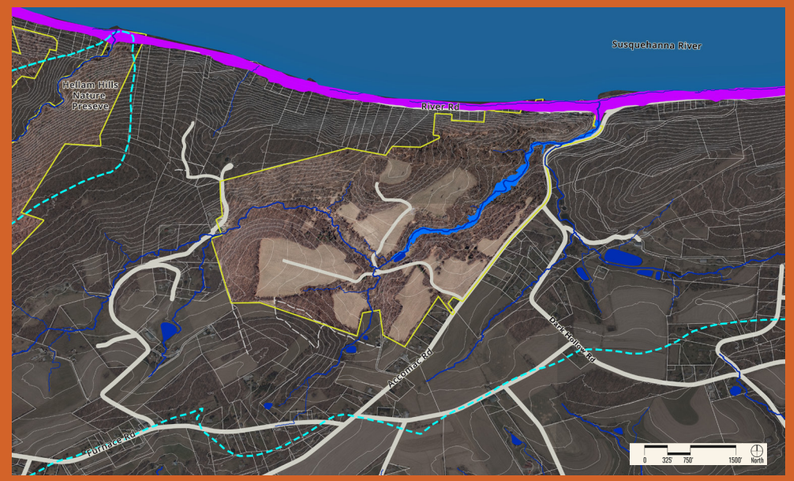


Figure 2.10 Wizard Ranch NP Slope Aspect Map



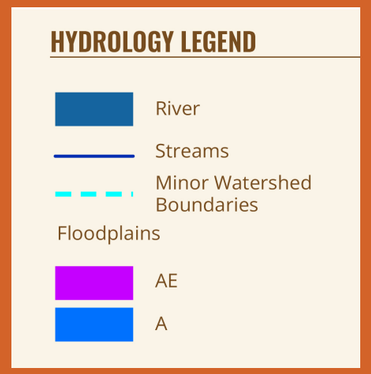


Figure 2.11 Wizard Ranch NP Hydrology Map

Flora & Fauna

Plants. A total of 182 plant species (Table 3) have been observed over five site visits. Forty-nine of the species are considered invasive — but many of these are dominants (most dense within communities as well as most widely distributed in some instances). Because of the large open fields there are areas of planted graminoids that are common crops (like corn) but are not considered native. The fields and roads that the Boys Scouts have consistently used show evidence of their anthropogenic use. They have a higher invasive count and coverage than other parts of the HHCA. Japanese stilt-grass (Microstegium vimineum) is pervasive. Site slopes typically had little to no groundcover and just a shrub layer of pawpaw (Asimina triloba). Please see the full Ecological Report for breakdown of plant communities by management unit and a full species list.

Birds. 97 bird species were observed via point count on site (see Ecological Report, Appendix II for the full species list) out of 388 individual birds observed. These observations were made during fall migration, spring migration, and breeding season. Of the species observed, 45 were confirmed or probable breeders per the PA Breeding Bird Survey behavior codes. The most frequently observed birds were indigo bunting (Passerina cyanea), northern cardinal (Cardinalis cardinalis), red-bellied woodpecker (Melanerpes carolinianus), red-eyed vireo (Vireo olivaceus), and American goldfinch (Carduelis tristis).

Herpetofauna. A relatively rich diversity of herpetofauna are present in the stream corridor and certain upland areas at Wizard Ranch NP. A total of 12 species (two turtles, five anurans, three salamanders, and two snakes) were confirmed present. In addition, degraded, but suitable habitat for spotted turtle is present on site.

Mammals. Many white-tailed deer (Odocoileus virginianus) were observed, and their presence was very notable in herbivory and scat. The fields adjacent to forested areas provided a large amount of edge habitat that deer were using. Other mammals observed include northern gray squirrel, raccoon, groundhog, opossum, and there was evidence of both fox and coyote

Wizard Ranch Vegetation			
	Native	Invasive	N/I
Tree	32	6	0
Shrub	9	5	1
Forb	62	25	6
Graminoid	16	7	3
Vine	4	6	0
Sub-Total	123	49	10
Total	182		

Access & Circulation

Main site access into Wizard Ranch NP is located along Accomac Road. A gate controls vehicular access to an existing gravel drive located at the western edge of the property. The gravel drive continues into Wizard Ranch NP towards the stream valley. Prior to the stream crossing, an offshoot of the gravel road continues west into the larger western field. Remnants of the road bisect the field and terminate at a centrally located flagpole.

Upstream of the stream convergence, the main portion of the gravel drive continues towards the center of Wizard Ranch NP crossing the stream corridor twice via bridges. Both of the vehicular bridges are older and in need of repair. Should these bridges be retained long term, inspections should be conducted prior to any public use.

After crossing the stream, the road continues centrally through the interior western field prior to turning northwest and continuing upslope into the upper field area.

Located along River Drive, a paved asphalt drive serves as a secondary vehicular access. The driveway crosses the steep terrain via a switch back and terminates at the top of the ridge near a former logging road / trail located in the northern forested area of Wizard Ranch NP. The extreme steep grades of the driveway slope limit its use to all terrain rescue vehicles.

A private drive originates from Whitetail Lane and enters the northwest corner on Wizard Ranch NP. This private road is not appropriate for public use but could serve as emergency access to the northern ridge area of Wizard Ranch NP.

A dirt farm field access road runs through the western forest connecting Wizard Ranch NP's western field to neighboring farms and fields.

A gated farm field access point is located along Accomac Road west of Dark Hollow Road. With minor improvements, this point could serve as a secondary emergency access to Wizard Ranch NP along Accomac Road.

Infrastructure & Utilities

There is limited infrastructure at Wizard Ranch NP. Four site structures include: two stone cabins, remnants of a root cellar and a cinder block pit toilet building. The cabins are in fairly good condition presenting opportunities for adaptive reuse. The first cabin is located east of the entrance road along the northern edge of the Accomac Road meadow. The second is located along the southern edge on the large interior eastern field along the forest line overlooking the stream valley. The toilet building (poor condition) is located in the same meadow along the southern tree line. The facility is in poor condition and the Conservancy should collaborate with the Boy Scouts to demolish the structure. In close proximity to the toilet building is a mobile trailer, this should be removed from Wizard Ranch NP.

Wizard Ranch NP has electrical service and well water but no septic facilities. This portion of the Township is not serviced by sewer. Electrical service terminate in the interior eastern field near the toilet building and the well is located in this area. It is not known if the well water is potable and the Conservancy will not maintain it as potable.

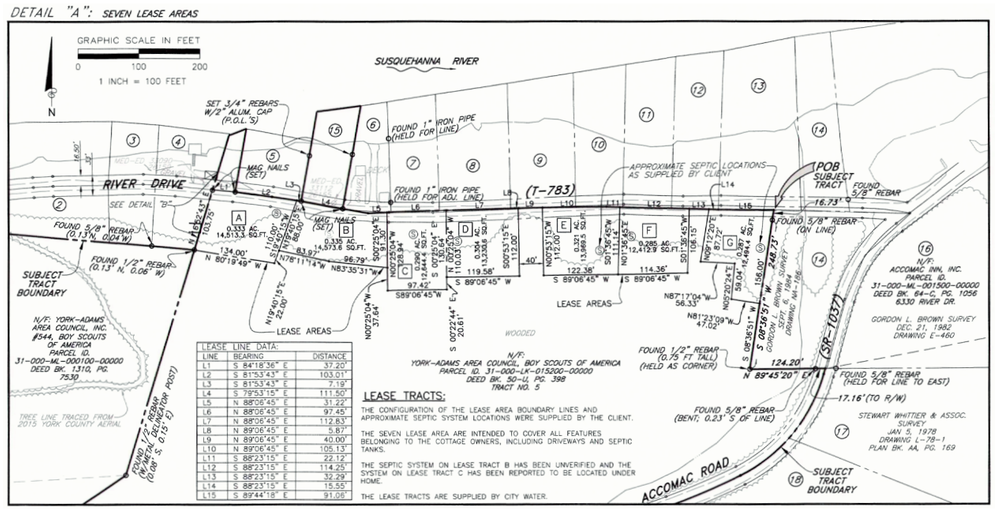
Use Agreements, Easements & Right-of-Ways

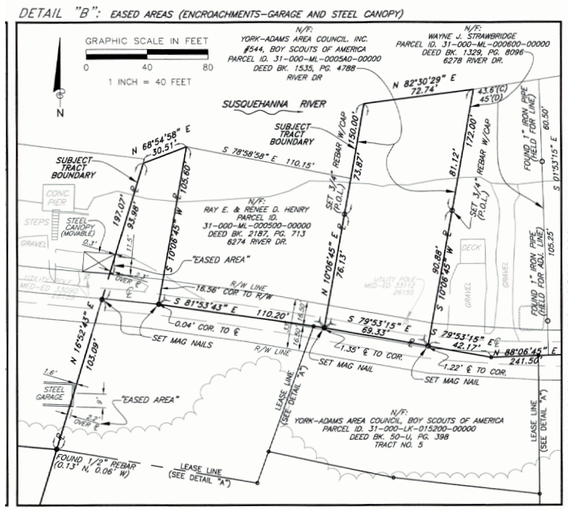
Negotiated as part of the acquisition of Wizard Ranch, a Limited Access and Management Agreement is in place between the Conservancy and New Birth of Freedom Council, Inc., (the Council). The agreement outlines the terms of continued use of Wizard Ranch NP by the Council for their quadrennial Wizard Safari events. The agreement notes that the following facilities will remain: two stone cabins, the façade poles, amphitheater poles, and climbing spars. It also notes that areas of meadow and forest should remain "substantially in a similar size" as at the time of the agreement. The Conservancy is to provide either portable or temporary restrooms for nature preserve users the Council is responsible for additional facilities that may be required during the Safari. The council is responsible for any repairs required to the nature preserve due to event activities. The report appendix includes a full copy of the agreement.

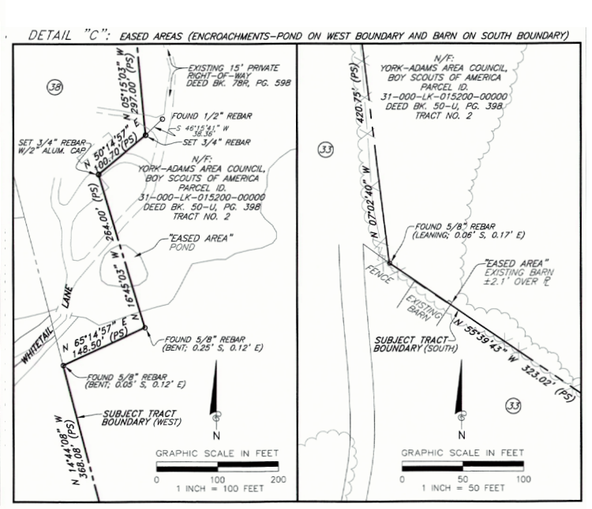
To the west of the intersection of Accomac and River Drive, portions of Wizard Ranch NP extend all the way to River Drive. Historically, Landowners in this area constructed their homes/cabins into the hillside on south of River Drive, however the owners' deeds only defined the land in the area north of River Drive. Along the River Drive portion of Wizard Ranch NP, the Conservancy maintains seven long-term leases to address where cabins were built on land that is in now owned by the Conservancy. The area for each lease covers the area surrounding the home, septic system and driveway. Each home is serviced by public water. The 2018 site survey defines these easements in Exhibit A.

Additionally, the 2018 survey identifies four minor site encroachments as "Eased Areas". Two areas are located along the western property boundary to the north of Wizard Ranch NP and are associated with private residences. The 2018 survey identifies these areas in Exhibit C. A third encroachment is located on the western property boundary to the south of Wizard Ranch NP and is associated with a privately owned farm. The 2018 survey identifies this encroachment in Exhibit C. The final 'eased area' (called out on the survey in Exhibit B is associated with a private residence located along the western River Drive boundary.

A view of the homes along River Drive looking down river towards Accomac Road







ACTIVITIES & FACILITIES ANALYSIS

3

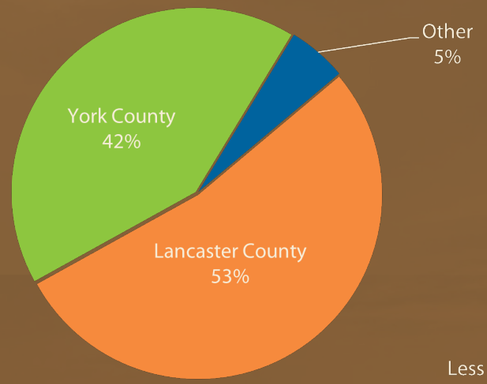
Potential Uses

A variety of potential site activities and facilities were explored in the preliminary stages of the master plan process. Ideas for activities were asked for from the public via public meetings, online survey and key person interviews. Activities and facilities for the Hellam Hills Conservation Area (HHCA) were considered through the lens of supporting a balance between ecosystem health and public access.

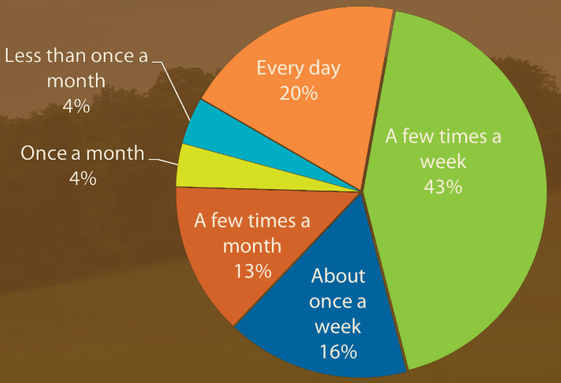
Public Survey Findings

The public survey was used as a tool to understand public priorities for passive recreation as well as understand public values surrounding stewardship and land management. We received 309 responses to the survey, with 15% of respondents living in Hellam Township. In general respondents were active users of the region's recreational facilities with 20% outside every day and 43% percent more than once a week.

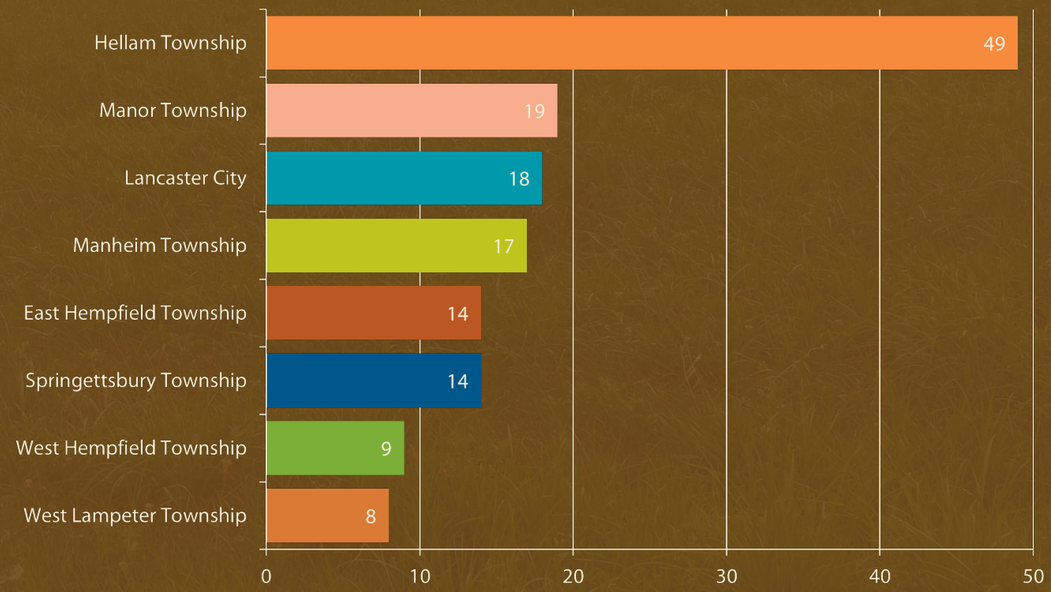
Respondent County



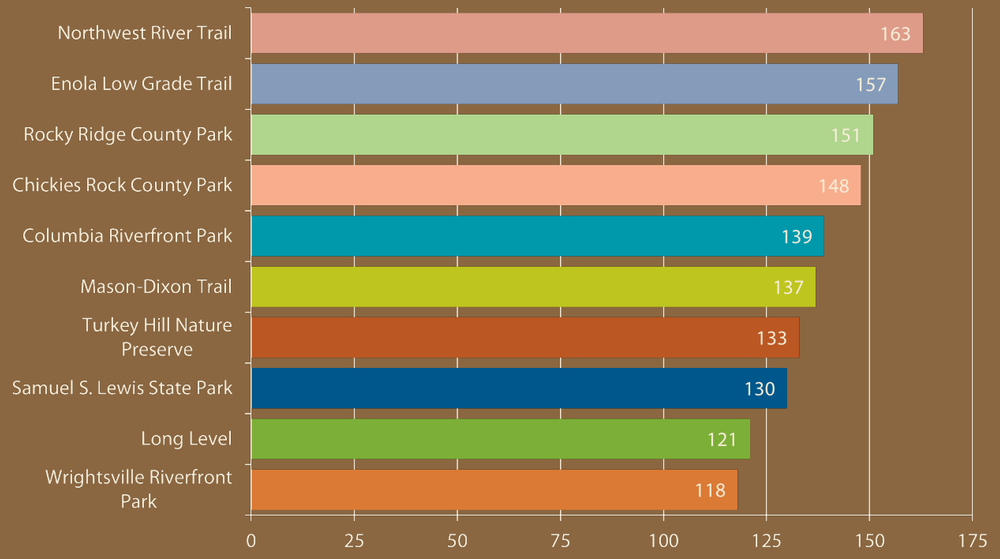
How often respodents visit outdoor areas



Top Responding Municipalities



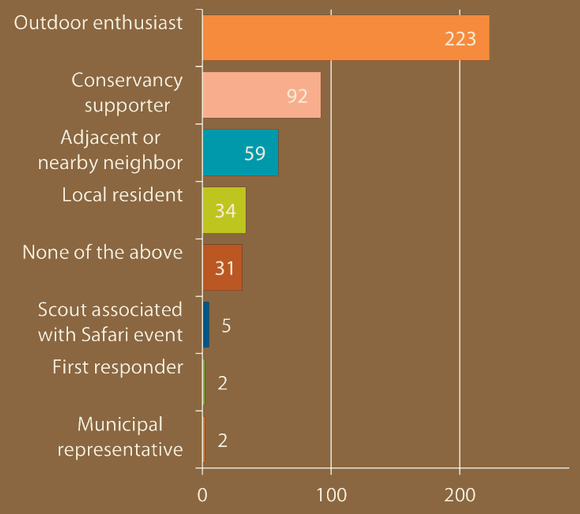
Riverlands Region Parks and Open Spaces Visited in the Past 12-24 Months.



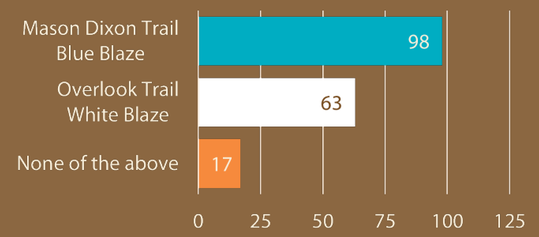
Area trails such as the Northwest River Trail ranked highest in use closely followed by county and state parks. In general respondents were willing to drive significant distances to take part in their preferred outdoor recreational activities with the 30% being willing to drive more than 50 miles. Hiking was by far the preferred recreational activity.

The majority of respondents identified as outdoor enthusiast and had a good understanding of the stewardship goals of the Conservancy. One-third of respondents currently use the HHCA for hiking, with the Mason-Dixon Trail (M-DT) being the most used trail. When asked to rank their top three priorities from a list of eight priorities for HHCA, the top ranking was habitat and wildlife.

Repondent Relationship to Conservation Landscape

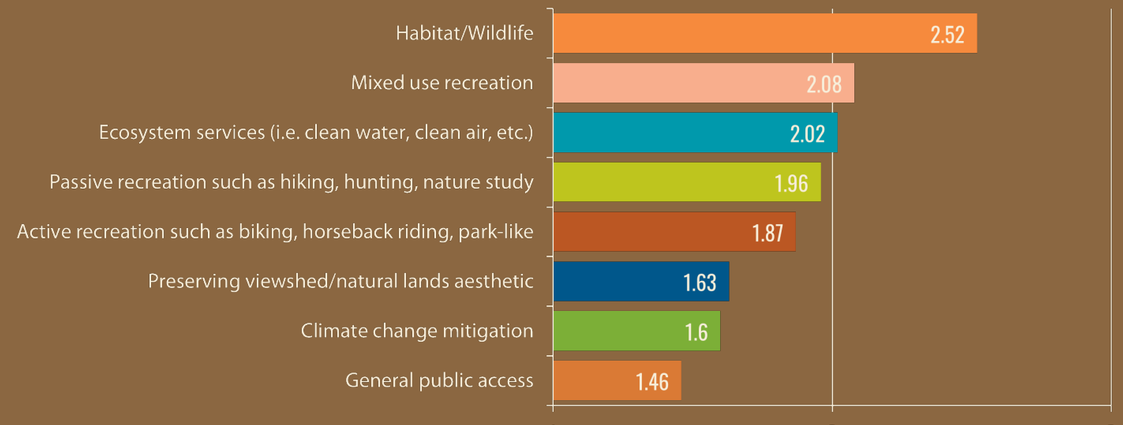


Current Trail Use

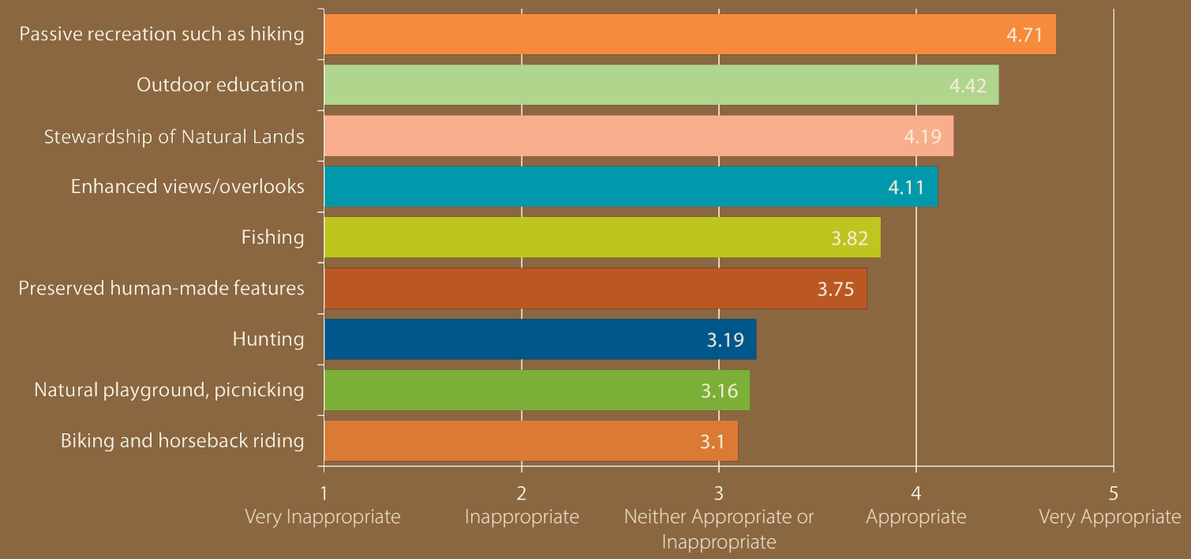


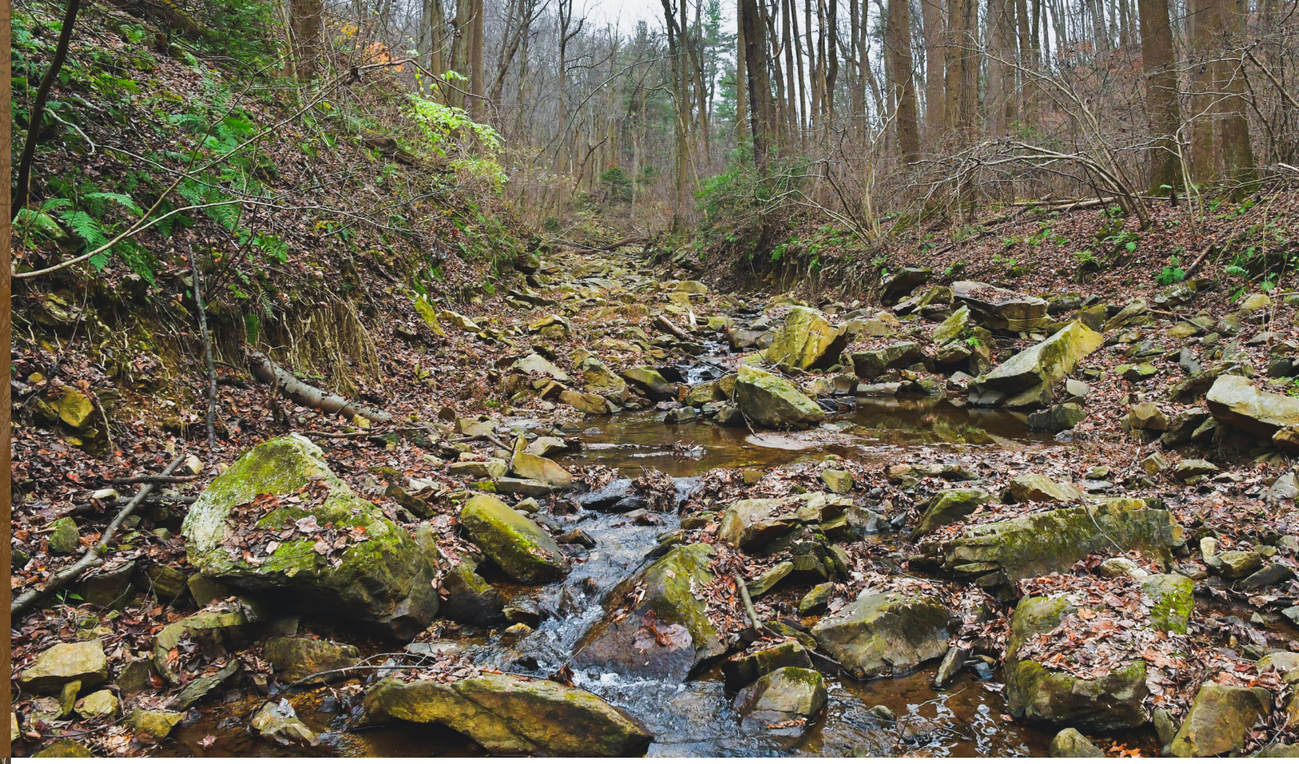
When asked to rate the appropriateness of a range of public uses for the HHCA active recreation and biking & equine use fell towards the bottom of the list rating slightly above "neither agree or disagree". In a related question, respondents were asked to rate potential or new actives. In this case trail improvements were a clear priority however mountain biking fell to the bottom of the list into the "disagree range".

Ranked priority for managing Hellam Hills/Wizard Ranch Nature Preserve



Rated appropriate public uses of Hellam Hills/Wizard Ranch Nature Preserve





Assessment of Needs

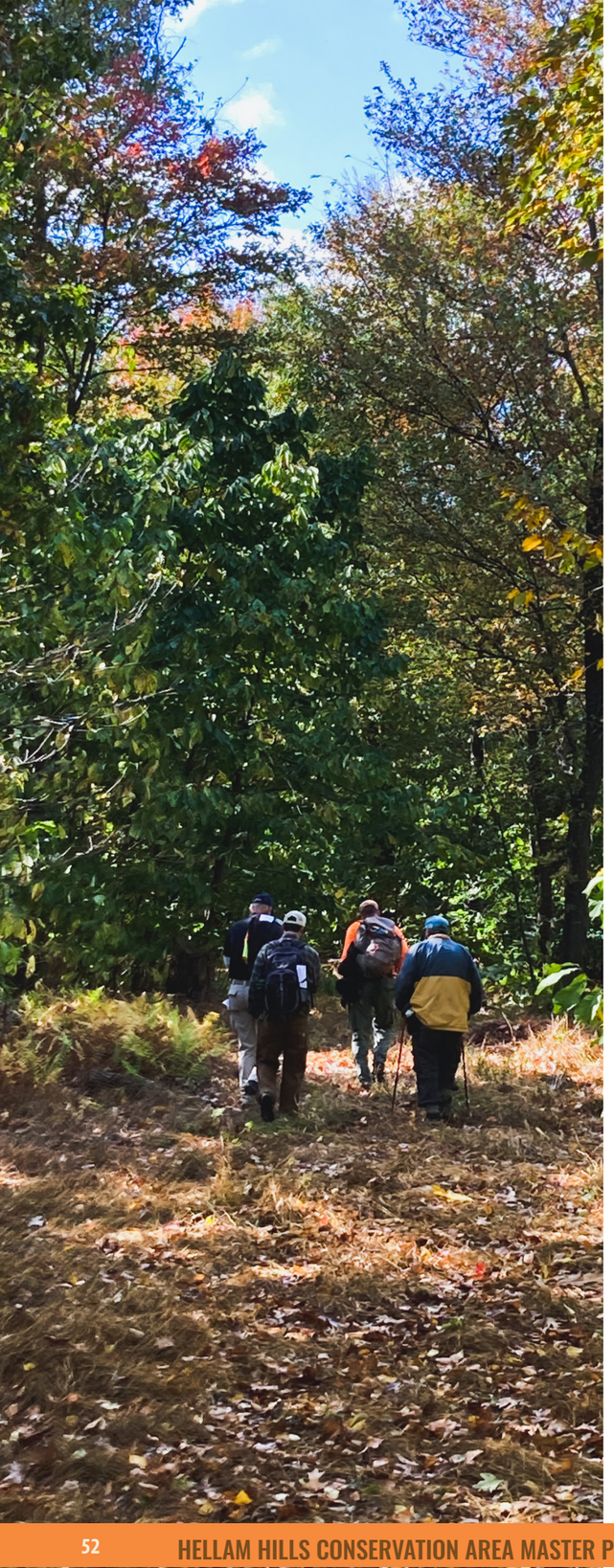
A range of public ideas were received through the public process. This wide range of ideas shared may point to the need for such facilities in the region, however not all ideas were proper to explore within the confines of HHCA due to a combination of site constraints and stewardship priorities.

Protection of Water Resources

The ecological assessment recommends the Conservancy prioritize the establishment of reach-wide stream restoration plan for the three streams in the HHCA. The restoration of these streams is critical to address the hydrological health of the greater HHCA. If left unchecked the continued erosion currently taking place along the streams will have rippling effects throughout the HHCA with primary effects being to more sensitive habitat such as vernal pools and wetlands.

The plan identifies areas of steep slopes (15% or greater), headwater seeps, wetland and floodplain as areas for protection. Along the areas to steep slope trail corridors should be limited to existing trail corridors that have been benched into the hillside. Fall line trails corridors in these areas should be restored. Headwater seeps and wetlands areas should be field delineated and protection buffers of 100 feet applied. Development of trails in these areas should be limited in nature and the use of boardwalks may be called for to limit impacts. At Wizard Ranch NP the stream restoration focuses heavily on the redevelopment of the central site floodplain. Final limits of floodplain and wetland will be defined through restoration efforts. Crossing of these areas should be limited to allow for safe connections across the Wizard Ranch NP and designed in conjunction with restoration efforts.

Opportunities for restoration of stream, wetlands, and floodplain at Wizard Ranch NP present a particular opportunity to offer benefits to both the HHCA and greater community. The series of 2018 storms that moved through the region lead to severe damage to area roads. The Wizard Ranch NP stream contributed directly to the road washout to both River Drive and Accomac Road. The strength and speed of the flash flood storm that effected the area is still fresh in the memories of many area residents and is a tangible teaching tool for the importance of watershed management and protection. The floodplain restoration at Wizard Ranch NP would build resilience into the stream corridor and will serve as a teaching tool for Wizard Ranch NP visitors.



Passive recreation

Outdoor recreation falls into two categories: passive and active. Active recreation refers to a structured individual or team activity that requires the use of special facilities, courses, fields, or equipment. Typical examples include soccer, baseball, tennis, skiing, or golf. Passive recreation refers to recreational activities that do not require prepared facilities like sports fields; the activities place minimal stress on a site's resources. The Conservancy's purpose is to protect lands and provide for public access, this aligns the Conservancy with offering for passive recreation.

During the public input process facilities were suggested that clearly fall into the realm of active recreation such as a sports field at Wizard Ranch. The Conservancy can appreciate that the need for sports fields may exist in the community, however it is not within their mission to supply such facilities.

A land manger must select the types of passive recreation facilities that they offer based on site goals, constraint, and resources. During the preliminary stages of the master plan process, each of suggested facilities were considered to find if they met the goal of minimal stress on site resources and aligned with specific site stewardship goals. For requested facilities such as picnicking, playgrounds, and disc golf it was decided that these falls outside of the Conservancy definition of passive recreation.

Playgrounds require regular inspection and maintenance to insure safe public use along with other comfort facilities that fall outside of the realm of Conservancy's nature preserves. Regarding picnicking the Conservancy recognizes that a small outing may include a packed picnic, but the management of a group picnic pavilion(s) for parties was not compatible with the setting of a nature preserve, nor did they want to direct resources to the management and maintenance of such a facility.

Regarding disc golf, the Conservancy recognizes that this is a growing recreational facility and can appreciate the excitement of the user base to pursue new course opportunities. Two facilities exist within the area. Two 18-hole course at Gifford Pinchot State Park and one 18-hole course at Klines Run Park. The HHCA ecological assessment identifies key birding habitat at both nature preserves and proposes stewardship recommendations to improve these habitats. The restoration goal for bird habitat is to create shrubland and meadow habits that have significant core habitat - an interior area that is buffered from adjacent trails. A typically disc goal space requirements range from 14-39 acres based on the level of play, terrain, and foliage density. Comprised of 9-18 holes the network of trails needed for such a facility do not align with the constraints of the HHCA and goals for restoration. Pair with the local offerings for this activity the Steering Committee did not feel it was appropriate to dedicate resources to such a facility in the HHCA.

It was decided that biking was not a suitable passive recreation active for the HHCA, this is expanded upon in the Regional Connectivity and Trails section below. Additionally, it was found that river access within the HHCA is not possible at this time, this is expanded upon in the River Access section below.

Passive recreational activities that align with the Conservancy mission and HHCA goals and constraints include hiking, walking, running/jogging, wildlife viewing, bird watching, historic and archaeological exploration, observing and photographing nature, hunting, primitive camping, cross-country skiing, and snow shoeing. All these activities center around the development of a sustainable trail network.

The Conservancy is excited to expand upon the diverse passive recreational facilities offered within the Susquehanna Riverlands Region. The benefits of HHCA facilities will add to the protection of area natural resource; restoration of ecosystem services; restoration of animal and plant habitat; and the growth of local economic development and tourism opportunities.

Regional Connectivity and Trails

The Conservancy recognizes the importance of the regional trail network and the potential that the HHCA offers to foster further connections. The planned pedestrian / cycling improvements to the Veterans Memorial Bridge will form a key link in connecting the recreational resources on both sides of the Susquehanna River. Potential trail corridors identified both by Hellman Township and York County will also create connections moving west to Rocky Ridge Park and the City of York. This regional trail network is important to fostering healthy communities as well as creating a regional recreation destination. The plan recommends that HHCA can add to the regional asset via pedestrian-oriented hiking trails. Where possible existing trail corridors have been identified for potential reuse. Existing trails were assessed considering the following criteria: proximity to water resources, development on steep slopes, if they lead off Conservancy property, and if they were redundant adding to fragmentation of the forest.

A desire to expand upon the regions cycling opportunities was expressed by both the public and the region's bike advocacy groups. Mountain biking, gravel biking, and on-road cycling are all important activities within the region. However, through the environmental assessment of the HHCA it was decided that restoration of the stream corridors and supporting landscapes are the primary goal for HHCA stewardship. Extensive trail networks through HHCA are not compatible with stewardship goals of long-term forest canopy health that recommend focused protection on primary stream corridors, headwaters seeps, wetland areas and steep slopes. The Conservancy is committed to a Hellam Hills gravel through trail for emergency access that, once completed as an improved trail, may be used for bicycles to traverse the property in support of regional biking routes

River Access

Prior to the master plan the Conservancy explored options for water access along the River Drive in the Hellam Hills NP. The project was abounded do to initial archaeological findings in the proposed area. Throughout the master plan the idea of river front access was discussed. The Conservancy understands the need for kayak and canoe access along the western bank of the Susquehanna River within the Hellam Hills Region. However, the existing road infrastructure along River Drive cannot safely support the public demand for such an amenity.

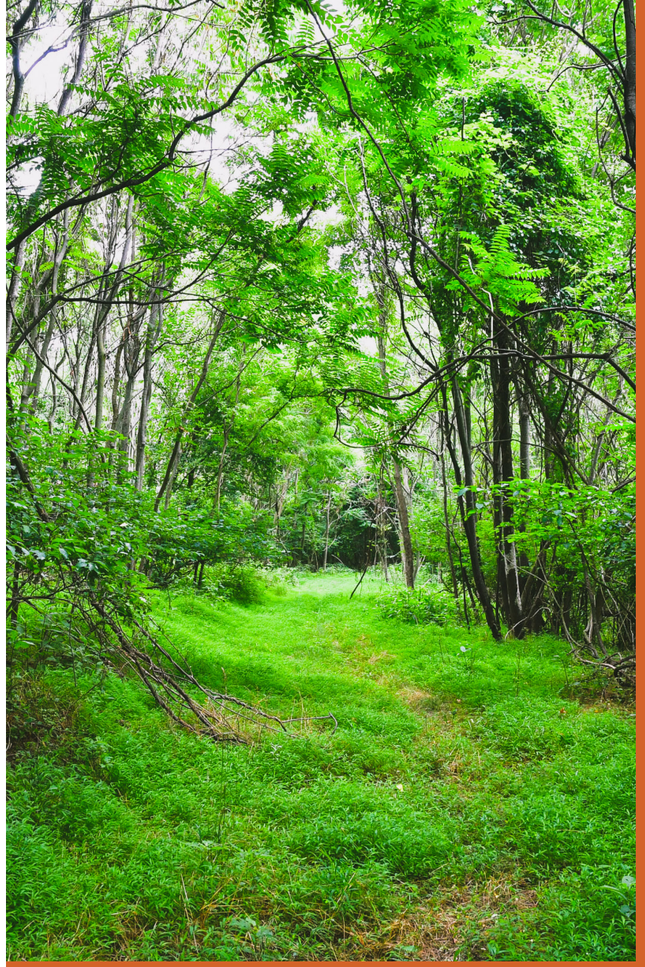
River Drive is a local road that at times narrows to single lane width. With potential river access locations only existing in the middle part of River Drive along Hellam Hills NP frontage the level of vehicular traffic that would be created would be too great of a negative effect on area residents to be considered. Paired with limiting impacts to the floodplain habitat in this area no vehicular parking is proposed in the River Drive corridor of the HHCA.

Emergency Access

Due to the size of the HHCA planning for emergency access into and throughout the HHCA is a key part of the plan. Each nature preserve will provide strategic trail corridors that can accommodate an emergency response all-terrain vehicle. As master plan trail recommendations are implemented local emergency responders should be notified of trail alignment changes. At Hellam Hills NP the creation of an emergency trail corridor will connect Furnace Road to River Drive. This trail corridor would serve the greater community by providing an alternate route into the River Drive residential area should the primary roads become shut off during a severe weather event.

Engagement Hub

The Conservancy runs a series of programs focused on engaging the public with nature, educating the public about nature, and facilitating volunteers to care for natural lands. To support these programs in the HHCA an Engagement Hub is envisioned. It should include both indoor and outdoor space. Restrooms should be provided either within a building addition or as standalone structure. The Engagement Hub should have a relationship to the Stewardship Hub for convenience for Conservancy Staff but as a public amenity have adequate separation to allow the Stewardship Hub to function properly as a staff only area.



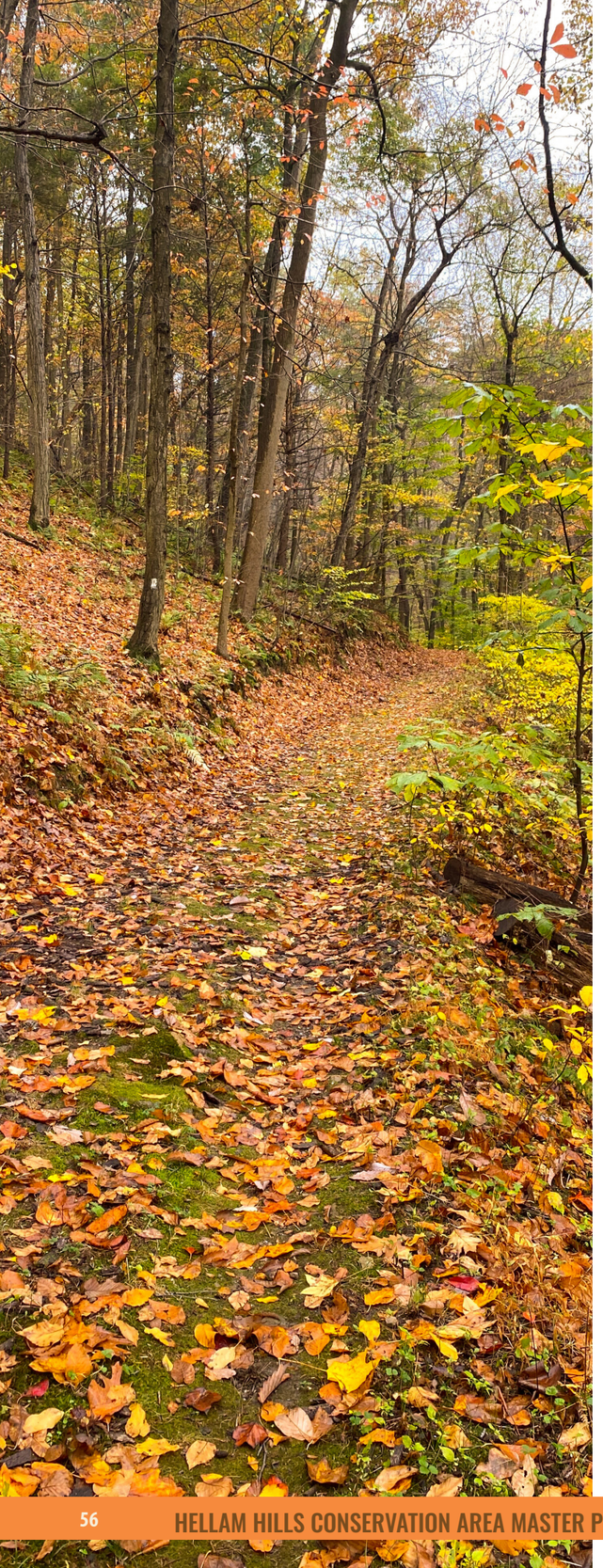
Regional Stewardship Hub

With the acquisition of the HHCA the Conservancy quickly added significant land holdings that are not centrally located near their existing stewardship hubs. The size of the HHCA in combination of the pursuit of additional preservation priority in the region a regional stewardship hub is needed for the HHCA. The Stewardship Hub is not a public building. It is intended to serve the specific needs of the Conservancy staff, stewardship work crews, and administrative services for the HHCA.

The hub will supply garage and yard space to accommodate the daily stewardship team(s) needs for the HHCA. As the Conservancy continues to grow, they recognized that one centralized office space is no longer the most efficient way of meeting the Conservancy office space needs. The stewardship hub would include both dedicated offices for staff focused in the HHCA as well as flexible office space for staff that work throughout the Conservancy's land holding.

Agroforestry

With the establishment of the Falmouth Forest Garden at Conoy Wetlands NP the Conservancy and regional partners developed what is believed to be the first forest garden established on public lands in Pennsylvania. The food forest has been a successful tool for educating the public on regenerative agroforestry as a public-natural lands management strategy. Additionally, Conservancy has undertaken agroforestry measures focused on growing material for restoration and construction resources at Wilton Meadows NP, also located within Hellam Township, with the planting of Black Locust coppice groves. HHCA will build upon this success. Agroforestry practices in the HHCA will aid in habitat restoration and management, as well as serve as a source of producing plant material for restoration and stewardship throughout all the Conservancy nature preserves.



General Design Standards

Trail Standards

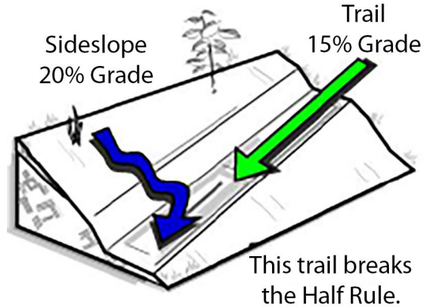
Trails will be a major part of HHCA. The proper development of the HHCA trail network will be key to the long-term health and resiliency of the HHCA. The following trail standards and best design practices should be implemented throughout the HHCA. The following best practices were gathered from the United States Department of Agriculture, Forest Service.

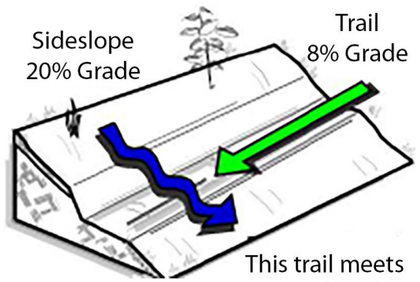
The 'Half' Rule

A trail's grade should not exceed half the grade of the side slope that the trail is traversing. If the trail grade exceeds half the slope grade, it is considered a 'fall-line trail'. Water — following the path of least resistance —will travel along a fall line trail eroding the trail bed rather than flowing across it.

For a trail corridor 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 a fall-line condition. Flat areas should be avoided, as trails built in these areas are more likely to collect and hold water.

Half Rule





Ten Percent Average Guideline

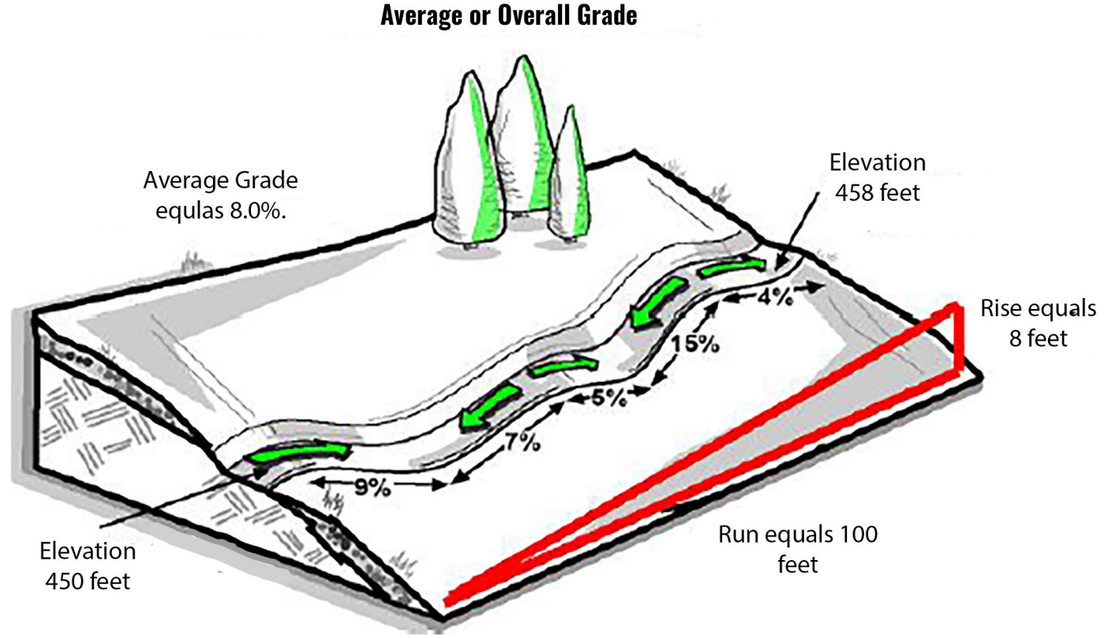
A 10% average grade is the most sustainable. Trails may, at points, be above and below 10%; however, the trail's average grade should be kept at a sustainable grade of 10% or less. Short sections can exceed 10% if the 'half rule' is still used (15% trail grades can be used for short sections if the side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

Maximum Sustainable Trail Grades

Maximum grade, usually around 15% to 20%, is the steepest allowable grade based on 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.

Average or Overall Grade



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 a soft, boggy tread.

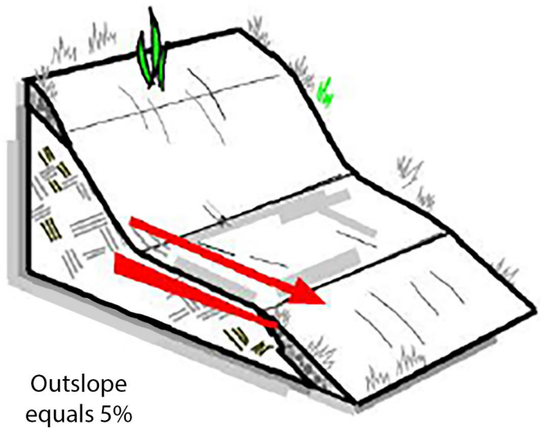
Building trails into the side slope, maintaining sustainable grades, frequent grade reversals, and out sloped tread are important trail design elements that allow water to sheet across the trail rather than pool on its surface.

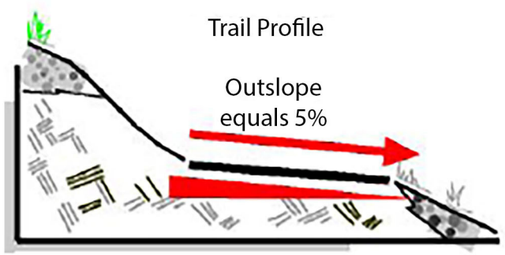
Outslope. As the trail contours across a hillside, the downhill, or outer edge of the trail's tread should be slightly lower than hillside, or inside edge, by 5%. Outslopes encourage water to sheet across the trail rather than travel down the trail's center. Outslopes can be difficult to maintain in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

Grade Dips. (also known as grade reversals, terrain dips, or Coweeta dips) 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 along it. These trail design features require minimal maintenance and are unobtrusive to trail users if constructed with smooth grade transitions.

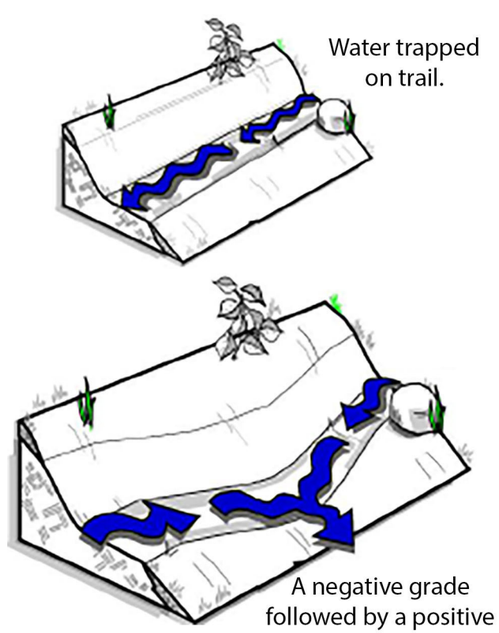
Grade reversals utilize natural contours of topography in the terrain — the grade of the trail is reversed for 10 to 15 feet, then "rolled" back over to resume the descent. This change in grade allows water to exit the trail tread at the low point of the grade reversal. Grade reversals should be placed often, every 20 to 50 feet. A trail that lies 'lightly' on the land will take advantage of natural dips and draws for grade reversals. Consideration of the area receiving the trail runoff should be given to ensure that the area is sufficiently vegetated or armored to protect it from erosion.

Outslope





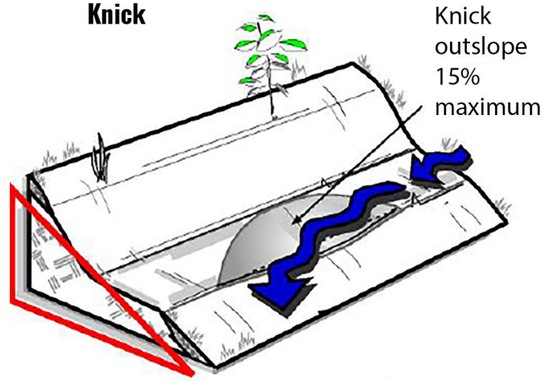
Grade Dip

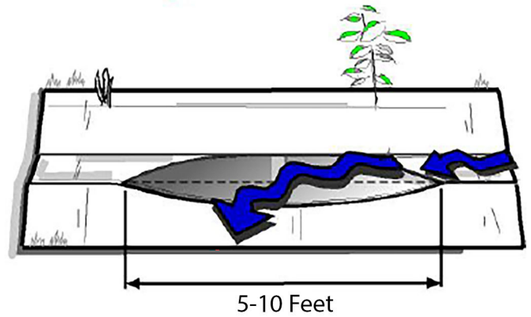


Tools improving Drainage on Existing Trails

Knicks. Standing water in flat areas on existing trails causes several kinds of tread damage. Users avoiding puddles will widen the trail and standing water can weaken trail backslopes. The knick is an effective outsloped 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. To be effective, the trail tread must have lower ground next to it, so the water has a place to drain.

Knick





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 a low maintenance trail tool.

Rolling grade dips should not be placed at the top of a grade and should be considered at frequent intervals to reduce stormwater volume and velocity. Mid-slope is the ideal rolling grade dip location, and more rolling grade dips are needed on steeper trails. Use caution when constructing near water sources as diverted sediment may flow to them.

Waterbars. While knicks and rolling grade dips are preferred tools for trail grading, waterbars can be an acceptable trail stormwater control measure. Water moving down a trail turns when it reaches a waterbar and is diverted to the lower edge of the trail.

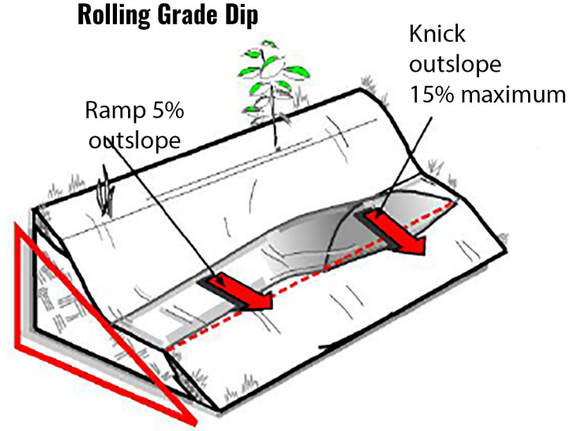
Waterbars slow water down and deposit sediment at the water bar eventually nullify the feature. Waterbars are more successful on grades of less than 5%. On steeper grades (15 to 20 %), waterbars are prone to clogging if they are at less than a 45-degree angle to the trail. Waterbars are mostly useless for grades steeper than 20%. Wood and rock waterbars can present potential tripping hazards and should be placed with caution.

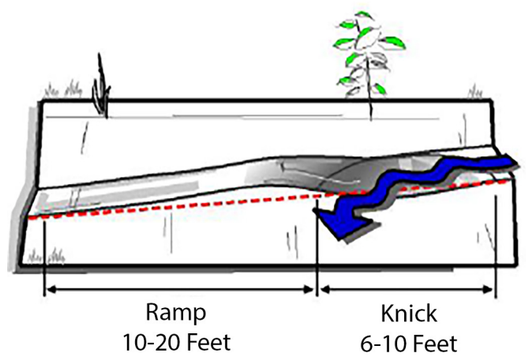
Relocating Problem Sections of Trail

In some cases, it may be necessary to relocate a trail that is not sustainable through improvements. The following considerations should be given when planning a trail relocation:

- Locate the new section of trail on a sideslope.
- Keep the trail grade less than half of the grade of the hillside slope.
- Build with a full bench cut to create a solid and durable tread.
- Construct plenty of grade reversals.
- Out slope 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.

Rolling Grade Dip





Universal Design Standards (Accessibility)

The Americans with Disabilities Act (ADA) Standards for Accessible Design serve as a base line accommodation standard for building accessibility in the United States. These are standards mandated by Federal statute. Public recreation improvements must be designed following the most recent edition of the ADA Accessibility Guidelines for Buildings and Facilities. The most recent version of the ADA Accessibility Guidelines for Buildings and Facilities can be found at: http://www.ada.gov. These standards will play a key role in the design of Wizard Ranch NP Stewardship Hub and Engagement Hub to assure that universal access is achieved, and the facilities function for users of all abilities.

Additional guidelines have been developed to provide guidance for outdoor recreation facilities including trails. The goal of the HHCA is to develop a trail system that is as inclusive as possible given the extensive area terrain. The following chart summarizes the various design criteria for accessible trails. The full guidelines can be found at: https://www.access-board.gov/aba/guides/chapter-10-outdoor/#trails.

Table 3.1 Access Board Accessible Trail Standards

Surface	
Firm and stable. Not permanently affected by normal wear and tear or expected weather conditions.	
Paved Surface	concrete, asphalt, stone dust
Natural Surface	crushed stone, packed soil
Tread Obstacle	
Paved Surface	Less than 1/2 inch
Natural Surface	Less than 2 inch
Tread Width	
Minimum width	36 inch
Minimum Passing Zone	60 inch x 60 Inch
Tread Out Slope	
Paved Surface	Less than 2%
Natural Surface	Less than 5%

Running Slope of Trail Segment		
Steeper Than	But Not Steeper Than	Maximum Length of Segment
1:20 (5%)	1:12 (8.33%)	200 feet
1:12 (8.33%)	1:10 (10%)	30 feet
1:10 (10%)	1:8 (12%)	10 feet

There are additional standards which exceed ADA. Universal Design (UD) is defined as "the design of products and environments to be usable by all people, to the greatest extent possible without the need for adaptation or specialized design" (Center for Universal Design, North Carolina State University). Universal design is meant to be adaptable to various building types, learning environments, and communities. UD is driven by seven core principles:

Equitable Use. The design is useful and marketable to people with diverse abilities. For example, a website that is designed to be accessible to everyone, including people who are blind and use screen reader technology, employs this principle.

Flexibility in Use. The design accommodates a wide range of individual preferences and abilities. An example is a museum that allows visitors to choose to read or listen to the description of the contents of a display case.

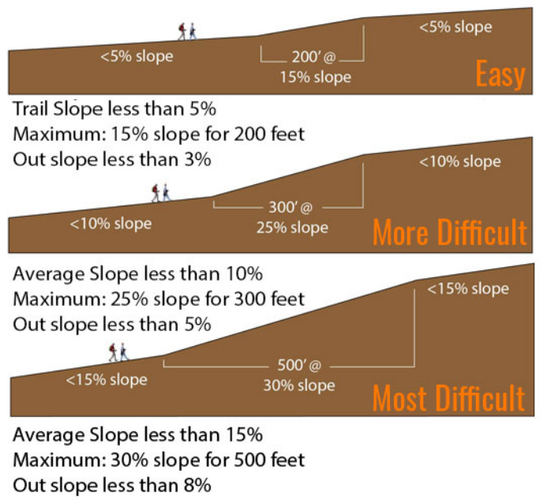
Simple and Intuitive. Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. Science lab equipment with clear and intuitive control buttons is an application of this principle.

Perceptible Information. The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. An example of this principle is captioned television programming projected in a noisy sports bar.

Tolerance for Error. The design minimizes hazards and the adverse consequences of accidental or unintended actions. An example of a product applying this principle is software applications that provide guidance when the user makes an inappropriate selection.

Low Physical Effort. The design can be used efficiently, comfortably and with minimum fatigue. Doors that open automatically for people with a wide variety of physical characteristics demonstrate the application of this principle.

Size and Space for Approach and Use. Appropriate size and space are provided for approach, reach, manipulation and use regardless of the user's body size, posture, or mobility. A flexible work area designed for use by employees who are left- or right-handed and have a variety of other physical characteristics and abilities is an example of applying this principle.



Trail Difficulty

Difficulty of trails is defined by the National Trail Difficulty Rating System and is identified by DCNR (Department of Conservation & Natural Resources) as the preferred guidelines. Trail difficulty is broken into three categories: Easy/Easiest, More Difficult, and Most Difficult.

Easy. These trails are typically wide with generous shoulders and most of the trail remains under 5% slope with the maximum slope of 15% for up to 200 ft. The pathway is smooth and has few obstacles. These trails can usually serve as ADA accessible routes if they have ADA surfaces.

More Difficult. These trails are usually within the 2-foot to 4-foot-wide range with smaller shoulders and are under 10% slope with the max slope of 25% up to 300 ft. The pathway may have occasional obstacles such as tree roots and smaller rocks.

Most Difficult. These trails are the hardest to traverse with slopes that can range from 15% up to 30% slope for up to 500 ft. There can be obstacles, steps, and unstable side surfaces. The trails are typically only 1-2' wide and are navigated by experienced users.

It is likely that all levels of difficulty will be found throughout the HHCA. Notifying trail users as to the difficulty of trail that they can expect will be key to ensuring that the trail system is accessible.

Trail Wayfinding

In addition to the physical trail design wayfinding plays a key component to accessible trail system design. HHCA entry and trailhead signage and should note HHCA rules, hours of operations, emergency contact numbers, and other relevant information.

Wayfinding signage should include trail blazes for wayfinding with the inclusion of "you are here" trail signs so that users can provide their location in an emergency. Area names should be signed to aid in orientation. Signage should be professionally planned and designed.

Wayfinding through both HHCA will be a critical issue due to the historic use of both nature preserves. Trail signage should provide trail wayfinding and educate users to trail use and etiquette. Trail markers can incorporate trail names, intended user groups, difficulty, Emergency Response Location Code (ERL) and QR Scan Codes to provide additional HHCA info such as maps and interpretive content. Materials for these signs can range from natural materials to plastics and metal, or a combination of both. Trail markings for the HHCA should be consistent to avoid any confusion from users. Additionally, clear signage should be developed to note areas where trails have been closed or are under a restoration process. Educational signage informing the public to stay on blazed trails will be important in the early implementation of the preserve to establish a long-term sustainable trail system.

Chesapeake Executive Council's Adoption Statement on Riparian Forest Buffers dated October 10, 1996

The site falls within the Chesapeake Watershed and is within 100 miles of the Chesapeake Bay. The Chesapeake Executive Council's Adoption Statement on Riparian Forest Buffers (RFB) recognizes the enormous benefits that riparian forests have on the health of the Chesapeake watershed.

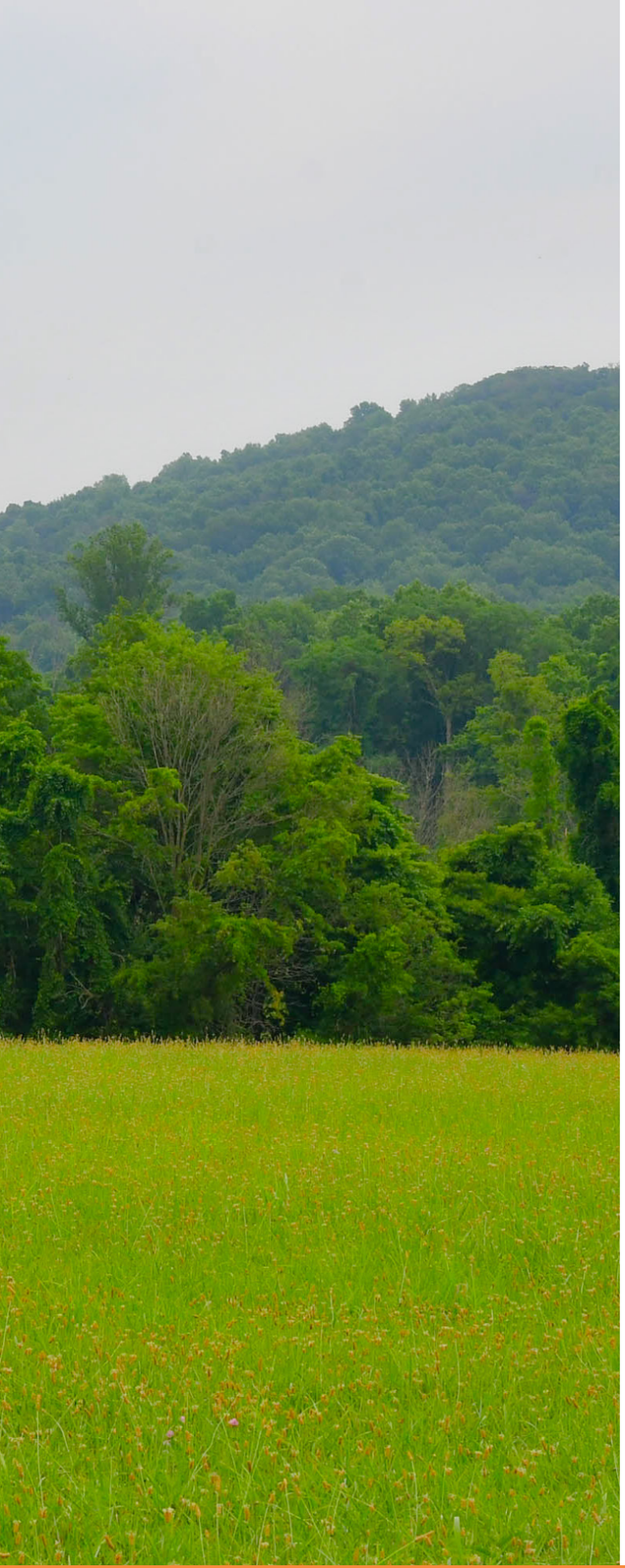
These streamside forests filter and absorb pollution, stabilize stream banks, provide habitat, and help keep river waters cool. The following are its guidelines for RFB.

Width for Restoring: 35 feet or greater, measured from the top of the bank or level of bankfull discharge. Individual jurisdictions may choose to apply greater widths in specific situations or to meet predetermined needs. The NRCS Standard provides guidance on variable widths from 35-100 feet.

Buffer widths of 50-100 feet will be promoted as the appropriate width for optimizing a range of multiple objectives for water quality and fish habitat improvement. Increasing widths to encompass the geomorphic flood plain is likewise desirable to optimize flood reduction benefits. Widths of up to 300 feet may be recommended to ensure values related to some wildlife habitat and use as migration corridors. Buffer averaging, the practice of expanding and contracting buffer widths to account for stream channel meandering and efficiency of protection measures such as fences, is acceptable.

Width for Conserving: A width of 100 feet on each side is recommended for protection of existing riparian forests. Individual jurisdictions may choose to apply greater widths in specific situations or to meet predetermined needs.

Riparian Forest Buffer Composition: RFB composition will include a diversity of native, noninvasive woody trees and shrubs (multiple species including hardwoods). Newly established buffers will be managed to allow the establishment of an organic duff layer and understory vegetation. The outermost zone or filter strip may include warm season grasses. Natural regeneration may be an acceptable afforestation practice where seed source is adequate for native tree recruitment, and invasive trees and other plants can be controlled.



Enhancement Criteria: RFB restoration will include situations where existing buffers are enhanced to meet the goals as defined in the RFB Panel Report. This is likely to include the following situations:

- Expansion of buffer widths to established recommended or minimum width.
- Conversion of grass filter strips to forest.
- Change in management practices to favor development of native vegetation.
- Change from mowed or highly managed landscaped area to a diversity of native species including trees where buffer functions and characteristics can be maintained and enhanced without the use of fertilizers and pesticides.

Bay Program partners are working actively to restore and protect forest buffers. The Bay Program's goal is to restore 900 miles of forest buffers per year until 70 percent of all stream banks and shorelines in the Bay watershed are buffered.

Permits

Erosion & Sedimentation Control

Simplified Stormwater Management Method for Minor/Minimal Land Disturbances. Minor Land Disturbances, 100 to 1000 square feet, and Minimal Land disturbances 1000 to 5000 square feet require a permit from Hellam Township. The township requires that the first two inches (2") of stormwater be captured and controlled via a stormwater best management practice (BMP) and that the first one inch (1") be permanently removed from the stormwater runoff (not discharged into a stream) via stormwater BMPs focused on reuse, evaporation, transpiration, or infiltration.

Erosion and Sedimentation Controls Plans are required for projects that create more than 5,000 square feet of earth disturbance. The York County Conservation District is delegated by the Department of Environmental Protection (DEP)to conduct certain activities for the Erosion and Sediment Pollution Control (ESPC) program and the National Pollutant Discharge Elimination System (NPDES) program for stormwater discharges from construction activities in York County. DEP rules and regulations state that a municipality or county which issues a building, or other permits shall notify DEP or Conservation District within 5 days of receipt of an application for a permit involving an earth disturbance activity consisting of one acre or more. Except for local stormwater approvals and authorizations, a municipality or county may not issue a building or other permit or approval until an NPDES or E&S permit, if necessary, has been obtained from the Conservation District or DEP.

The National Pollutant Discharge Elimination System (NPDES) Permit

The overall goal of the NPDES permit is to improve water quality. It is a federal permit that is administered at the state level. Projects that disturb over one (1) acre of land require an NPDES permit for Stormwater Discharges Associated with Construction Activities.

The permit plans are divided into two (2) parts: Erosion & Sedimentation Pollution Control Plans (ESPC) and Post Construction Stormwater Control Plans (PCSC). The ESPC is to be implemented by the contractor throughout construction activities until the site is stabilized by permanent plant growth. The PCSC is to be constructed during the project and maintained by the site owner for the life of the project. NPDES plans are reviewed by York County Conservation District.

DEP Chapter 105 Water Obstruction & Encroachment General Permits

In addition to NPDES permit, DEP may require a Chapter 105 Water Obstruction & Encroachment General Permit. These permits are required when construction activities impact existing waterways and wetlands. Such impacts may include stream crossings or stream / floodplain restoration.

Stormwater Best Management Practices

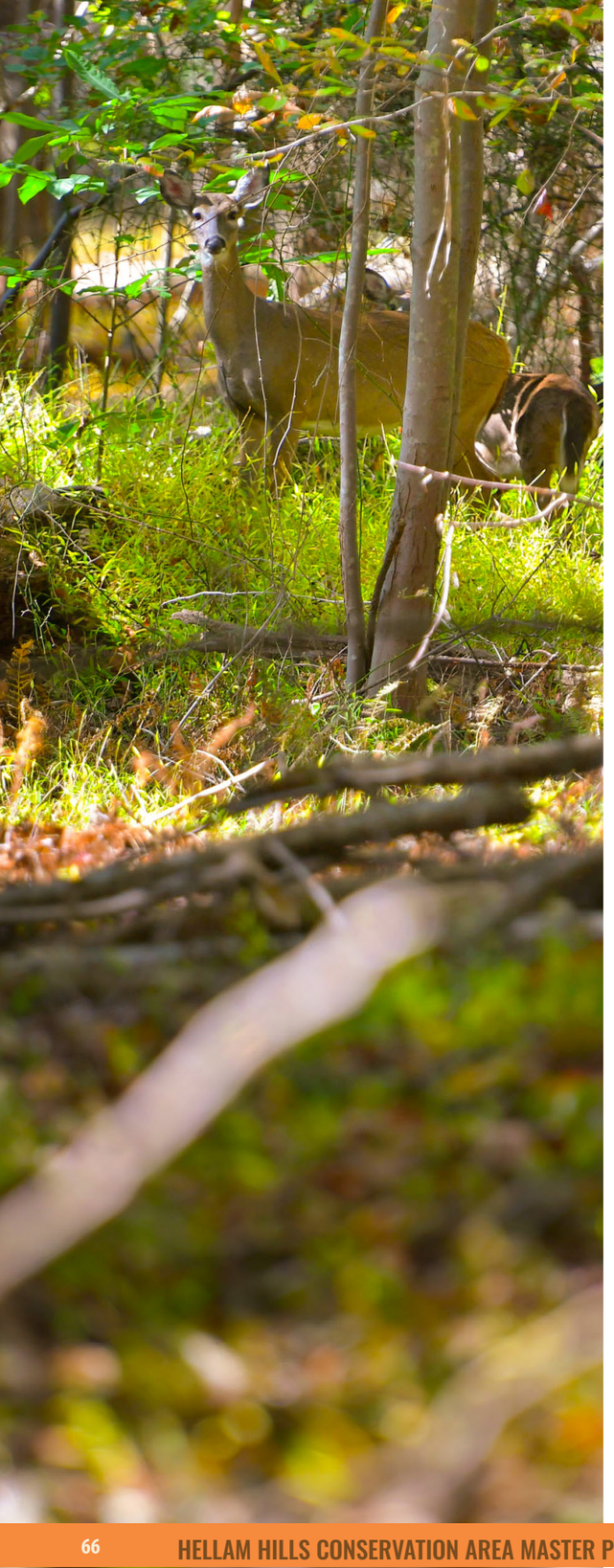
Developed by DEP, The Pennsylvania Handbook of Best Management Practices for Developing Areas offers numerous solutions for managing on-site stormwater. Best Management Practices (BMPs) that might be implemented at the HHCA could include:

- Protect / utilize natural stormwater flow runoff direction.
- Habitat restoration.
- Soil amendments designed to increase stormwater infiltration in selected locations.
- Native tree planting, rain gardens & bio-swales.
- Detention/infiltration facilities.
- The use of porous surfaces in the parking areas, or trails.

These facilities require site-specific soil tests to determine site suitability and the infiltration rates of the existing soils. Incorporation of these BMPs into HHCA development will have a direct impact on preserving and enhancing water quality. The opportunity for education exists through the placement of interpretive signage to educate HHCA visitors about watershed quality and how implementation of BMPs can positively impact our streams and communities.

Protection & Enhancement of Environmentally Sensitive Areas

An Ecological Assessment for HHCA was prepared by the team's biologists and ecologist. The report organizes HHCA into management units based on the types to habitat, vegetation, and ecological resources. Each management unit identifies existing conditions and wildlife value, then presents recommended management strategies. Recommendation strategies include the removal of invasive species, restoration/enhancement of habitats, and continued stewardship. Please refer to the appendix for the complete Ecological Assessment of HHCA.



Wildlife Management

The Master Plan team of ecologists and designers noted the large deer population in the HHCA. Deer damage caused by browsing is clear in both the forest understory and trees throughout the HHCA. In addition to damaging the plants themselves, this loss also destroys important habitat for other wildlife species, most notably birds. The plan recommends that hunting be used as a herd management tool. This would include opening lands for public hunting via cooperative agreement with the Pennsylvania Game Commission (PGC) for hunting on private lands. Additionally, the Conservancy may consider more aggressive management through a series of controlled hunts. Many other local governments or NGOs have established and successfully executed these programs. Some use a lottery system where local hunters can hunt at specific times and via specified means (bow, shotgun, etc.) to manage herd size safely and inexpensively, while other programs give priority to hunters that participate in hunting educational programs. The need or frequency of controlled hunts should be further explored with the PGC and with DCNR in regards to deed restrictions.

Public Lands Hunting Case Studies

Safety to nature preserve users and surrounding residents is a primary concern when considering hunting in the HHCA. Pennsylvania has a long history of hunting. Many examples of the coexistence of hunting and trail use can be found across the Commonwealth and within the Conservancy's own nature preserves. A key factor to most successful lands that offer public access for trail use and hunting is the partnership with the PGC via a cooperative agreement for hunting on private lands.

Ned Smith Center Lands and Trails

Located on the outskirts of historic Millersburg, the Ned Smith Center Lands and Trails encompass more than 500 acres of forest and meadow. The land includes a mature hardwood forest alive with deer, bear, wild turkey, grouse, fox, along with hundreds of species of songbirds, insects and reptiles.

Public hunting has been allowed on the Center's lands since the lands were acquired in 1993. The Ned Smith Center has a long-established cooperative agreement with the PGC for hunting on private lands. The Ned Smith Center uses the natural boundary of the on-site Rail Trail to denote areas of hunting. Area's north of the Rail Trail and closer to their public building do not permit hunting due to the higher volume of daily users and represents a small portion of their overall trail system. Areas south of the Rail Trail Public hunting is permitted.

The Center posts information regarding hunter education both on-site and via their website. The Center strongly encourages everyone using the trails during all hunting seasons to wear orange, and orange vests are available for loan from the gift shop during open hours. The center clearly notes that if a hunter is unsure of the areas where hunting is permitted, it is the hunter's responsibility to contact the Center for clarification.

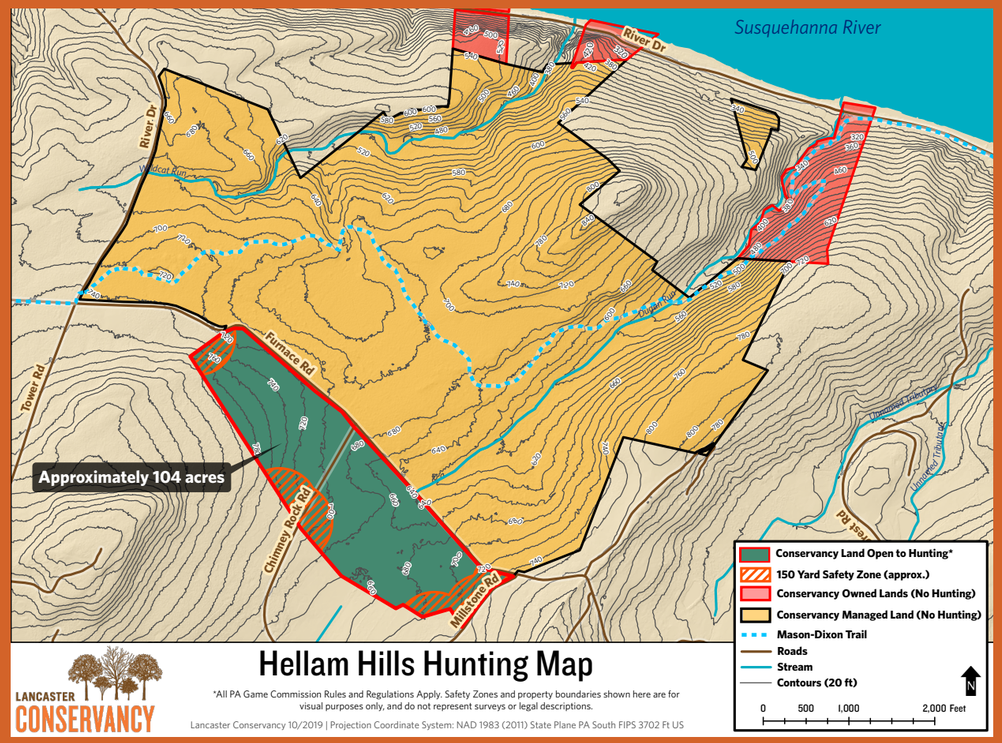
Trexler Nature Preserve

Located in the Lehigh Valley, the Trexler Nature Preserve is a 1,108-acre public park/ preserve owned by Lehigh County. The Preserve is divided into three ranges and offers 18-miles of trails providing for a full range of trail users including: hiking, walking, jogging, mountain bike riding, snow shoeing, and cross-country skiing.

Bow hunting is permitted at Trexler Nature Preserve via a cooperative agreement with the PGC for hunting on private lands in the North and South Ranges. In the North Range bow hunting has successfully coexisting with mountain biking, hikers, and horseback riders that frequent the North Range. Park signage clearly denotes areas of hunting and safety zones near residential homes. Additionally, the County provides educational signage at trails head and orange ribbon markers for bikers and hikers to wear will using the trail system.

Kellys Run NP

Located in Lancaster County, Kellys Run NP is 458-acres in size and owned and managed by the Conservancy. Kellys Run NP is open to Mixed-Use and Archery-Only Hunting with areas of No-Hunting. Commission via a cooperative agreement with the PGC for hunting on private lands. The Conservancy has maps clearly denoting the various areas and educates hunters that it is their responsibility to be aware of the areas with hunting restrictions, as well as property boundaries. Emergency numbers and the contacts for the SGC Regional Game Warden are posted should an emergency occur, and illegal activity is observed.



Current (2022) Hunting Map for Hellam Hills Nature Preserve.

Sustainable Site Design & Green Infrastructure/Materials

Site Architecture

Set within a sensitive and re-emerging ecology, the buildings will incorporate the following sustainable design elements:

PLACE + SOIL. The Stewardship Hub layout mimics a traditional bank barn construction to engage in a place-based relationship with the existing topography and to minimize construction impacts at Wizard Ranch NP. The Engagement Hub will retain the sense of place and history be adaptively reusing the existing stone cabin. HHCA parking and driveways are located towards site boundaries and will work to be ecologically restorative to the HHCA with native plantings and enhanced storm water management.

WATER. The building will engage in a relationship with water which treats it as a precious resource. Rainwater will be collected and recycled for non-potable uses, and commercial composting toilets will be utilized to reduce water consumption.

ENERGY + CARBON. Being located on an open slope, the Stewardship Hub is in an ideal location to generate energy from rooftop photo-voltaic panels. In addition to this energy generation, the buildings will seek to reduce its energy demand through an energy efficient passive-house inspired building envelope, high-efficiency HVAC systems and lighting. Furthermore, the buildings will be constructed of low-embodied carbon materials such as wood and locally sourced stone.

HEALTH + HAPPINESS. The buildings will provide superior air quality through increased fresh air ventilation and provide access to daylight and operable windows for all building users.

MATERIALS. The buildings will be constructed of low-toxicity materials to provide a safe environment for users while also limiting chemical exposure to builders and material manufacturers.

EQUITY. The building will be universally accessible to all.

BEAUTY + INSPIRATION. The buildings will employ principles of biophilic design throughout to connect Conservancy staff and visitors to the nature of the HHCA. Additionally, the buildings will seek to incorporate educational elements in the relevant spaces.

Sustainable Materials

Choices in materials can affect the stewardship of a site or larger ecosystem. Every material has a life cycle cost with implications for water and energy use, as well as its carbon footprint. Close consideration of the sustainability of a material's life cycle can have far-reaching implications. Best sustainability practices that may be applicable to HHCA include the following:

- Reuse existing site materials.
- Purchase local and sustainable produced plants and materials.
- Consider the full life cycle of materials and end life cycle of a product. Can it be deconstructed & reused?
- Work towards zero net waste in demolition, construction, and management.
- Strive to harvest solar energy and reuse greywater and stormwater.
- Mitigate the impacts of site development while improving the environment.

Protection/Enhancement of Significant Historic Structures & Areas.

Introduction

The Hellam Hills Conservation Area (HHCA) consists of the Hellam Hills NP and the Wizard Ranch NP. This cultural resources screening includes above-ground and below-ground assessments of both tracts and indicates what cultural resources clearance work may be required for the development of the HHCA. This effort included internet-based background research that focused on historic maps, historic aerials, and relevant files available through the Pennsylvania State Historic Preservation Office's (PA SHPO) PA-SHARE website. In addition, a site visit was conducted to capture photographs of extant structures as well as to determine the current conditions and archaeological sensitivity of the tracts. A brief history and summary of the soils and topography within the Hellam Hills NP and the Wizard Ranch NP are included in Chapter 2 of this document .

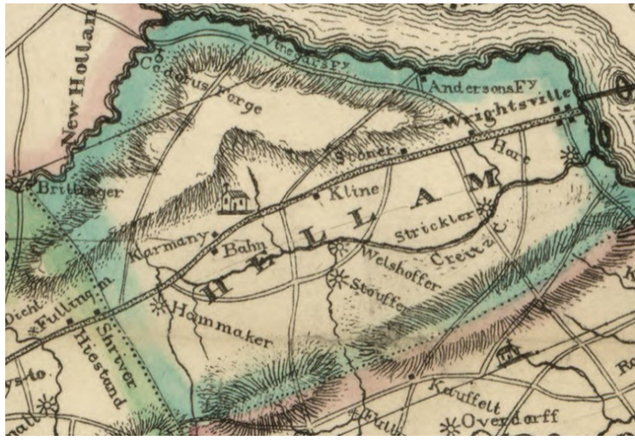
Historic Structures

Background

Both tracts within the HHCA witnessed activity during the nineteenth and twentieth centuries. An 1821 map of York and Adams counties shows a turnpike from York to Wrightsville, and that Hellam Township included five grist mills, a church, several individual properties, and the Codorus Furnace on the northwestern edge. However, very little is depicted in the vicinity of the HHCA other than Andersons Ferry and Vinegars Ferry, which were both located on the Susquehanna River (Small and Wagner 1821). An 1860 map of York County shows the number of individual properties had increased in the vicinity of the HHCA. The map depicts approximately four properties and a saw mill within the Hellam Hills tract and approximately one property within the Wizard Ranch tract, although several more properties are located within the vicinity of the Wizard Ranch tract (Shearer 1860). While Vinegars Ferry is not depicted, Glatz Ferry is shown where Andersons Ferry was in 1821. The final map from the nineteenth century, published in 1876, shows a further increase in the number of properties in the vicinity of the HHCA, specifically along the unnamed tributary that runs through a portion of the Wizard Ranch tract. The areas within the Hellam Hills and Wizard Ranch tracts are still sparsely populated compared to the surrounding area, with the Hellam Hills tract containing approximately seven properties and Wizard Ranch containing approximately four. Of note, the Grubbs Ore Bank is shown in the southwest corner of the Hellam Hill tract, while Wild Cat Falls Summer Resort is shown where Wildcat Run connects to the Susquehanna River.

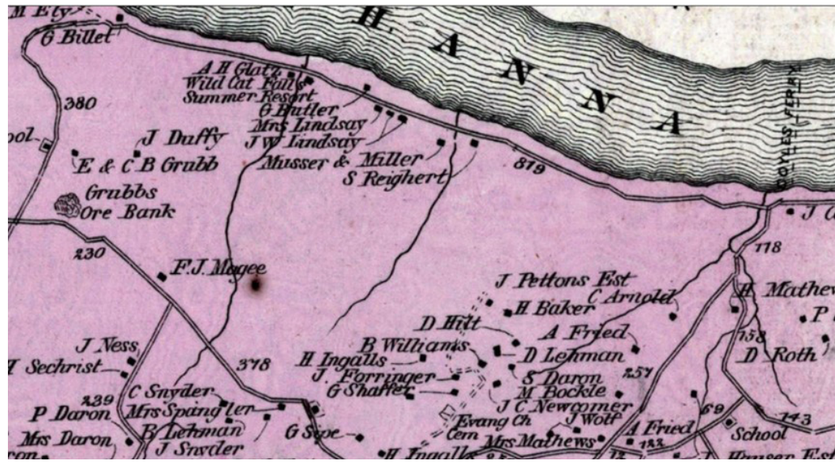
Aerial photographs from the mid-twentieth century show the wooded and hilly nature of the HHCA. Due to the dense tree cover, individual buildings are not visible in the Hellam Hills tract, while the Wizard Ranch contained more open meadow area. Aerials from the 1950s and 60s show several outbuildings in the open meadows, possibly early structures used by Mahlon N. Haines for the "Haines Safari" events he hosted for local boy scouts. By the 1970s, those structures are no longer extant; however, it appears one of the extant stone cabins is visible on aerials.

A review of PA-SHARE indicated that two dams, one in Dugan Run and one in Wildcat Run, were removed along with their associated outbuildings and infrastructure. The dams, reservoirs and associated buildings were evaluated and determined Not Eligible for listing in the National Register of Historic Places due to a lack of significance and integrity (Resource No. 2016RE00171). Remnants of these dams and associated building foundations are still present within the Hellam Hills tract.



Portion of 1821 map of York and Adams. Small and Wagner 1821

Portion of 1860 map of York County. Shearer 1860



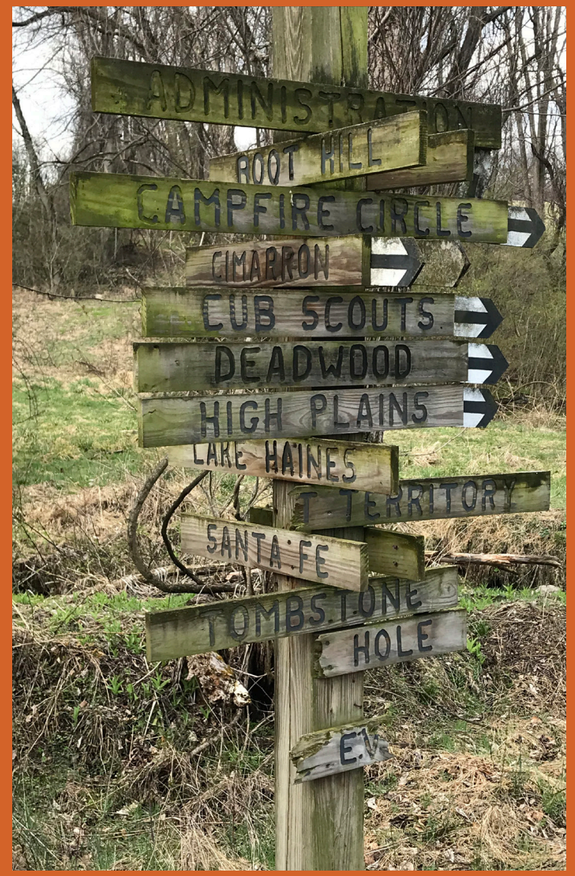
Portion of 1876 map of York County. Pomeroy, Whitman & Co. 1876

Photograph 1. Rear and side elevations of one of the Accomac Road boy scout cabin present on the Wizard Ranch NP.

Existing Conditions

A site visit was conducted in which portions of both tracts were traversed by foot to locate any known extant structures, look for any previously unidentified properties, and gain an understanding of the existing conditions. Within Wizard Ranch, the two stone cabins that may be associated with Mahlon N. Haines and his boy scout safaris were located and photographed (Photographs 1-2). The stone cabins appear to have rebuilt roofs sheathed in asphalt shingles, and plywood covers the window and door bays of one cabin, while the other features a wood door with single-light screened windows. One of the cabins appears to have been enlarged with an addition, as a seam in the stonework is present. Both cabins have poured concrete floors. A concrete block latrine and small mobile office-type building were also noted on the property (Photograph 3). In addition, signage and various activity areas used by the boy scouts are present on the property (Photograph 4). No extant structures were observed on the Hellam Hills tract, and the steep nature of the tract limited the area accessible by foot.

Photograph 3. View of the concrete block latrine used by the boy scouts located on the Wizard Ranch tract.



Photograph 4. Example of signage for the boy scout camp located on the Wizard Ranch tract.

Photograph 2. Rear and side elevations of one of the interior site boy scout cabin present on the Wizard Ranch NP.

Photograph 5. Example of an area of precontact archaeological sensitivity within Hellam Hills NP, showing top of summit with landform under 10 percent slope.

Archaeology

Both the Hellam Hills P and the Wizard Ranch NP contain areas of high and moderate precontact (Native American) archaeological sensitivity according to the State Precontact Predictive Model in PA-SHARE. No previously identified archaeological sites or previously conducted archaeological surveys are mapped within either area on PA-SHARE. The tract's proximity to the Susquehanna River and its confluences with Wildcat Run, Dugan Run and another unnamed tributary as well as the limited development of the tracts make the potential for intact archaeological resources very likely on select landforms meeting specific criteria. The following section serves as a general discussion of archaeological sensitivity on the two tracts and serves to guide any future development project activities. The study methodology, the two tracts and their precontact and historic archaeological sensitivity are discussed below.

Methodology

Archaeological sensitivity criteria are dependent on proximity to water, drainage of the soils present, degree/aspect of slope, the level of historic development/disturbance present, and the presence/proximity of previously identified archaeological sites and/or historic structures. A pedestrian field view of both tracts was completed on March 25, 2022. Information gathered on soils, previously identified historic resources, together with background research and the field view allowed us to assign levels of archaeological sensitivity to the tracts (Table 1). The first two categories within Table 1 below refer to the United States Department of Agriculture (USDA) soils and their corresponding landforms, and are used as an indicator of precontact archaeological sensitivity. Landforms containing soils that are moderately-to-well drained with a slope of less than 15 percent contain a moderate to high sensitivity for intact precontact archaeological resources. However, any of the landforms that meet these criteria should also be undisturbed by previous development.

The last column within Table 3.2 refers to the probability that former structures were present within the tracts based on research using PA-SHARE and historic maps. The presence of these former structures is indicative of a high potential for historic archaeological resources. The discussions of the two tracts below will begin with precontact archaeological sensitivity and then conclude with historic archaeological sensitivity. It must be noted that due to the limited scope of the present task and the size of the two tracts, archaeological sensitivity within this document is discussed generally. Any future development projects within the tracts can use the information below as an initial guideline to determine if archaeological resources may be present and/or if additional archaeological studies may be needed in a given area.

Hellam Hills NP

The Hellam Hills NP is located on uplands bordering the Susquehanna River. Dugan Run traverses the eastern portion of the tract flowing roughly southwest to northeast, and Wildcat Run (near its headwaters) traverses the western portion of the tract flowing west near Whitetail Lane. Neither of the drainages has floodplain soils or portions of the drainages deeply incised. Numerous low, wet areas border the drainages, particularly Dugan Run. A total of seven soils are mapped within the tract by the USDA (Table 3.3). These include soils on upland landforms with slopes ranging from zero to 70 percent. The steepest portion of the tract is located along its northern limits where it slopes steeply down to River Drive and the Susquehanna River. Undisturbed, well drained landforms within the tract containing under 15 percent slope have a moderate to high sensitivity for precontact archaeological resources (Photograph 5). Potential rock shelters utilized during the precontact period may be present along this steep escarpment given its location overlooking and bordering the river.

Historic map research using the 1860 Shearer, 1876 Pomeroy and Whitman historic atlas maps, USGS topographic maps from 1908 to present-day and historic twentieth century aerials was completed for the Hellam Hills tract (1860 Shearer; 1876 Pomeroy and Whitman, USDA 1908-Present; USDA-NRCS 1940, 1957 and 1971). The 1860 map of the area shows only three structures within the tract owned by A. Shuck, J.F. McGee and G. Weir. The 1876 map shows at least four former structures within the property owned by E & C.B. Grubb, J. Duffy and F.J. McGee (labeled Magee on map). The structures are likely related to Grubbs Ore Bank (also known as the Codorus Iron Mine) shown on the map within the southwest corner of the tract, near the intersection of River Drive and Furnace Road. The Grubb family controlled an iron dynasty of many companies manufacturing iron from numerous locations throughout Pennsylvania for over 165 years (1734 to 1936), including at nearby Codorus Forge and Furnace (Wikipedia 2022). Even though the furnace ceased operations in 1850, the Codorus Iron Mine, located within the southwest corner of the tract, was mined from 1866 to 1874 under C.B. (Clement Brooke) Grubb and Son (Charles Ross Grubb). It appears that the 1876 map of the tract shows that Clement's father, Edward Burd Grubb, Sr., may have had some ownership in the mine as a structure owned by E & C.B Grubb is noted within the mine area. The tract has likely been logged numerous times since the mid-nineteenth century and less steeply sloped portions have been used for agriculture. No mining appeared to occur on the tract until 1866, prior occupation of the tract (prior to 1860) were likely isolated dwellings or possible farmsteads.

The tract was then utilized for water production in the late nineteenth century by the Marietta Gravity Water Company who purchased the property in 1892. This included the construction of the Wildcat Reservoir and Dam (Resource No. 2016RE00171) and the Dugan Run Reservoir and Dam (Resource No. 2016RE2021). The reservoirs and dams associated with both were constructed in November of 1892. The Columbia Water Company later acquired the land in 2013 and the area served as a recreational area used for hiking and hunting. The dams associated with both reservoirs were removed from the property between 2016 and 2017. As noted previously, some of the remnants of these dams and associated building foundations are still present within the tract.

The structures shown on the historic USGS maps align with those on the nineteenth century maps and some of the ruins observed during the field view. The ruins on the west side of the tract, including those of a stone structure and a spring house, are likely related to the nineteenth century McGee (or Magee) and Weir dwellings north of Furnace Road. A stone work associated with a spring head located near the headwaters of Wildcat Run may be related to the mining operations that took place within this portion of the tract, supplying water to the former structures in that area and the mine. The concrete block foundation located near the former reservoir appears to be twentieth century in origin and is likely related to the former Wildcat Reservoir and Dam. The ruins within the southeast corner of the tract just above Furnace Road appear only on the 1908 USGS map of the area and are gone by 1943. These may be the remnants of a former early-to-mid twentieth century dwelling.

Assessment. The Hellam Hills NP contains large areas that are sensitive for precontact archaeological resources. Nineteenth century mining, the construction of the Wildcat and Dugan Reservoirs in the late nineteenth century and continued logging have impacted portions of the tract; however, any well drained areas with a slope of less than 15 percent have a moderate to high sensitivity for precontact archaeological resources. Conversely, the eastern portion of the tract has a moderate to high sensitivity for historic archaeological resources related to the mining of the property by the Grubb family in the mid-to-late nineteenth century.

Sensitivity Level	Soil Slope	Soil Drainage Class	Historic Research
Low	Over 15%	Poor to somewhat poorly drained	No previous structures identified
Moderate	Between 10 and 15%	Somewhat well to well drained	Possible former structures identified
High	Less than 10% slope	Moderately well drained to well drained	Former structures identified during research and/or the field view

Table 3.2 Archaeological Sensitivity Levels

USDA Soil Type	Slope	Topographic Setting	Soil Drainage Class	Precontact Archaeological Sensitivity	Discussion
Edgemont channery loam (EdC)	8 to15%	Mountainsides, shoulders, summits	Well drained	Moderate to high	High sensitivity within areas less than 10% slope, moderate sensitivity in areas between 10 and 15% slope
Edgemont channery loam, very stony (EeB)	0 to 8%	Mountainsides, summits	Well drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands
Edgemont channery loam (EeD)	8 to 25%	Mountainsides, shoulders, summits	Well drained	Low, moderate and high	High sensitivity within relatively flat, sloped areas under 8%, moderate sensitivity on landforms between 10 and 15% slope and low sensitivity on landforms between 15 and 25%.
Edgemont channery loam, very stony (EeF)	25 to 70%	Mountainsides, summits	Well drained	Low to moderate	Primarily low sensitivity due to excessive slope, however rock shelters may present on the escarpment
Glenville channery loam (GbB)	3 to 8%	Summits, shoulders, backslope	Well drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands
Glenville channery loam (GbC)	8 to 15%	Backslopes, shoulders	Well drained	Moderate to high	High sensitivity within areas less than 10% slope, moderate sensitivity in areas between 10 and 15% slope
Glenville silt loam (GdB)	3 to 8%	Drainageways, footslopes	Moderately well drained to somewhat poorly drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands

Table 3.3 USDA Soil Types within the Hellam Hills Nature Preserve Tract and Associated Precontact Archaeological Sensitivity. Source: USDA-NRCS 2022

Photograph 6. Example of an area of precontact archaeological sensitivity within Wizard Ranch NP, showing top of summit with landform under 10 percent slope.

Wizard Ranch NP

The Wizard Ranch NP is located on uplands and floodplain areas overlooking the Susquehanna River and an unnamed tributary that traverses roughly southwest to northeast through the preserve. A total of ten upland and floodplain soils are mapped within the tract (Table 3.3). Landforms containing soils that are moderately-to-well drained with a slope of less than 15 percent contain a moderate to high sensitivity for intact precontact archaeological resources (Photograph 6). However, any of the landforms that meet these criteria should also be moderately well drained to well drained and undisturbed. Of particular concern are the mapped Codorus silt loam floodplain soils that surround the unnamed tributary. While some of the tributary is deeply incised, portions at the valley bottom are typically sloped less than eight percent and appear well drained, containing a high sensitivity for precontact archaeological resources. However, low, wet areas do exist within the valley bordering the drainage and these areas contain a low sensitivity for archaeological resources due to standing water and wet soils.

Historic maps and aerials indicate that the Wizard Ranch NP saw a boom of occupation during the mid-to-late nineteenth century (1860 Shearer; 1876 Pomeroy and Whitman, USDA 1908-Present; USDA-NRCS 1940, 1957 and 1971). The 1860 map of the tract shows four former structures present belonging to J. Felton, G. Farringer, A.H. Glatz and an unlabeled structure. The 1876 map shows eight former structures within the tract including C. Arnold, A Fried, D. Lehman, H. Baker, J. Pettons Est., B. Williams, S. Daron and D. Hilt. These structures appear to have been present primarily within the southeast portion of the property on either other side of the unnamed tributary. The majority of these structures likely served as farmsteads or dwellings with most gone by the mid-twentieth century. It is at this time the tract was purchased by Mahlon N. Haines who farmed portions of the tract and held events for the Boy Scouts of America. He officially donated the tract to the Boy Scouts in 1960. The tract serves as a Boy Scout camp to this day with the only four standing structures present on the property. These structures likely date to the mid-to-late twentieth century and are associated with the Boy Scouts use of the property.

Assessment. Similar to the Hellam Hills Tract, the Wizard Ranch NP contains large areas that are sensitive for precontact archaeological resources. Any moderately well-to-well drained areas with a slope of less than 15 percent have a moderate to high sensitivity for precontact archaeological resources. The area has largely been undisturbed since Mahlon N. Haines occupation of the property in the mid-twentieth century, with limited logging and farming occurring prior to that period. The southeastern portion of the property saw numerous dwellings and farmsteads develop during the mid-to-late nineteenth century. As a result, this portion of the tract has a moderate to high sensitivity for historic archaeological resources. While no ruins were identified during the field view, a possibility exists that they are covered in brush and/or are subsurface.

Recommendations

To begin the process of Cultural Resources clearance the project will be initiated with the PA SHPO through their PA-SHARE website. Information about the project will be uploaded including a project location map, GIS shapefiles of the Area of Potential Effects (APE), areas and amount of ground disturbance, any known historic resources or archaeological sites, required permits, and a description of construction activities and where they will occur. This information will be used by the PA SHPO to determine what, if any, cultural resource clearance work may be required.

Historic Structures

Based on the background research and site visit it is anticipated that a Historic Resource Survey Form (HRSF) may be required to document and evaluate the Wizard Ranch Boy Scout Camp, started by Mahlon N. Haines, for its eligibility for listing in the National Register of Historic Places. There does not appear to be any standing structures located on the Hellam Hills tract that warrant National Register evaluation.

Archaeology

Based on the background research and field view, additional Phase I archaeology may be needed for specific areas in the Hellam Hills NP and the Wizard Ranch NP that meet the sensitivity criteria discussed above. This would be dependent on the type of project and its location within the tracts. If the project is located within an area that meets the moderate to high sensitivity criteria, then additional coordination with the appropriate agencies may be required to determine the need and level of effort for testing. Within the Hellam Hills NP it should be noted that the western portion of the tract was occupied and mined by the Grubb family, an important family within the iron industry in Pennsylvania during the nineteenth and mid-twentieth centuries. Additional archaeological work could include Phase I subsurface testing, a geomorphological assessment of the floodplain soils bordering the unnamed tributary at Wizard Ranch NP to determine if there are any intact precontact living surfaces present under alluvium) and the creation and installation of interpretive signage at the Hellam Hills NP discussing the Grubb family, their ownership of the property and their link to the nearby Codorus Forge and Furnace, a National Register-Listed property.

USDA Soil Type	Slope	Topographic Setting	Soil Drainage Class	Precontact Archaeological Sensitivity	Discussion
Codorus silt loam (Cm)	0 to 3%	Floodplain	Moderately well drained	High	Floodplain soils could contain precontact resources buried beneath alluvium.
Catoctin channery silt loam (CcC)	8 to 15%	Mountain sides	Well drained	Moderate to high	High sensitivity within areas less than 10% slope, moderate sensitivity in areas between 10 and 15% slope
Chester silt loam (CeB)	3 to 8%	Hillslopes, ridges and summits	Well drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands
Edgemont channery loam (EdC)	8 to15%	Mountainsides, shoulders, summits	Well drained	Moderate to high	High sensitivity within areas less than 10% slope, moderate sensitivity in areas between 10 and 15% slope
Edgemont channery loam (EdB)	3 to 8%	Hillslopes, ridges and summits	Well drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands
Edgemont channery loam (EeD)	8 to 25%	Mountainsides, shoulders, summits	Well drained	Low, moderate and high	High sensitivity within relatively flat, sloped areas under 8%, moderate sensitivity on landforms between 10 and 15% slope and low sensitivity on landforms between 15 and 25%.
Glenville channery loam (GbC)	8 to 15%	Backslopes, shoulders	Well drained	Moderate to high	High sensitivity within areas less than 10% slope, moderate sensitivity in areas between 10 and 15% slope
Glenville silt loam (GdB)	3 to 8%	Drainageways, footslopes	Moderately well drained to somewhat poorly drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands
Highfield and Catoctin channery silt soils (HHD)	15 to 25%	Mountainsides	Well drained	Low	Too steeply sloped
Mt. Airy and Manor soils (MOB)	3 to 8%	Hillslopes, summits	Moderately well drained to somewhat excessively drained	High	High sensitivity within relatively flat, sloped areas under 8% on uplands

Table 3. USDA Soil Types within the Wizard Ranch Nature Preserve Tract and Associated Precontact Archaeological Sensitivity. Source: USDA-NRCS 2022

Proposed Recreation & Conservation Facilities

Site Access and Parking

As per the Hellam Township code driveways and parking areas should be paved asphalt. This will provide a long-term low maintenance surface and dust control. Exploration of porous and permeable pavements options should be considered during design and engineering as they may prove effective methods for stormwater infiltration on site. For low-use parking areas the Township can approve the use of alternative surfaces. In the case of a nature preserve, gravel parking may be appropriate at trailhead parking locations.

Internal primary public access drive lanes should be a minimum of 10-feet wide, with a total road width minimum of 20-feet. Asphalt paving profile should accommodate medium to heavy traffic loads.

Secondary driveways for maintenance/emergency access and lesser traveled driveways should have a minimum lane of 9-feet wide, with a total road width minimum of 18-feet.

Parking areas should conform to current stall and width layouts as required by local ordinances at the time of development. For planning purposes, a generous standard of 10 x 20-foot parking stalls with a 24-foot-wide aisle was used. Asphalt paving profile should accommodate medium to heavy traffic loads.

Trails

A primary goal of the plan is to create meaningful user experiences for people of all abilities. To accomplish this series of trail options is recommended throughout HHCA.

ADA-Compliant Asphalt Trails

5-foot to 6-foot-wide asphalt trails and walkways are proposed to provide an ADA-compliant trail option within the HHCA. The material provides a level and stable walkway while minimizing maintenance in areas where slopes exceed 3 percent. The use of asphalt trails should be limited to high traffic areas such as parking and core activity areas. Trails, 5-foot to-6-foot widths are recommended to conform with required passing widths.

ADA Compliant Stone Dust Trails

5-foot to 6-foot-wide compacted stone dust trails are proposed to provide an ADA-compliant trail option within the HHCA. In key locations the placement of boulders or logs along the edge can help prevent the migration of stone dust material. For single use walking trails, a width of 5-feet with 1-foot shoulders is appropriate.

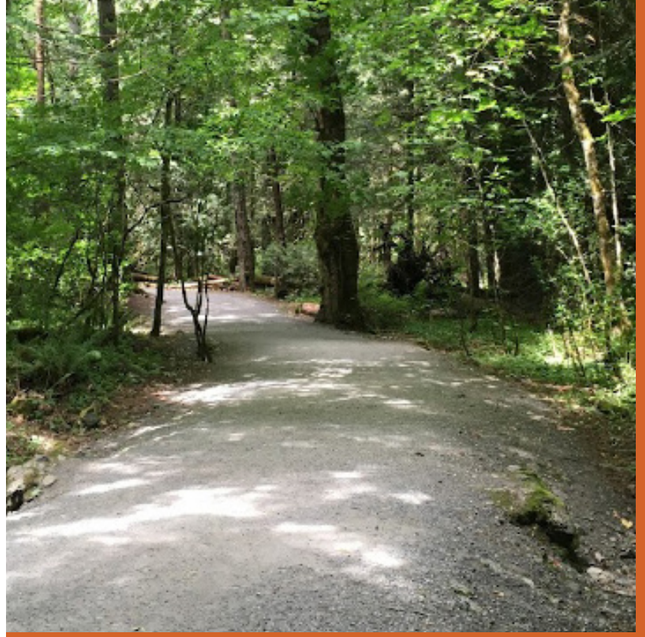
Mown Trails

Mown trails are often used in naturalized meadow areas and are low cost to implement but require regular maintenance in the form of mowing. A wide, mown width of 8-foot to 12-foot-wide is recommended to allow trail users to safely pass without brushing against taller meadow plantings. A core path width of 5-6 feet should be mown regularly while the edges can be mown less regularly creating a transition into the taller meadow area. These trails are not ADA compliant and may become muddy with heavy use. Trail cross-slopes should range from 2 to 5 percent. In larger meadow areas trail locations can be altered every 2-3 years to address overuse.

Native Surface Hiking Trails

Hiking trails will be a main component of the HHCA trail system and will naturally limit the types and number of trail users. Compacted earthen surfaces are primarily used for hiking and are often used to navigate the site in environmentally sensitive areas. Not all hiking trails will meet ADA trail guidelines for hiking. However, an extensive accessible trail network can be established through HHCA with proper design techniques.

A large majority of existing hiking trails exist within the HHCA where former logging roads existed. The 6-foot to 8-foot-wide corridors are conducive to group or family hikes. Additionally, the wider widths (8 feet), can accommodate emergency all-terrain vehicles. The rerouting of the M-DT through the Hellam Hill NP will require construction of new trail. Some portions of this trail will be single track. Single track trail should be used to transverse more difficult terrain. Trail beds should range from 1-foot to 3-foot-wide with 1-foot-wide shoulders.



Stream / Sensitive Areas Crossings

Stream crossings will be required throughout HHCA. The stream crossing should meet accessibility based on the trail rating that delivers users to the crossing. For difficult single-track trails, a steppingstone crossing or rustic low flow grade crossing is appropriate. Along more accessible trails, crossings should conform to universal access standards.

Foot Bridges

New bridges should have 8-foot to 10-foot-wide clear decks (with railings if needed). Some may need to accommodate light weight rescue and maintenance equipment. This will be determined by the Conservancy on a location-by-location basis. The approaches should be designed so that the bridge accommodates the passage of high storm flows beneath the bridge without significant obstruction. Conversely, structures may be designed as low flow crossings structures to be overtopped during storm events. Low flow structures need to be able to withstand impacts by woody debris or ice. Wood timber or stone structures are recommended in keeping with the rustic design vocabulary of the HHCA.

Boardwalks

There are areas along HHCA headwaters and stream corridors that have adjoining wetlands or sensitive habitats. Boardwalks are proposed to allow HHCA users to safely interact with and observe these critical habitats. HHCA boardwalks should have a minimum clear deck of 5-foot-wide. In areas where the deck is more than 32-inches above grade, full railings that are 42-inches high are to be included. Wood or recycled plastic timber are appropriate boardwalk materials. In some wetland locations where DEP reviewers have concerns about casting shade on wetland vegetation, open metal grate decking might be considered to eliminate this concern.

Observation Platforms

Observation platforms provide opportunities for viewing areas from an elevated space. These platforms are often used for educational purposes, wildlife observation and for resting. By taking advantage of terrain and vegetation, proposed observation platforms can be strategically located in the landscape to be universally accessible while providing dramatic vantage viewing points. Similarly, construction of boardwalk approaches to platforms should have a minimum clear deck width of 5-feet. In areas where the deck is more than 32-inches above grade, full railings that are 42-inches high are to be included. Wood or recycled plastic timber and open metal grate deck are appropriate materials.

Other Structures

Pavilion

Pavilions can provide a place for people to gather while simultaneously functioning as a small event space. Any new pavilion design should be economical and durable while offering a quality of design that helps to reinforce a cohesive HHCA identity. In high use areas, a size of 800-900 square feet is recommended. In lower traffic areas, smaller pavilions of 200-300 square feet are recommended. For larger pavilions, utility services should include electrical and water for programing and maintenance. Picnic tables should be durable, easily cleaned, and accommodate wheelchairs.

ADA Hunting Blind

ADA hunting blind can vary in complexity from slightly elevated wood or metal grating platform to a prefabricated portable trailer that can be placed and removed from the site to coordinate with the hunting season. If elevated, approach ramps should not exceed 8% slope. In areas where the deck is more than 32-inches above grade, full railings that are 42-inches high will be required. Portions of the railing should be adjusted to accommodate shooting from a sitting position. Consideration should be given to protection from the elements. This may include partial walls to protect from prevailing winds and a covered area to offer protection from inclement weather.

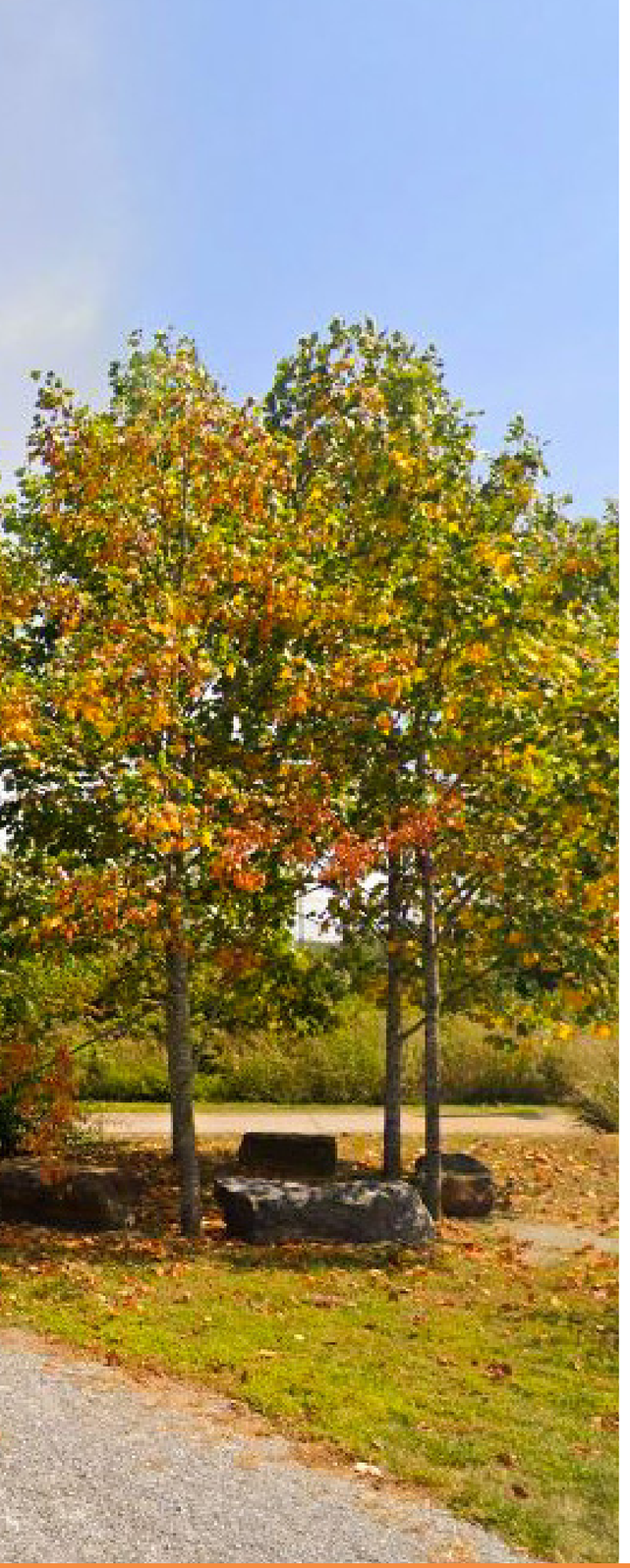
Restrooms

With no public sewer system, a Clivus Multrum composting toilet system is recommended to provide permanent restroom facilities. Clivus Multrum systems can be prefabricated off-site limiting the cost associated with on-site construction. The system is comprised of separate tanks for solids and liquids. Removal of compost from tanks happens every 2-3 years.

An electrical source is required to run the tank fans. The continuously operating fan pulls air down the toilet fixture and out through a vent stack creating an odorless bathroom. A range of designs options allow for traditional electrical service or solar service to operate the fan. If a solar modal is selected, clear story windows are recommended to provide natural lighting.

With access to water within the HHCA, washing stations should be considered for the restrooms. Wastewater from the sinks is considered greywater and could be treated on-site via a modest greywater treatment system.

Restrooms should be located so that it is easily visible from the driveway and parking. New restroom design should be economical and durable while offering a quality design that can reinforce a cohesive HHCA identity. The facility should accommodate 1-2 toilets fixtures.



Buffers and Fencing

There may be areas along HHCA boundaries where plant buffers and /or fencing may be appropriate to maintain adjacent property owner visual privacy. Some of these locations are not discernible at the master plan level. The Conservancy staff should maintain open communications with the Township and residents and respond appropriately.

Interpretive Signage

The Master Plan offers opportunities for interpretive signage to educate the public on the history and natural processes of the HHCA. These can vary in size and should be designed to appropriately fit within the natural setting of the HHCA. The plan recommends 4 to 6 interpretative panels throughout the HHCA which can focus on the following topics:

- Habitat Restoration – meadows; forest; wetlands and others
- The importance of protecting stream headwaters
- Susquehanna Riverlands Landscape
- HHCA History
- Wildlife – Snakes; birds; deer; and others
- HHCA Stewardship / Agroforestry Practices
- Wildlife Management / Hunting

Site Furnishings

Site furnishings provide additional amenities and create a sense of uniformity in the HHCA landscape. These improvements will include benches, trash receptacles, and signage. In high use areas these amenities should be chosen to be durable and blend seamlessly into the natural landscape of the HHCA and meet ADA standards. In other areas such as along hiking trails these amenities may be as simple as a log bench or boulder.

Habitat Boxes

Fabricated fauna habitats in the form of wildlife boxes are proposed to encourage habitats for bats, native birds, and native bees. Wildlife boxes can be an early implementation projects for local scouts, and volunteer groups.

Preliminary Concept Plans

The program elements were explored and vetted with the public, master plan study committee, and Conservancy staff, through an evolution of concepts. Broad HHCA wide concepts were developed to explore options for HHCA access and trail networks in coordination with restoration recommendations.

Trails Uses

The early concepts facilities discussion centering around trail user groups. Early in the process it was determined that mountain biking trails would not be pursued in the HHCA. Often there are benefits to opening a site to mountain biking and pairing with mountain bike user groups. They often can be key partners in building, maintaining trails, and organizing volunteers. However, once a site is open to mountain biking policing the proper usage of trails and ensuring rogue trail building does not take place can become a large burden for a land manager. Specifically, in the HHCA where hiking is the intended primary use and with new trails envisioned as single track to limit disturbance it would limit the ability to provide for both user groups safely on the same trail system.

Early plans also explored the option for a gravel bike through trail. The advantage of the corridor would be to take regional gravel bikers off the more narrow and steep portions of River Drive and allow them to connect west towards Rocky Ridge via a wider trail corridor through Hellam Hills NP. Disadvantages would be in opening the HHCA to biking the potential to creating a need to police unauthorized biking on hiking only trails. It was determined the advantages did not directly support Conservancy goals where the disadvantages of unauthorized use could work against restoration goals; for this reason, gravel biking was no longer explored as a HHCA activity.

Figure 3.1 Hellam Hills NP Concept Trail Plan

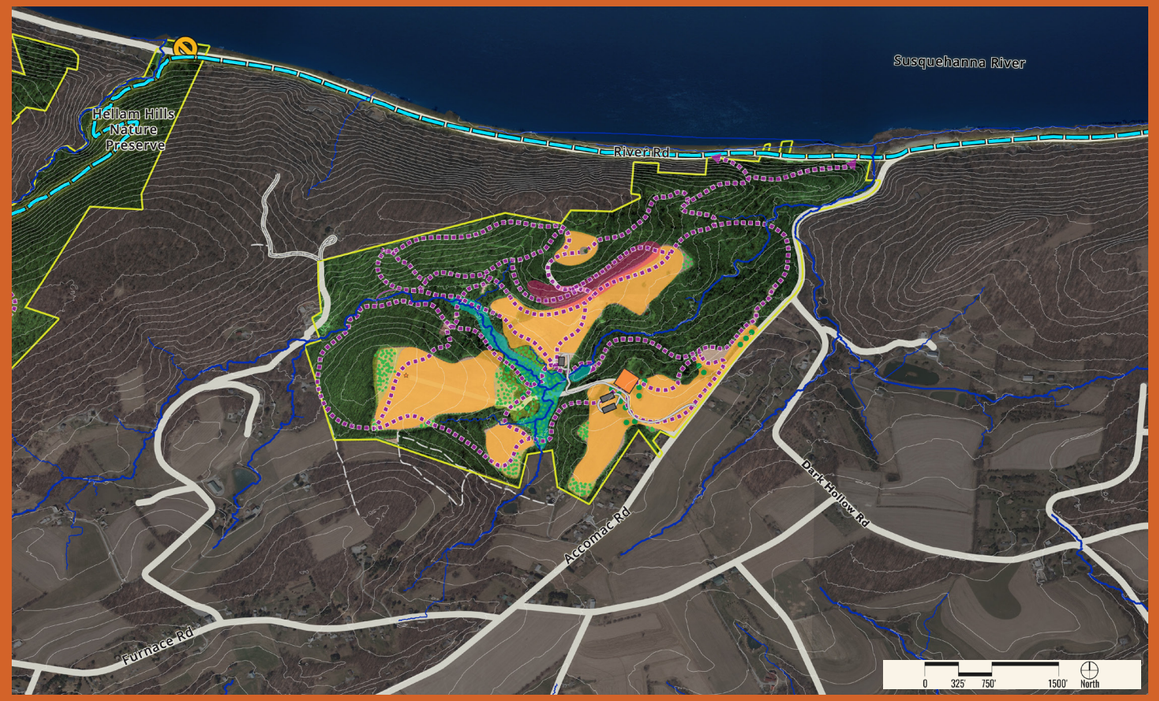


Figure 3.2 Wizard Ranch NP Concept Trail Plan

Figure 3.3 Hellam Hills NP Refined Trail & Activities Plan

Figure 3.4 Wizard Ranch NP Refined Trail & Activities Plan

Stewardship and Engagement Hub

It was determined that the Stewardship Center should be located at Wizard Ranch NP where the scale of the building would be appropriate to the surrounding agricultural land uses. Hellam Hills NP was rule out as a home for the Stewardship Hub for two reasons. First, the scale of the hub would create a disruption to the forest canopy along the Furnace Road corridor that is out of character with the surrounding land uses. Second Wizard Ranch has a direct route to the Rt 30 corridor.

Within Wizard Ranch two initial sites for the Stewardship and Engagement Hub were identified: one within the interior of the site and a second along Accomac Road. During the early planning stages, it was assumed that the Hubs would be developed in proximity as one campus.

The benefits of the interior site are that its location would put visitors into the core of Wizard Ranch NP allowing them to feel immersed in nature. Draw backs include a long driveway for stewardship vehicles to traverse in and out of the site and the need to maintain the full driveway in winter.

Benefits of the Accomac Road site are direct road access for stewardship vehicular access and good surveillance views of the structures from the road. Additionally keeping development close to road corridor allows for the interior of the site to be maintained as core habitat. For the Conservancy these benefits far out way the need to place immediately place visitors into the center of the Wizard Ranch NP.

Upper Right

Figure 3.5 Stewardship Hub Concept 1

Lower Right

Figure 3.6 Stewardship Hub Concept 2

PLAN RECOMMENDATIONS

4

Hellam Hills NP Ecological Recommendations

Hellam Hills Nature Preserve (NP), despite many years of impacts from logging and water utility management, sustains a gorgeous mature canopy of native trees. It requires stewardship to ensure that this forested landscape can remain so for centuries to come. This will involve management of deer and invasive species. Until the deer population is reduced to pre-European settlement densities, it will require planting and herbivory protection of slow-growing native species, such as oaks, hickories and elms. Conversion of the spruce planting area into a mosaic of field, shrubland, emerging hardwood and mixed forest types will have the largest terrestrial impact on the site and has the potential to drastically increase overall biodiversity. The breeding bird community is already impressive. Adding successional habitat at this scale will increase the odds of attracting locally declining species such as yellow-breasted chat, blue grosbeak, and golden-winged warbler to the Hellam Hills NP. The stream reaches of Wildcat Run and Dugan Run are both in dire need of a full restoration plan. While many locations along the reaches may need only simple interventions. Other portions require streambank stabilization, more rigorous grade control structures and stream bed elevation corrections. These will be costly but extremely valuable endeavors, with a high probability of being awarded grant support for the design/build approaches.

Ecological recommendations fall into 5 major categories:

- Stream and Floodplain Restoration
- Invasive management
- Norway Spruce management
- Breeding Bird & Pollinator Habitat Enhancement
- Forest Regeneration Health

Stream and Floodplain Restoration

Establish a reach-wide stream restoration plan for both Dugan Run and Wildcat Run. The plan elements should address the overall health of the stream corridor and should include recommendations for areas of

- Streambank stabilization
- Streambed elevation
- Grade-control structures, and
- Invasive species management.

A plan of this nature is a mix of ecology and engineering, and final recommendations / plans should be based on additional field work and survey information. Plan sets meeting permit requirements will be required for work within the waterways.

A major component of the stream restoration plan will be to improve hydrology in stream-associated wetlands. The plan should work to reconnect wetlands to streams or redirect channels as needed to ensure healthy water levels in associated wetlands and vernal pools. This work should be paired with the monitoring of changes in the plant community to benchmark the restoration progress.

It is recommended that the Conservancy work with Hellam Township to explore how improvements to Hellam Hills NP water ways may assist the Township in meeting state and federally mandated Municipal Separate Storm Sewer System (MS-4) requirements. Hellam Hills NP offers many opportunities for the improvement of water quality.

A project of this scope and magnitude represents opportunities for 'mitigation banking'. Mitigation banking is an environmental tool often pursued in the design of road and utility improvements when impacts to the environment are unavoidable. When impacts cannot be satisfactorily mitigated by restoring conditions on-site, projects will look to purchase 'mitigation credits' generated from the successful restoration of comparable property in proximity. Mitigation banking is a federally regulated system of credits and debits used to offset these unavoidable impacts. An Inter-Agency Review team (IRT) comprised of various federal and state agencies determines the number of mitigation credits available for a restored bank site, as well as the required maintenance and monitoring requirements. A 'mitigation bank' is often required to be encumbered by a conservation easement and will have long-term stewardship requirements to ensure its success. Private restoration companies will undertake the restoration and annual stewardship of a site on speculation that they would be able to sell the mitigation credits in the future. As a private landowner, the Conservancy could consider granting an easement to such a company to permit them to complete the restoration for the Conservancy and bank the credits.

LANCASTER CONSERVANCY **Hellam Hills Nature Preserve** *Figure 4.1 Hellam Hills NP Restoration Plan*

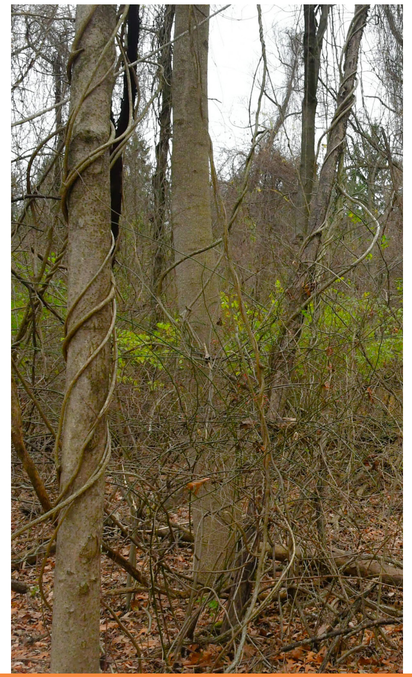
Norway Spruce Management

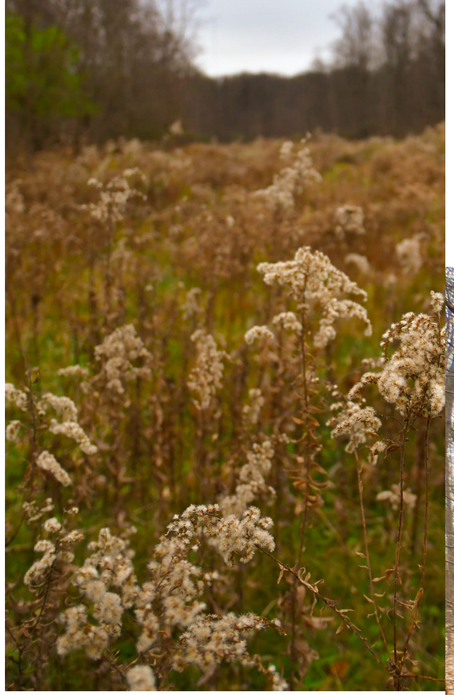
Large areas of Hellam Hills NP are planted with Norway spruce and other conifers. However, these non-native tree plantings are aging out and overcrowded. Due to, deer over browsing and the lack of native woody regeneration, the canopy gaps left by dying trees are typically populated by colonizing invasive plants. Selectively thinning of the spruce trees or the removal of full sections followed immediately by the planting of grouping white pines, oaks, birch, hemlock, dogwoods, viburnums, and laurels in a mosaic of warm season grasses will create a more diverse forest mosaic typical of a native Pennsylvania forest while still providing winter coverage. These groupings should be protected with deer exclousure fencing.

Invasive management / Selective Tree Removal / Viewshed Management

Invasive species management is critical to the health of Hellam Hills NP flora and fauna. An extension of white-tailed deer hunting across Furnace Road to the majority of Hellam Hills NP is necessary to address over-population of deer on site. Systematic removal of all invasion woodies (trees, shrubs, vines) should be undertaken on site with priority given to the removal of all tree-of-heaven (Ailanthus altissima). The result will help to promote forest diversity and health, enhance aesthetics, and remove Spotted Lantern Fly habitat. In the area of Buzzard Roost, the removal of a stand of tree-of-heaven would allow for eastern views of the river.

Removal of invasive herbaceous plants (Japanese stilt-grass, mile-a-minute, etc.) should be undertaken and paired with the planting or seeding of native vegetation to suppress re-growth of invasives, contribute to forest structure, and increase plant diversity, habitat, and wildlife use.





Breeding Bird & Pollinator Habitat Enhancement

In open meadow areas such as the pipeline right-of-way, the Conservancy should coordinate with the utility to enhance plantings and seed mixes to better promote successional breeding birds and pollinating insects. Additionally, the Conservancy should explore options to soften the transition from meadow to mature forest canopy along the right-of-way by expanding some of the open meadow areas to transition into successional forest 'edge' to create a mixed habitat.

A small old field / meadow exists at the Furnace Road utility road entrance and is bordered by existing spruce forest borders. In this area, the removal of the spruce forest should be paired with expanded meadow planting and transitional plantings maintained to create a mosaic of areas of successional forest and mature second growth. The expansion of meadow areas and transitional forest edge will build upon and add to the important bird and pollinator habitat to these areas.

Forest Regeneration Health

As the result of many years of logging and other uses, the forest floor has been fragmented by trails and logging roads. These trails can work against forest regeneration by serving as vectors for invasive species to enter the forest. The compacted trails become conduits for stormwater flows and, in some cases, lead to soil erosion and sediment deposits in site water ways. If left unchecked, the many trail corridors can lead to the fragmentation of the mature forest canopy. A plan for the final trail network should look carefully at the development of new trails as these may impact the Hellam Hills NP. Existing trails that are sustainable may limit the need for new trails. The trails that are not to be incorporated into the proposed trail plan should be restored to a native forest floor and canopy. In some cases, this may be as simple as allowing for the natural accumulation of leaf litter and forest duff to take place on the trail bed. In areas where erosion is an issue, best management practices (BMPs) should be implemented to stabilize and revegetate the former trails beds.

Hellam Hills NP Facilities & Activities Recommendations

Site Activities

Site activities at Hellam Hills NP are focused on self-guided passive recreation, with a focus on hiking, nature studies and hunting. As part of the greater Hellam Hills Conservation Area, it is anticipated that the Conservancy will run occasional group programs at Hellam Hills NP.

Site Access & Parking

Safe vehicular access to the preserve is a key component of creating a preserve that is successful and respectful to the surrounding neighbors. The plan recommends focusing public access in the Furnace Road area where the road infrastructure is appropriately designed to handle public access.

The main parking area is proposed at the intersection of Furnace and Chimney Rock Road. A new driveway would align with the intersection and lead into a parking area. The water utility access drive is realigned to originate from the new driveway and a vehicular gate would control access to the utility driveway. The current driveway impacts a portion of the headwaters to Wildcat Run. The driveway alignment should consider site hydrology and provide for proper conveyance of water via culvert under the driveway.

The parking location is proposed close to Furnace Road to limit development impacts on the greater site and to allow for easy surveillance of the area. It is to be developed in conjunction with the expanded meadow restoration area, limiting impacts to desirable mature forest areas.

The plan shows 60 parking spaces in this area. As the plan proposes secondary parking areas at trailheads, it may be determined that only a portion of the parking spaces be developed in the early phases of Hellam Hills NP phasing. The parking area could be laid out in a way that holds areas in reserve should future parking be deemed necessary.

Two trailhead parking areas are proposed to supplement parking at the main entrance. Both areas are 10-20 spaces in size. Like the main parking area, the initial development of the trailhead parking could be limited to 10 spaces, holding an area for a future addition of 10 spaces. The first trailhead parking area is located along Chimney Rock Road and would serve as access to the Kinsley Tract land trails. The second is located east of the River Drive and Furnace Road intersection and would serve as trailhead parking for the Mason-Dixon Trail (M-DT).

River Rd
Susquehanna River
Wildcat Run
Buzzards Roost
Dugan Run
Chimney Rock Rd
Furnace Rd

LEGEND
- Preserve Boundary
- York County Parcels
- Contours
- Streams
- Drainage ways
- Roads
- Mason-Dixon Trail
- Proposed Trail System

LEGEND
- Buzzard Roost Trail
- Emergency Access Trail
- Cross Preserve Trail
- Field & Forest Bird Trail
- Hunting Skills Trail
- Connector Trails
- Parking
- Pavilion
- Restroom
- Camping
- Trail head Kiosk
- Point of Interset

0 325' 750' 1500' North

LANCASTER CONSERVANCY Hellam Hills Nature Preserve

Figure 4.2 Hellam Hills NP Facilities Plan

There are multiple other vehicular access points into the Hellman Hills NP that are private in nature, see Chapter 2. Hellam Hills NP mapping and signage should clearly denote these areas as 'private' and not for public access. In the initial stages of opening Hellman Hills NP to the public the Conservancy should work with partners such as hiking clubs and hunters to educate them on the best places to park.

Site Facilities

Basic site facilities are recommended to provide for Conservancy group programs, site stewardship, and user comfort. These facilities are focused at the Furnace Road entrance to limit major development impacts in one area. A single occupancy composting toilet is proposed in the vicinity of the parking area. A pavilion is proposed opposite the parking area. The pavilion will serve as a group activity space. Located in an area along the trail system that overlooks a key birding area it also offers a place for hikers to rest and view wildlife.

Opportunities exist throughout Hellam Hills NP for interpretation of stewardship, history, and site ecology. The plan notes the general locations of these areas. They include meadow habitat and successional forest management; headwater, wetland, floodplain and stream corridor restoration; and cultural resources such as Buzzard Roost and Wildcat Bluff overlooks, site historic ruins and the former Mine Pit.

Adjacent to the Wildcat Bluff overlook, an area has been identified for camping for by hikers of the M-DT. Located near existing site infrastructure and with limited vehicular access, the area can be easily maintained and monitored.

The potential exists to relocate 2-3 screened in cabins from another Conservancy site to be used as camping shelters. Alternatively, the development of simple tent pads could be explored. The Conservancy has a 'no fire' policy on their preserves. Clear policies for the camping area should be established that allow for the use of a camping stove in a designated area. Camping sites would be operated by reservation only, like other M-DT camp sites. The operation of camp sites and a reservation system should be a cooperative effort between the M-DT club and York County Parks similar to the Apollo Park model.

Trails

Trails improvements are a key component of Hellam Hills NP. The Master Plan identifies 5 trail corridors. Each trail is recommended to achieve key site goals and offer a unique site experience. Trail alignments and recommendations are schematic in nature based off GIS (Geographic Information System) topography and site observation. Implementation of trails will require additional field verification. In some cases of new trail corridors or major trail restoration work, topographic survey to develop and submit permit plans will be required.

Buzzard Roost Overlook Trail

A primary destination for most visitors to the Hellam Hills NP will be the Buzzard Roost Overlook. A primary goal of the plan is to create an accessible hiking route to the overlook. The majority of the Buzzard Roost Overlook Trail takes advantage of existing site trails and would classify as an accessible hiking trail with minor improvements. The 1.85-mile trail originates from the main parking area and follows the western edge of the proposed meadow to the north before crossing the utility access drive. This portion of the trail would be new construction and have gentle grades below 3% allowing for the use of stone dust surface to create the most accessible trail surface in keeping with the rustic surroundings of the Hellam Hills NP. After crossing the utility access drive, the trail alignment takes advantage of existing trails that approach Buzzard Roost from the west allowing for a long steady climb across the change in elevation. The first portion of the trail is very level and minimal improvements are required to provide for adequate drainage of the existing trail. The last 2000-feet of the trail climbs 140 ft to the overlook. The existing trail ranges from 5 to 8.3% with a few areas in the 8.3-10% range. To meet the accessible trails standard this portion of the trail will require work to ensure that the trail bed is clear of obstructions, has proper drainage, and has resting areas placed at 200-foot intervals for grades of 5-8.33% and at 30-foot intervals for grades 8.33-10%. The anticipated trail rating for the Buzzard Roost Overlook Trail is 'Easy'.

At the overlook itself, two viewing areas are recommended. The uppermost overlook has an existing boulder field allowing for rustic seating. A slightly lower vantage point, however, could be improved with a stable surface. A bench or picnic table would accommodate a seating and resting area. The recommended selective tree removal of this area should take into consideration views from both observation areas.

Mason-Dixon Trail

The long-term goal of the Hellam Hill NP portion of the M-DT is to create a back country trail experience that allows for day hikers and through hikers to experience the unique features throughout the Hellam Hills NP. The trail takes advantage of the existing trail system and will require the development of new trails corridors. The trail falls into three sections: Dugan Run, Buzzard Roost Overlook, and Wildcat Run.

The majority of the Dugan Run section of trail uses the existing M-DT alignment, starting at River Drive and continuing to the existing Dugan Run stone crossing. It is recommended that a new portion of trail continue along the eastern slope of the Dugan Run stream valley with a new low flow crossing of the stream at a higher elevation in the watershed. From there, the trail would traverse the western slope of the stream valley before crossing back over the existing water utility access drive.

There are existing logging roads in this area however they fall with in headwater buffer areas and have fall line alignments that make them unsustainable trail corridors. Proposed trail alignments are envisioned to be single track in keeping with the nature of the existing M-DT section established along the Dugan Run. Substantial portion of this trail fall within areas identified for Norway Spruce forest restoration and Dugan Run head water restoration. Final trail alignments and stream crossing location should be informed by restoration goals in this area. Former logging roads should be stabilized and re vegetated in coordination with restoration efforts. It is anticipated that this section of trail would be rated 'More Difficult'. Consideration should be given to creating a stream crossing that is universally accessible.

As the trail crosses over the water utility access drive, it continues northeast along the eastern slope of Buzzard Roost. In this area the trail is proposed to be a mix of new, single track hiking trail and existing trail corridors that run along the edge of a minor ridge. This area was observed to have key bird habitat. Final trail alignments should look to minimize impacts to the existing habitat. The proposed trail runs parallel to an existing trail corridor serving as a wider emergency access trail, it may be determined that if impacts to habitat are too great that the trail corridors could be combined into the one existing corridor to limit impacts.

The trail crosses over the emergency access trail and a new section of trail ascends to the slope to align with the existing eastern approach to Buzzard Roost with the final portion falling within the extreme end of the 'More Difficult' rating with a slope of 24% for a length of 250-feet. The trail exits Buzzard Roost to the west following the alignment of the Buzzard Roost Overlook Trail. The eastern approach trail will require work to ensure that the trail bed is clear of obstructions, has proper drainage and has level resting areas where possible.

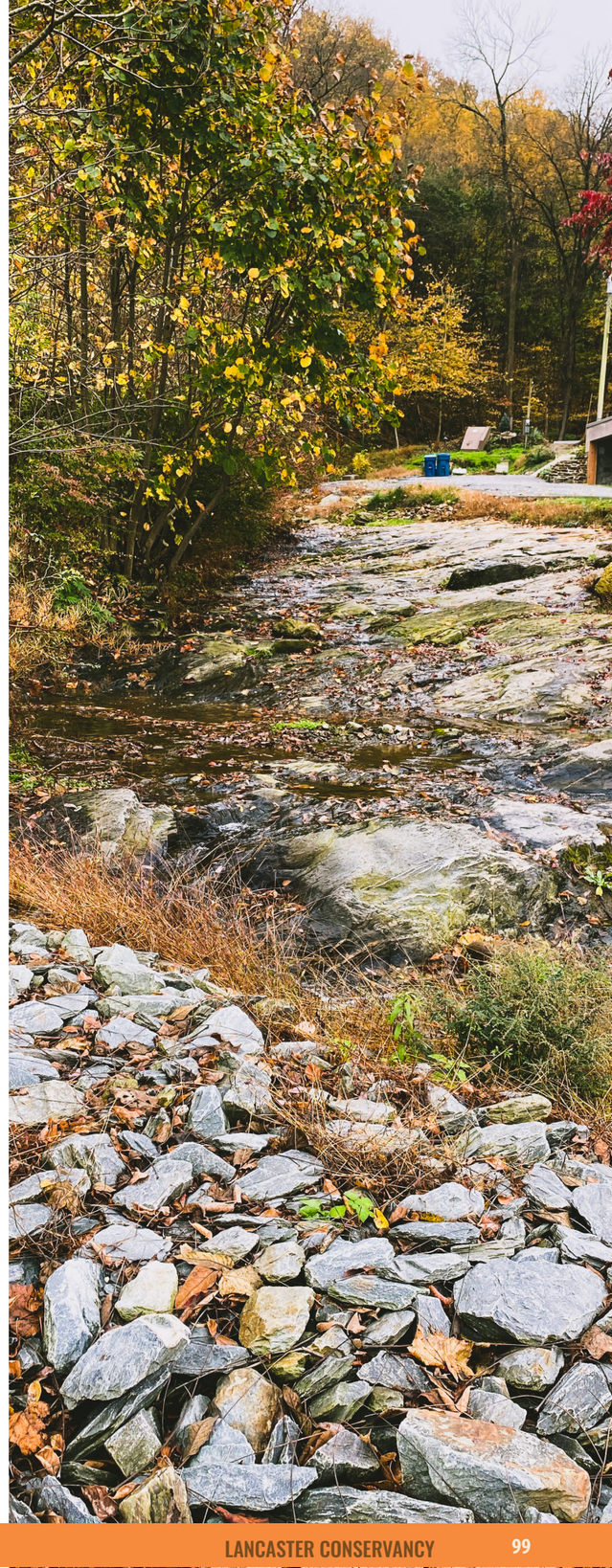
The trail departs from the Buzzard Roost Overlook Trail and continues along an existing trail corridor heading north towards the Wildcat Bluff Area. The beginning of the existing trail corridor is benched into the hillside and has slopes ranging from 5 to 8%. However, as the trail proceeds into a steeper part of the hillside a portion of the trail does not meet the 'Half' Rule for trail design creating fall line trail condition. In this area the existing trail a has slopes of 20% for 450-feet. The trail will require work to ensure that the trail bed is clear of obstructions, has proper drainage, and has resting areas appropriately placed to meet the 'More Difficult' trail rating.

The final portion of the M-DT follows along Wildcat Runs eastern stream valley. Departing from Wildcat Bluff the trail follows the alignment of the existing overlook trail corridor. With a wide trail bed and level trail grade this portion of the trail requires minimal improvement. In the area of the former reservoir location, due to the existing hillside springs rerouting of the trail should be coordinated with stream bank restoration. It is anticipated that a portion of boardwalk may be required in this area to limit impacts to the existing hillside spring complex. The boardwalk could terminate in a small viewing platform providing for an interpretation of the former reservoir and stream restoration project. This portion of the trail from the Wildcat Bluff facilities to the Reservoir Overlook would be rated 'Easy'. Due to the gentle grade it could be surfaced with stone dust making the section of trail from the Wildcat Bluff residence to the reservoir an ADA accessible route.

West of the reservoir a new single track hiking trail would follow more closely to the stream corridor abandoning the remainder of the prior overlook trail. This portion of existing overlook trail is a fall line trail that has experienced significant erosion and will require stabilization and vegetation effort to restore the forest vegetation. Fall line logging roads along the slope should also be included in the stabilized and revegetation work.

The new trail crosses the southern stream branch of Wildcat Run with a rustic stepping stone crossing and continues west climbing out of the stream valley towards an overlook resting spot with a dramatic overview of the stream. The portion of the trail exiting the stream valley will be approach grades of 15% for a segment of 250-feet, trail construction in this area may be paired with existing boulders to create series of natural steps along the trail. From this point the trail continues west along the stream valley and is benched into the hillside. Final trail alignment will need to be field verified to limit impacts to the slope and tree canopy.

As the trail approaches the gas line right-of-way, ruins associated with the former homestead in this area can be observed in the stream. This area is also a focus area of stream corridor and wetland improvements. Areas of wetlands and springs will need to be surveyed and the final trail alignment should be developed in conjunction with stream restoration work. After crossing the utility right-of way, the existing forest has a series of former trails offering various alignments. The final alignment should avoid the western property edge that is home to the Wildcat headwaters. It is recommended that the trail alignment pass by the existing mine pit to offer interpretive signage opportunities. Interpretive themes could revolve around HHCA's relationship of the Codorus Furnace located along the M-DT 4-miles west of Hellam Hills NP and the history of mining and forestry for charcoal production. The last portion of the trail connects to the proposed trailhead parking along Furnace Road and continues along the existing MD-T corridor before rejoining the on-road trail route that continues west at the intersection of River Drive and Furnace Road.



In all, the new trail alignment from River Drive to Furnace Road would be 5.5-miles long—adding an additional 2.5-miles to the M-DT through Hellam Hills NP. Most of the trail would be single track hiking trail rated 'More Difficult'.

Cross Preserve Trail

It is recommended that the existing portion of the M-DT that runs from the trailhead parking to the water utility access road and along the road to the crossing of Dugan Run be maintained as a cross preserve trail allowing hikers to adjust the overall length of their desired hike. This portion of trail is rated 'Easy' and requires minimal to no improvement. The trail is1.8-miles long.

Field & Forest Bird Loop

The Field and Forest Bird Loop is intended to offer a short, accessible hiking opportunity that takes users through some of the key birding areas at Hellam Hills NP. The trail originates from the M-DT trailhead parking area and traverses the forested area associated with the headwaters of Wildcat Run. The trail leads to the main parking area meadow. In this area a loop trail passes through meadow and forest restoration areas. Located strategically mid loop is a pavilion offering views out towards a key bird habitat area. In all, the out and back trail offer a 2.0-mile hike. The loop portion access from the main parking area offers a 0.75-mile hike. The gentle terrain would allow the use of stone dust paving to create a fully ADA accessible trail.

In areas where soils have poor drainage the trail should be elevated through minor grading paired with habitat restoration to create wetland areas or withe the use of boardwalks. Boardwalks should conform to ADA accessible standards.

Emergency Access Through Trail

Due to the wide trail corridors that already exists on-site, the potential exists to create an emergency access trail. The trail would serve the Hellam Hill NP by providing emergency access to the interior of the site as well as serving the River Drive residences with an alternative emergency route connecting Furnace Road to River Drive. The trail would follow existing trail corridors originating from the water utility access road and running along the eastern slope of Buzzard Roost. The trail continues north around the base of the Buzzard Roost summit and continues west toward Wildcat Bluff. In this area, the trail follows the alignment of the M-DT. The final portion of the trail continues along a recently improved gravel road that exits onto River Drive. A connector trail would connect this portion of trail up to the M-DT at the Wildcat Bluff overlook area via an existing trail corridor. In total, the trail is 2.2 miles in length. Minor trail improvements are required to ensure that the trail bed is clear of obstructions and has proper drainage. A substantial portion of this trail would be rated 'Easy' with the portion connecting Buzzard Roost area to River Drive being considered 'More Difficult'. Extensive existing trail networks existing in the area between Buzzard Roost and River Drive. Trails not included in the final trail alignment should be closed and revegetated in conjunction with the development of this trail.

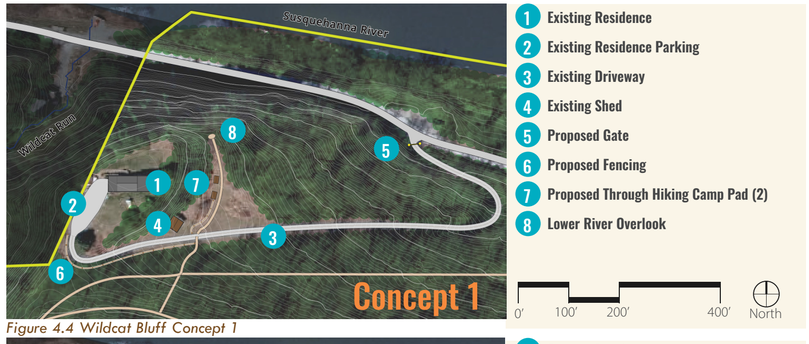
Hunting Universal Access / Skills Trail

The goal for trails along the Kinsley Tract is to offer accessible routes for hunters with disabilities and a skills course for beginner hunters. Due to the gentle terrain most of the trail system can be constructed under grades of 5%. North of Chimney Rock Road, the change in elevation would allow for two at-grade ADA hunting blinds to be placed at vantage point above lower terrain. South of Chimney Rock Road the gentle terrain would allow the use of stone dust paving to create ADA accessible routes to two hunting blinds. In this area, hunting blinds should be situated with vantage point towards areas of key deer habitat. ADA blinds are typically offered by land managers through a reservation process.

The smaller nature, presence of safety zones and varied terrain of the Kinsley Tract lends well to being use as a hunting skills trail course. Skills trails complement classroom hunting courses and are used to teach beginning hunters safe hunting guidelines. Courses are set up so that students encounter a variety of scenarios that allow them to practice good decision-making process when hunting. At each decision points hunters are encouraged to go through three questions as they set up a shot, "Is it safe? Is it legal? Is it ethical?". Questions regarding safe and legal should have clearly identifiable yes / no answers; while ethical questions can vary across participants, with each individual arriving at their own answers. It should be noted that courses do not have permanent features but are set up by instructors in advance of a scheduled class and removed following the class.

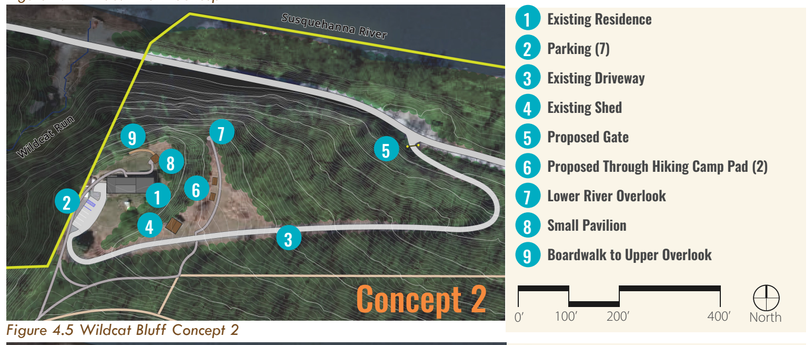
The trail system through the Kinsley tract should leave adequate buffers to headwater areas and neighboring residences. In total, 2.0-miles of trail are proposed. The trails will be universally accessible routes.

Figure 4.3 Hellam Hills NP Trail Difficulty Plan



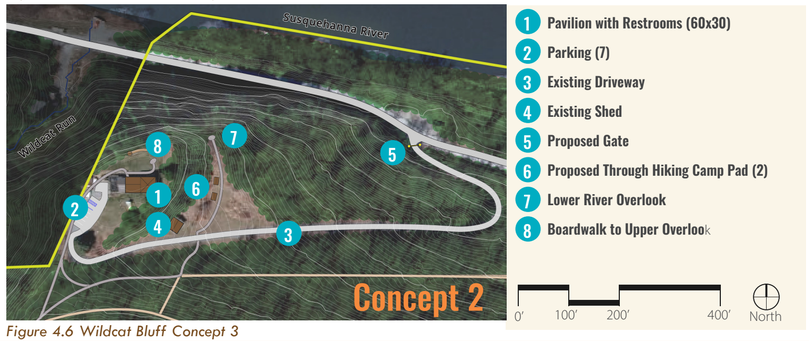
1. Existing Residence
2. Existing Residence Parking
3. Existing Driveway
4. Existing Shed
5. Proposed Gate
6. Proposed Fencing
7. Proposed Through Hiking Camp Pad (2)
8. Lower River Overlook

Figure 4.4 Wildcat Bluff Concept 1



1. Existing Residence
2. Parking (7)
3. Existing Driveway
4. Existing Shed
5. Proposed Gate
6. Proposed Through Hiking Camp Pad (2)
7. Lower River Overlook
8. Small Pavilion
9. Boardwalk to Upper Overlook

Figure 4.5 Wildcat Bluff Concept 2



1. Pavilion with Restrooms (60x30)
2. Parking (7)
3. Existing Driveway
4. Existing Shed
5. Proposed Gate
6. Proposed Through Hiking Camp Pad (2)
7. Lower River Overlook
8. Boardwalk to Upper Overlook

Figure 4.6 Wildcat Bluff Concept 3

Wildcat Bluff

The Wildcat Bluff residence was acquired via donation to the Conservancy. The current home is rented via long-term lease. The Conservancy has had a successful relationship with the current tenant—a key to maintaining the house and surrounding property.

Prior to renting the home on a long-term lease basis, the Conservancy operated the residence as an Airbnb. The current home is open concept with a private master suite area. The basement level of the home was converted to a single bedroom efficiency apartment area. Though the two units were popular, and booking was not an issue, the management of the property was becoming a full-time job for Conservancy Staff. The Wildcat Bluff area and building configuration lend itself to many options for the Conservancy moving forward. The master plan explores three options for the future of the Wildcat Buff Area.

One option would maintain the home as a private single-family residence. In this scenario fencing should be added along trail corridors to clearly denote private residents' area from the public Wildcat Bluff overlook area. The option would exist to rent the main portion of the house to generate modest income and use the basement apartment for staff housing for seasonal workers. The basement apartment is near to the camping area so staff residents could help to monitor this area.

A second option would maintain the existing structure for Conservancy office or program space. The existing parking court area at the top of the driveway would be reconfigured to accommodate 5-7 parking spaces for Conservancy staff and ADA parking. A trail connection from the M-DT would connect to the rear of the home and a boardwalk connection would allow visitors to safely reach the upper Wildcat Bluff overlook area. Any public programs held at Wildcat Bluff would be via hike-in access from the main parking area located on Furnace Road. Potential uses include indoor multipurpose room for group activities, Conservancy offices, or as area artist-in-residency facilities using the downstairs as living quarters and the upstairs as studio / classroom space.

The third option explores the removal of the existing home and developing an open-air pavilion with restrooms. The existing infrastructure would allow for electricity, potable water, septic service, and vehicular access to the pavilion site. Like Option 2, a small parking area would be provided for Conservancy Staff and ADA parking, however public access would be via hike in access from Furnace Road. The pavilion could be constructed on the former building pad limiting site disturbance and walkways and boardwalks would connect to the adjoining trails and a new upper bluff overlook area.

During the master plan process, there was no preferred direction for Wildcat Bluff. The Conservancy anticipates that the house will continue to be rented for the near future. It is recommended that a vehicular gate be added to the base of the driveway at River Drive so that the driveway can be closed if there are times that the residence is vacant.

Hellam Hills NP Hunting Recommendations

In conjunction with invasive species management Hellam Hills NP will be opened to deer hunting. Public hunting would be administered in accordance with Pennsylvania Game Commission (PGC) Regulations and would be open to Firearm and Bow & Arrow. The master plan makes preliminary recommendations of where hunting would be allowed in Hellam Hills NP and general locations of safety areas. Safety areas are defined by PGC as 1000-yards from an occupied building. For Hellam Hills NP this would include surrounding residences. The plan limits hunting of Hellam Hills NP to the areas west of Wildcat Run and excludes the north facing slopes leading towards River Drive. Along Wildcat Run the M-DT would serve as the natural boundary of the hunting limits along the north facing slope the emergency trail would serve of as the boundary. Signage denoting the hunting boundary will be required in area along the north facing slope and Wildcat Run where there is no trail.

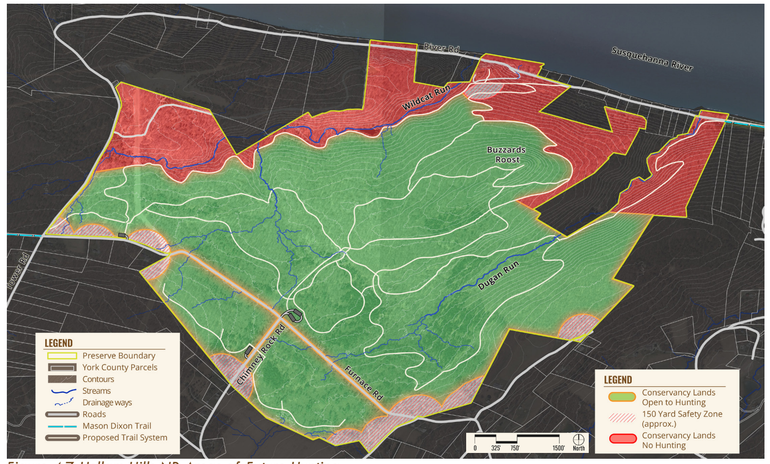


Figure 4.7 Hellam Hills NP Areas of Future Hunting

Wizard Ranch Ecological Recommendations

Wizard Ranch Nature Preserve (NP) is a former agricultural or working landscape. In recent years, the large field areas have been routinely harvested for hay production. The goal of the ecological recommendations is to restore this working landscape in a manner that celebrates early succession habitats (ex. wildflower meadows) while providing for interactive food forest and agroforestry components that continue the history of a working landscape by serving humans beyond passive recreation. It is highly encouraged to modify the existing haying arrangement of the fields at Wizard Ranch NP. Conversion from the existing simple hay mix to a more robust warm season grassland meadow and modifying the harvest/mow schedule to be amenable to breeding grassland birds is a simple and inexpensive way to increase the beauty, aesthetics and ecological function of Wizard Ranch NP. Softening of field edges is also encouraged through invasive species removal and the planting of young trees and shrubs in non-linear arrangements at the current forest/field edge. Re-routing the main site access road outside of the historically complex and dynamic stream convergence black willow wetland; and restoring hydrology will have great benefit to plants, insects, reptiles, amphibians and tree-roosting bats in summer months. The entire stream reach should be considered for restoration measures with a similar approach to Hellam Hills NP. Raising the streambed elevation to reconnect the structurally intact (but vegetatively and hydrologically altered) floodplain will have great benefit and may require little vegetation management if the hydrology is restored properly. Degraded secondary growth woodlands between the fields should be

completely removed to allow for new, fresh vegetative growth. This is a big project that will involve heavy machinery and winter clearing, followed by seeding, mulching, and planting to start anew. This provides flexibility in ecological planning as well. If grassland connectivity became a priority, this cleared area as early succession meadow (via fire, animal grazing, or mowing) would increase the field size significantly and possibly attract more denizens of the grassland. If successional birds, such as chats, and orchard orioles, and chestnut-sided warblers were a priority, the newly established meadow area could be planted with clusters of trees and shrubs to promote 30-40 years of successional woodlands which would over time develop into a mature hardwood forest.

Ecological recommendations fall into 4 major recommendations:

- Stream & Floodplain Restoration
- Invasive management
- Foster Forest Diversity
- Meadow Recommendations

Stream and Floodplain Restoration

Establish a reach-wide stream restoration plan for the Wizard Ranch NP unnamed tributary. This work should be coordinated with site access improvements. The plan elements should address the overall health of the stream corridor and should include recommendations for areas of:

- Streambank stabilization
- Streambed elevation
- Grade-control structures, and
- Invasive species management.

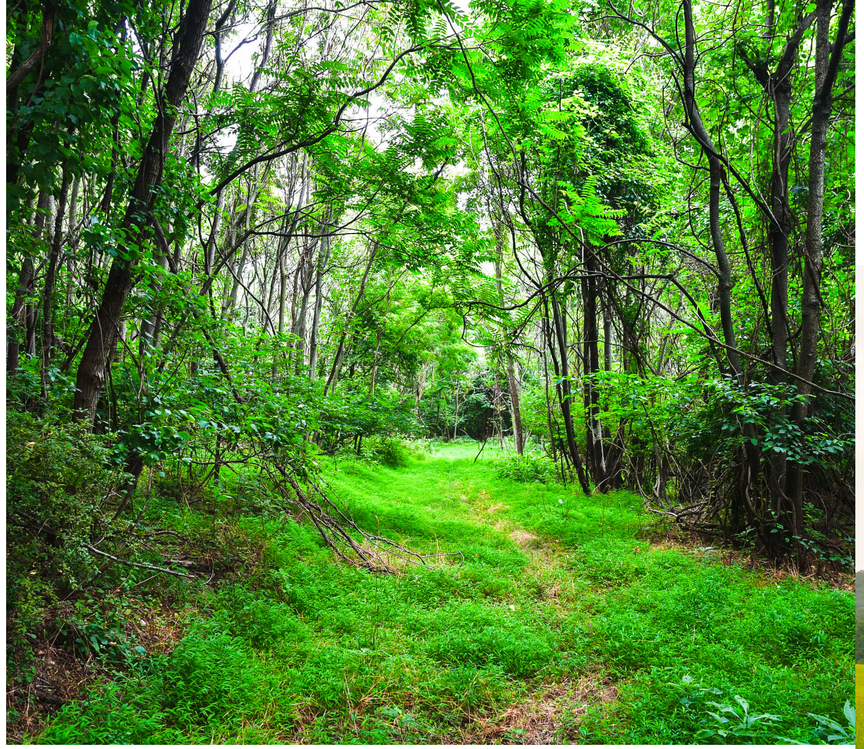
A plan of this nature is a mix of ecology and engineering, and final recommendations / plans should be based on additional field work and survey information. Permits plans will be required for work within the waterways.

The plan should incorporate the design and improvement of floodplain wetlands. In the area of the central stream convergence there is robust potential for restoring and reconnecting hydrology to the floodplain with dynamic faunal and floral habitat enhancements. Additionally, the modification of the pond to connect to the stream and function as a wetland provides opportunities for additional dynamic habitat.

LANCASTER CONSERVANCY **Wizard Ranch Nature Preserve** *Figure 4.8 Wizard Ranch NP Restoration Plan*

Within the existing wetland areas, in coordination with invasive species removal, hand-distributed seed methods should be used to quickly reestablish vegetative cover. The use of PA Piedmont Physiographic Wet-Mesic and Obligate Wetland seed mixes is recommended. Planting of woody vegetation should take place after the overall stream complex is restored.

In connection with the stream restoration planning, acoustic monitoring of bats in the breeding season (April-August) should be conducted to determine what species are present. This can inform tree removals and drive spatial ecology of restoration designs.



Invasive management

Invasive species management is critical to the health of Wizard Ranch NP and required for the management of both fauna and flora. Hunting of white-tailed deer for the majority of Wizard Ranch NP is necessary to address the over-population of deer at Wizard Ranch NP. Systematic removal of all invasion woodies (trees, shrubs, vines) should be undertaken on site with priority given to clear invasives from old logging roads and margins. Areas of large-scale removal will create opportunities to celebrate successional woods.

Additionally, removal of invasive herbaceous plants (Japanese stilt-grass, mile-a-minute, etc.) should be undertaken and paired with the planting or seeding of native vegetation to suppress re-growth of invasive. This will contribute to forest structure, and increase plant diversity, habitat, and wildlife use.

Foster Forest Diversity

As noted above deer herbivory is prevalent at Wizard Ranch NP. Paired with the invasive removal a focus on fostering forest diversity though new plantings is recommended. Planting clusters of oaks, hickories, cherries, and a selection of shrubs (with seed) is recommended. Plantings should be done in groupings and enclosed with deer fencing for protection. Monitoring of post establishment progress should be performed routinely to ensure protection of volunteer trees from deer herbivory, control invasives species within new plantings, and protection of plant investments. Additional monitoring of breeding birds in response to this effort would inform future restoration projects of a similar nature.

Meadow Recommendations

The conversion of the existing hay fields to grassland bird habitat will have a profound impact on the Wizard Ranch NP. Adjust mowing schedule to accommodate nesting and breeding should be coordinated during the next growing season (2022). Additionally, the conversion from agricultural grasses to native species and meadow plantings will create ideal habitat for grassland bird. Softening of the hard edges between the forest and existing fields by thinning some trees and planting some successional species for a smoother transition will create a diverse mixed-use habitat.

Photo Credit: Forested

Photo Credit: Forested

Photo Credit: Forested

Agroforestry

Stewardship Hub Food Forest

A food forest garden is an agricultural planting modeled on the forest. It includes a diversity of plant species and is designed with equal emphasis on ecology and productivity. Besides cleaning water, building soil, and providing wildlife habitat, a food forest garden produces fruit and nuts, lumber and fiber, salad and herbs, mushrooms, medicines, fodder, firewood and other useful products.

Location

The food forest is a place for people to enjoy on a regular basis and will require frequent observation to maintain and harvest the different crops throughout the growing season. As such, it will be most effective if located all around the Engagement Hub. Position higher maintenance plantings (e.g., berry shrubs) closest to the buildings where people are and high traffic areas. Position lower maintenance plantings further out (e.g., nut trees).

Interpretive Features

The food forest will be a welcoming and educational place for Wizard Ranch NP visitors to learn about the intersection of food and ecology. Interpretive panel signs, plant labels, benches and shade structures and open lawn spaces can be included to make guests comfortable and encourage them to explore.

Plant Selection

Try planting a large variety of plants and expect to adapt your plans over time. Season by season, plant more of the species that thrive on the site. Prioritize native plants, especially those that are found at Wizard Ranch NP already.

Blocks

For crop plants, place at least enough of a given species in a block to make it worthwhile walking to that location for maintenance and harvest. E.g., 10 blueberry bushes, 3 semi-dwarf apple trees. Besides edible plants, also include native "support plants" to provide insect and bird habitat, and to improve the soil.

Paths

Paths define space in the food forest and prevent unnecessary soil compaction from visitors over time. The paths should run on contour (across the slope, rather than up and down it). Paths running directly up and down hill can become erosion channels. Level paths are easier to work on than steep paths.

Paths can be surfaced with grass, or wood chips if needed. Log or steppingstone stairs may be needed in some places for steeper slopes

A main food forest loop will connect the engagement hub with the food forest. Size the paths according to mowing equipment

Deer Exclosure

Because of the large deer population, a deer exclosure fence will be needed to protect the food forest area. This fence should encompass the whole engagement hub and be set well back from the buildings. In-ground deer/cattle guard grates are an option instead of gates where the exclosure crosses roads.

Bed Areas

New planting beds can be sheet mulched. Mow, then sheet mulch with thick cardboard to kill the existing vegetation. Then lay down a thick layer of weed-free compost 6-inches to 8-inches deep, and finally 2-inches to 3-inches of shredded wood chip mulch on top of that. This creates a good environment for growing smaller shrubs and herbaceous plants.

Non-bed areas can be allowed to grow up into a low meadow, mowed 4 to 8 times per year and before harvest time. All trees growing in this area should be kept thoroughly mulched, so they do not suffer from too much competition with the grasses.

Phasing

Plant from big plants to small plants and get any hardscape elements done as early as possible. Begin closest to the buildings and work outward

Resources

Forest Garden Plant Species that have performed well at Forested in Bowie, Maryland. https://docs.google.com/spreadsheets/d/1WIJdMMmrbM0xwPZhkhUI7Hus13oAP6IxRuiZzT180c/edit#gid=0

Forest garden tools, plant sources, books, etc. https://docs.google.com/spreadsheets/d/1Y0CPHXlVFtd92U9ngoICJjLI2e9DCLGL-_hffH9xxQ/edit#gid=0

Pole Production

General Recommendations. Pole production plantings to be established in existing degraded forest zone (see site map). Heavily thin existing forest to remove all invasive trees and shrubs. When possible, preserve any native species found.

Rows of pole trees should follow the contour of this steep piece of ground, space the trees at about 8' x 8'. Do not plant a pure monoculture. Intermix 10-20% other well-adapted native tree and shrub species in the pole plantation area. A seed mix such as Ernst Seed ERNMX-105 Mesic to Dry Native Pollinator Mix can be used to increase herbaceous biodiversity. The plantation will need to be mowed several times each season. A commercial grade zero turn mower is a good option.

Key Species

Black Locust, Robinia pseudoacacia

- Highly rot-resistant wood
- Adapted to poor soils
- Produces thorny suckers when young and in full sun, so the area should be mowed several times each season
- Casts a light shade, so native shrub and perennial herbaceous species can be grown with these trees
- Prime nectar source for bees
- Soil-building legume

Eastern Redcedar, Juniperus virginiana

- Rot-resistant wood
- Adapted to poor soils
- Excellent bird habitat
- Cedar Apple Rust host
- Produces thorny suckers when young and in full sun, so the area should be mowed several times each season
- Casts a light shade, so native shrub and perennial herbaceous species can be grown with these trees
- Prime nectar source for bees

Post Oak, Quercus stellata

- Rot-resistant wood
- Adapted to poor soils and drought
- Slower growth rate
- Wildlife mast source

Photo Credit: Cornell Cals

Live Stakes Coppice

General Recommendations. Plants to be coppiced for live stakes should be planted in moist to wet soils according to the requirements of each species. Plant single or double rows at 3-foot to 6-foot-spacing to encourage strong upward growth and production of straight stakes.

Position coppiced plants along pathways for maintenance and harvest access. Paths sized according to mowing equipment.

Key Species

- Pussy Willow, Salix discolor
- Black Willow, Salix nigra
- American Elderberry, Sambucus canadensis
- Red Osier Dogwood, Cornus sericea
- Silky Dogwood, Cornus amomum
- Spicebush, Lindera benzoin
- Ninebark, Physocarpus opulifolius
- Smooth Alder, Alnus serrulata

Photo Credit: Fairmont Park Conservancy

Photo Credit: Fairmont Park Conservancy

Photo Credit: Fairmont Park Conservancy

Photo Credit: Forested

Woody Ornamental Florals

General Recommendations. See above under Live Stakes Coppice

Key Species

Note: there is significant overlap between species useful for Live Stakes and species useful as Ornamental Florals

- American Beautyberry, Callicarpa americana
- Eastern Redbud, Cercis Canadensis
- Dwarf Fothergilla, Fothergilla gardenia
- Common Witchhazel, Hamamelis virginiana
- Oakleaf Hydrangea, Hydrangea quercifolia
- Coral Honeysuckle, Lonicera sempervirens
- Northern Bayberry, Myrica pensylvanica
- Ninebark, Physocarpus opulifolius
- Pussy Willow, Salix discolor
- Red Chokeberry, Aronia arbutifolia
- Southern Magnolia, Magnolia grandiflora
- Summersweet, Clethra alnifolia
- Winterberry Holly, Ilex verticillata

Resource

Woody Ornamentals for Cut Flower Growers - ATTRA
https://www.wnc.edu/files/departments/ce/sci/04wofcfg.pdf

Wizard Ranch NP Facilities & Activities Recommendations

Site Activities

Wizard Ranch NP will continue to be a working landscape with a new focus towards balancing habitat with production and programming. This will be achieved by transitioning from hay production to agroforestry uses. The site will also serve as a working classroom, focusing on educating the public on a variety of topics surrounding land stewardship. Site actives may include educational group hikes, volunteer training, scout activities and Conservancy stewardship hub activities.

Site Access & Parking

Site access will continue to be via the Accomac Road. A new entrance drive has been shifted to the east of the existing gravel drive to allow for a buffer area between the new driveway and adjoining private residence. The driveway provides access to the two main parking areas. Public parking is developed to the east. A organic loop layout is proposed to preserve specimen trees and to break up the visual impact of one large parking area. A total of 55 spaces are proposed in this area. However, it is anticipated that initial parking area would accommodate about 25 spaces with additional parking held in reserve if it were determined to be necessary in the future.

To the west of the drive a secondary driveway loop and parking areas would serve the Conservancy Stewardship Hub. Twelve paved parking spaces would serve Conservancy staff needs and an additional 14 stabilized turf parking spaces would serve as overflow parking. A loop drive connects the parking area to the yard areas in the rear of the building. An exit drive from the yard connects to the main driveway allowing for a one-way truck access drive through the yard area to increase worker safety.

The access drive continues into Wizard Ranch NP to provide access to the lower stream area. A new single stream crossing located downstream of the stream convergence is proposed to improve stream health in this area. The new vehicular crossing should be design and engineered in coordinated with the floodplain restoration efforts. The public drive would terminate at a small trailhead parking area providing ADA parking near proposed accessible trails.

Maintenance access drives would still be maintained into the large western meadow, eastern interior meadow, and upper small meadow. Access to the large western meadow would be via a stabilized ford stream crossing to be developed in conjunction with the floodplain restoration.

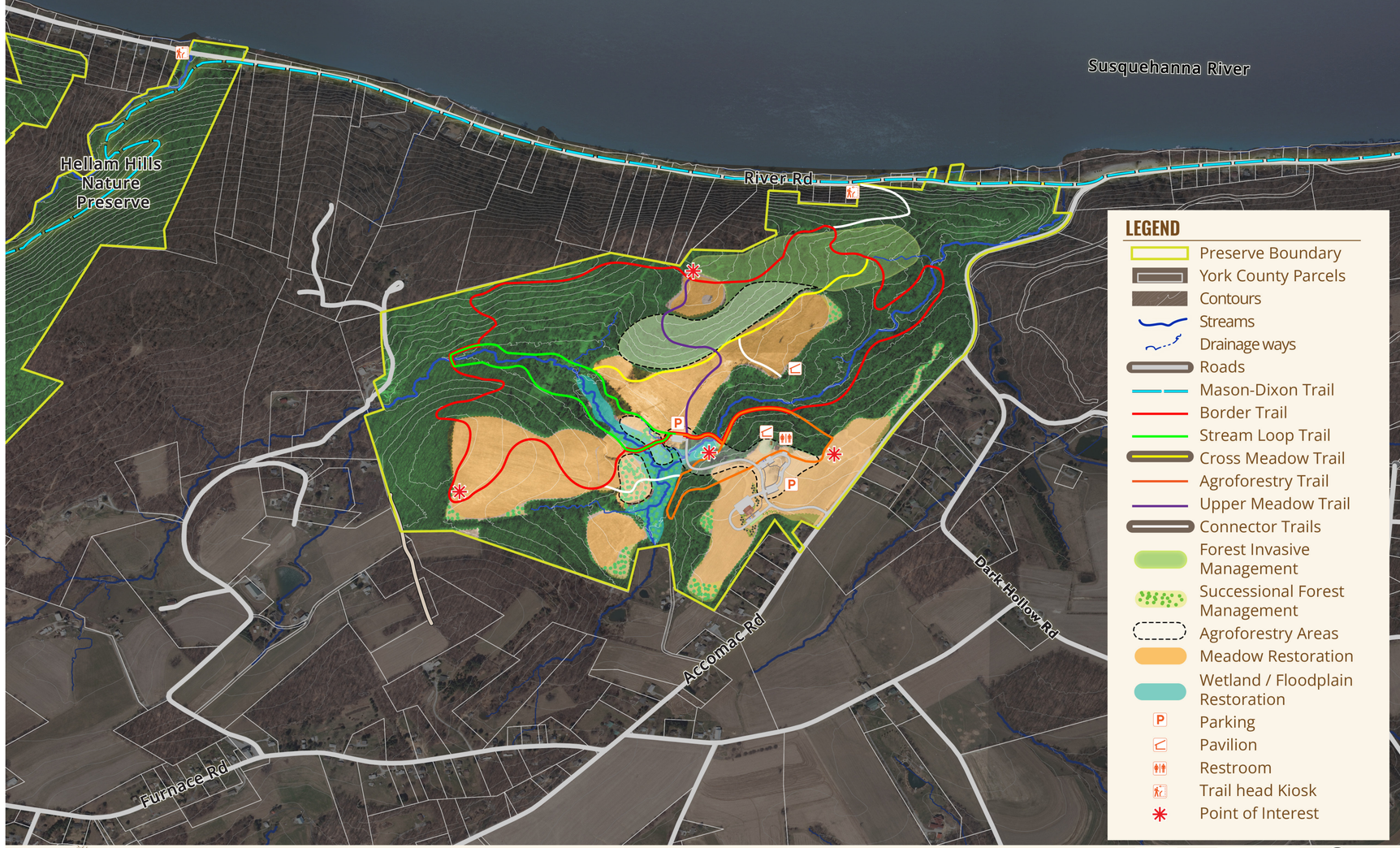
Boy Scout Safari

There are existing site features that are used for the Boy Scout Safaris that are to remain as per the agreement:

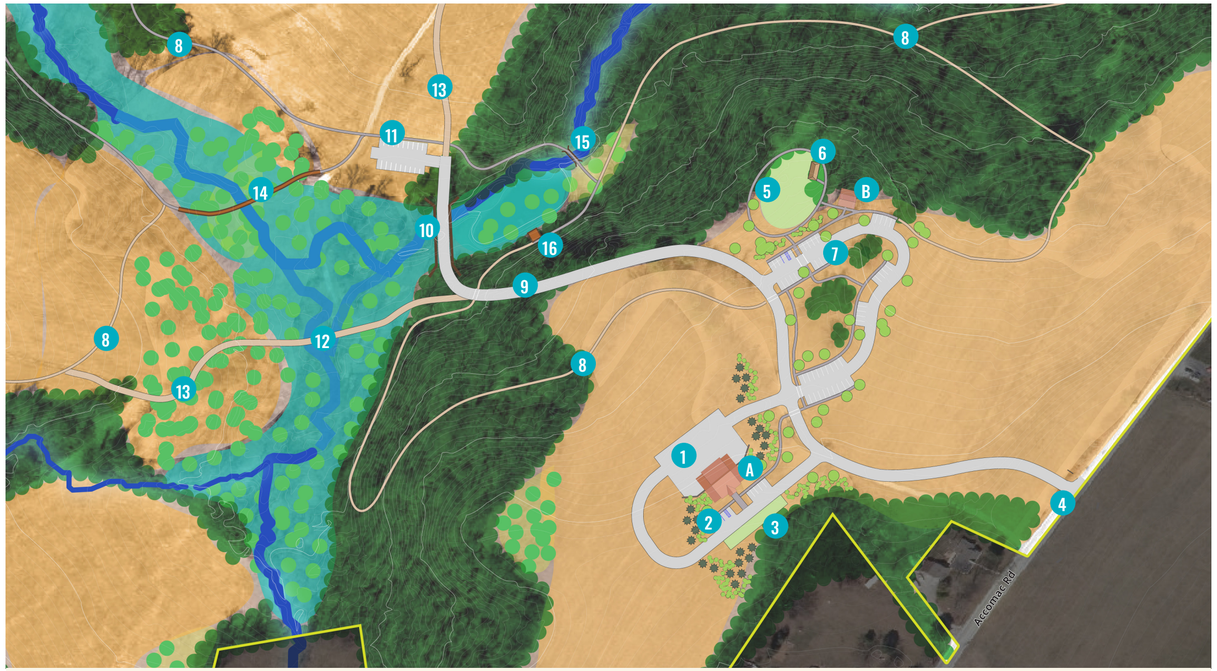
- Large Western Meadow Flagpole
- Amphitheater Poles
- Town Center Façade Poles
- Climbing Spar Poles

The flagpole is well maintained and acts as a landmark orientating feature for the site. The climbing spars and Amphitheater Poles are in areas that are less prominence and along forested edges. The area surrounding the poles should be monitored for invasives and options should be explored to see if some of these poles could serve for wildlife habitat boxes. However, the poles of the town center facades are predominantly located in the large eastern field. Options should be explored with the Boy Scouts to see if pole sleeves could be installed so that the poles can be removed following the safari event.

A similar sleeve system should be explored for the Safari signage. It is anticipated that the Conservancy will develop Wizard Ranch NP wayfinding system and conflicting signage will lead to user confusion. Other former structures such as footbridges that are no longer safe should be removed from Wizard Ranch NP prior to opening the nature preserve up to the public.



LANCASTER CONSERVANCY **Wizard Ranch Nature Preserve** *Figure 4.9 Wizard Ranch NP Facilities Plan*



A Stewardship Hub

B Engagement Hub / Cabin

1. Yard – 14,000 SF
2. Parking - 12
3. GrassPave Parking - 14
4. Driveway Entrance
5. Event Lawn
6. Pavilion
7. Parking - 55
8. Trails
9. Realigned Site Access Drive
10. New Vehicular Bridge
11. Lower Site Parking – 20
12. Ford Stream Crossing
13. Access Drive / Trail
14. Pedestrian Boardwalk
15. Pedestrian Bridge
16. Wetland Food Forest Observation Platform

0' 100' 200' 400' North

Figure 4.10 Stewardship & Engagement Hub Site Plan

Site Facilities

Stewardship Hub

The Stewardship Hub proposes a function of accommodating staff and staff functions internal to the organization. It will serve as a regional hub for the Conservancy's Stewardship crews. The building is designed with two entries. One entry for Conservancy management staff also serves as the main building entrance. The view you see as you come down the driveway is shown in the conceptual rendering, depicts the main entrance. The second entry for equipment and stewardship staff is located along the downhill side out of view and out of public access for safety. This design approach presents an appropriate scale for the building while supporting the other building functionality responding to the site conditions.

Internally, the building itself will share functions between staff on both floors to ensure that Conservancy staff interact and collaborate across departments. The lower level will house equipment and tool storage with some support space for staff, while the upper-level houses office space and staff support areas.

Engagement Hub

The existing site cabin closest to Accomac Road is to be re-purposed to serve as an Engagement Hub saving some of the history of Wizard Ranch NP. The cabin will be configured to include a volunteer station and a small lounge/display area. Restrooms will be provided by either a building addition or via a standalone facility providing for 1-2 toilets and washing stations. The focus of visitor activities and gathering would be an open-air pavilion located in the area near the existing cabin along the forest edge.

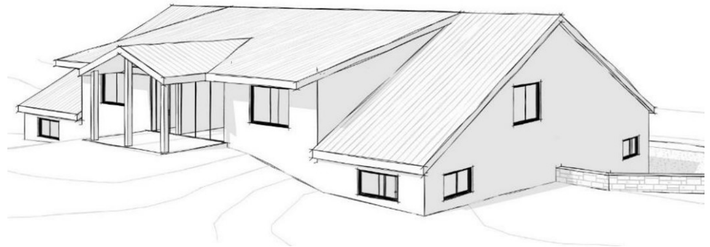


Figure 4.11 Stewardship Hub Conceptual Rendering

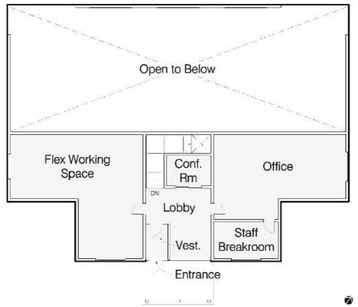


Figure 4.12 Stewardship Hub 2nd Story Floor Plan

Figure 4.14 Engagement Hub Conceptual Rendering

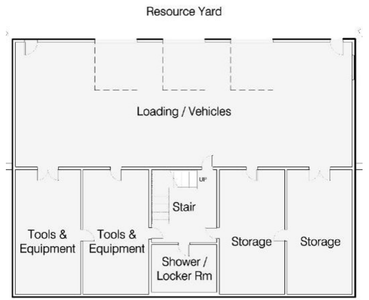


Figure 4.13 Stewardship Hub Ground Floor Plan

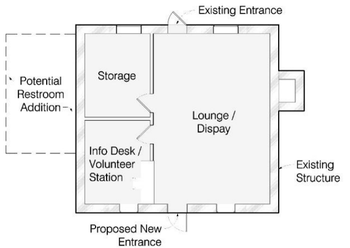


Figure 4.15 Engagement Hub Floor Plan

Trails

The trails network for at Wizard Ranch NP uses the existing social trails to develop a trail network that is conducive of short to medium length educational hikes. Each trail focuses on unique site habitat and stewardship areas. In total six trails are recommended at Wizard Ranch NP.

Agroforestry Trail

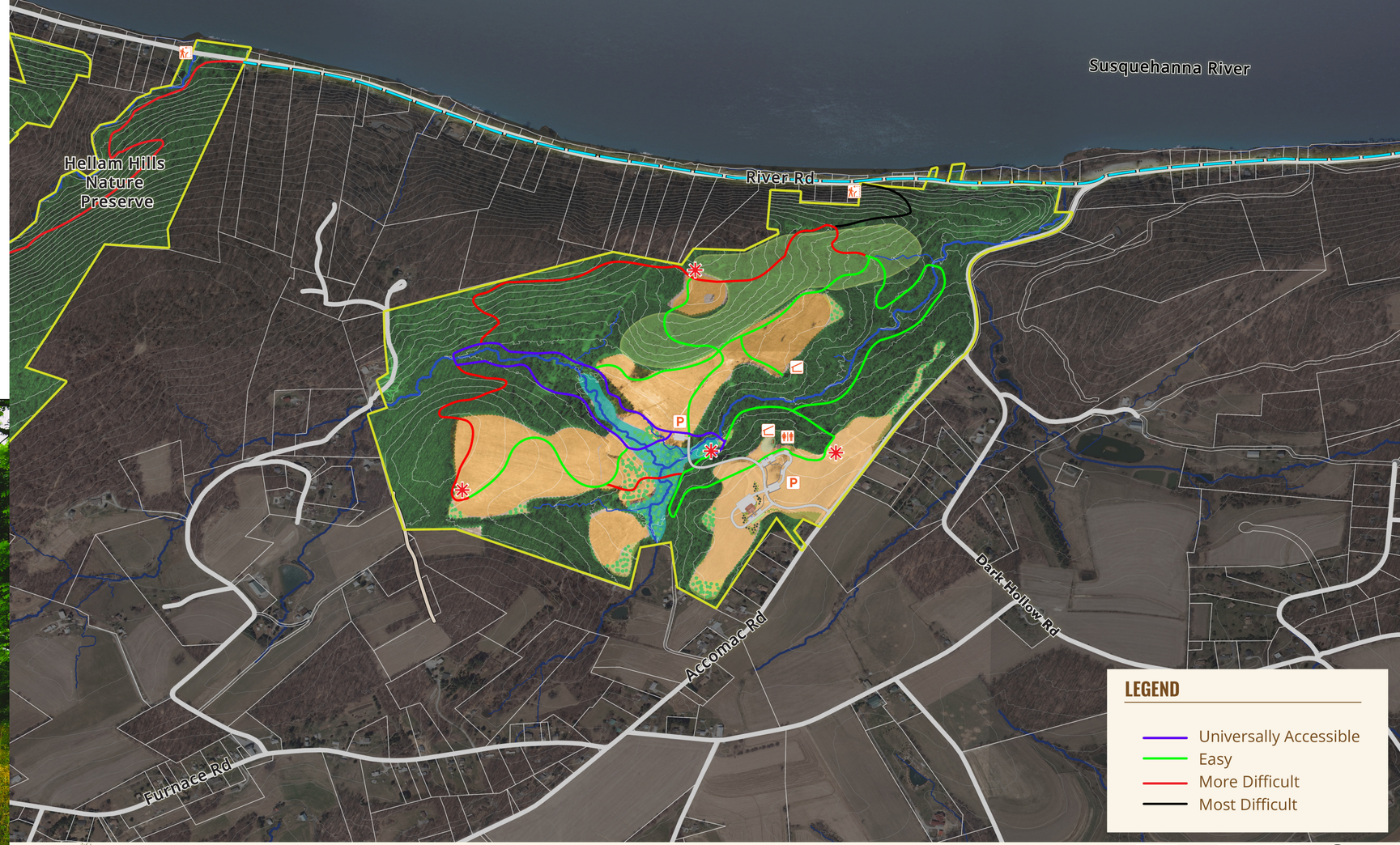
The Agroforestry Trail originates from the Engagement Hub and is designed as a 'Easy' short loop trail. The goal of the trail is to provide access and views into the three of the different agroforestry areas; encouraging visitors to interact and learn about agroforestry practices. A new portion of trail heads west from the Engagement Hub through the meadow before descending into the stream corridor through the forested slope offer views into the Live Stakes Coppice and Woody Floral areas. At the bottom of the slope the trail runs east along the edge of the proposed floodplain wetland restoration area. It crosses the relocated access drive and continues east passing through the wetland food forest area prior to joining up with an existing trail. The trail continues east along the riparian forest before entering back into the Accomac Road meadow and turning west to loop back to the Engagement Hub.

Stone dust accessible pathways are proposed for the portions of the trail through the meadow and close to the Engagement Hub. In this area the trail will interconnect with facility walkways and provide for interaction with the food forest area. The remainder of the proposed trail is a 5-feet wide hiking trail with the goal of achieving an 'Easy' trail rating. Where the trail descends into the stream valley a long switch back and resting areas are required to achieve an 'Easy' rating. Along the existing trail bed, the trail will require work to ensure that the trail bed is clear of obstructions, has proper drainage, and has resting areas appropriately placed to meet the 'Easy' rating. In all the trail is 0.66-miles long.

A second access point to the trail originates from the lower trailhead parking area. The stone dust trail runs east along the stream edge before crossing the stream via a footbridge and continues to a observation platform overlooking the wetland food forest area. This 300-foot long trail provides for universal accessible access to the overlook point.

Stream Loop Trail

The stream trail originates from the lower trailhead parking area and is designed as a loop trail traversing the gentle slope along each side of the stream. The goal of the trail is to provide accessible trail access along the stream corridor encouraging visitors to



LANCASTER CONSERVANCY **Wizard Ranch Nature Preserve** *Figure 4.16 Wizard Ranch NP Trail Difficulty Plan*

interact with water and learn about the importance of watershed protection. Educational opportunities will include wetland and floodplain restoration tying into the agroforestry production areas.

Development of the trail should be done in conjunction with the stream and floodplain restoration. Much of the trail along the southern stream bank can be developed along existing trail corridor. Minor improvements to the trail surface from dirt to stone dust would be required to create an accessible trail. A new bridge crossing is proposed at the western end of the loop. A boardwalk at the eastern end loop will take users through the proposed floodplain wetland restoration area. The boardwalk should be designed to be ADA accessible and accommodate maintenance equipment. The 0.78-mile trail is comprised of new and existing trails corridor and is rated 'Accessible'.

Border Trail

The Border Trail originates from the Agroforestry Loop Trail and provides for a long hike through Wizard Ranch NP. From the Agroforestry Trail a new trail runs east along the southern edge of the main stream valley. It crosses the stream via a new pedestrian bridge and passes through forest area prior to joining up with an existing trail. An existing connector trail in this area provides hiking and emergency access down to River Drive.

The existing trail continues west through an area of proposed forest restoration heading upslope into the small upper meadow. From the meadow new trail continues west following the ridge line until turning south to descend the hillside into the stream valley. The trail crosses the stream via the Stream Loop Trail bridge and follows existing trail heading west along the southern stream bank. As the trail approaches the western boundary a new trail leads upslope through the forest before exiting into the large western meadow. A final segment of mown trail gently follows the terrain of the meadow and crosses the stream via the Stream Loop Trail boardwalk connecting back to the Agroforestry Loop Trail.

Much of the trail would be new trail construction through the forested area and would be rated as 'More Difficult'. The mown trail should be laid out to minimize grading and maintain an 'Easy' trail rating to the meadow overlook. In all the trail is 2.40-miles long. The Meadow overlook portion originating from the lower trailhead parking area is 0.50-miles long.

Upper Meadow Access Trail

The plan recommends that the existing site access drive be maintained and improved to create a trail from the lower trailhead parking area to the small upper meadow. The trail would be maintained as gravel to allow for maintenance and emergency access. The trail is 0.33-miles.

Cross Meadow Trail

A Trail running along the northern edge of the large eastern meadow would connect the Border Trail to the Stream Loop Trail allowing for a shorter loop hike that would be rated as 'Easy". The trail is xx miles and the loop with the Border Trail is 0.50-Miles Long.

Wizard Ranch NP Hunting Recommendations

In conjunction with invasive species management Wizard Ranch NP will be opened to deer hunting. Public hunting would be administered in accordance with PGC Regulations and would be limited to Bow and Arrow. The master plan makes preliminary recommendations of where hunting would be allowed in Wizard Ranch NP and general locations of safety areas. Safety areas are defined by PGC as 1000-yards from an occupied building. For Wizard Ranch NP this would include surrounding residences, the Stewardship Hub, and the Engagement Hub. The plan limits hunting of Wizard Ranch NP to the south facing slope of the northern ridge line. The Ridge line trail would serve as the natural boundary of limits of hunting in this area. Signage denoting the hunting boundary will be required in area along the ridge line where there is no trail.

Figure 4.17 Wizard Ranch NP Areas of Future Hunting

Hellam Hills Conservation Area Climate Change Recommendations

Introduction

As the effects of climate change continue to be felt with increasing magnitude, scientists, land managers, policy makers, and concerned citizens look towards ways to move forward sustainably and with resilience. Climate change encompasses more than global warming, it includes increased frequency and intensity of extreme weather events (like storms, hurricanes, tornados, and heat waves), the warming and acidification of oceans, melting ice caps and glaciers, droughts, and sea-level rise. The Earth experiences natural long-term climate change influenced by sun energy output, oceanic cooling and warming cycles, volcanic activity, and levels of vegetation. However, current anthropogenic-induced climate change is an accelerated climate change showing a spike in temperature and climate influences directly related to the amount of fossil fuels burned, aerosol released, and land use change from agriculture and deforestation.

Climate change impacts areas differently depending on numerous factors, so it is important to view these changes at multiple scales all the way from global to site-specific. According to the Pennsylvania Department of Conservation and Natural Resources (PADCNR), "The commonwealth has seen a temperature increase of more than 1.8° F. Winter temperatures have risen even faster, increasing 1.3 °F per decade from 1970 to 2000 in the northeast U.S.". Additionally, precipitation has increased by ten percent over the last one hundred years. "Looking to the future, Pennsylvania is projected to be as much as 5.4 °F warmer by the middle of this century than it was at the end of the last century if emissions are not curtailed significantly. Additionally, precipitation is expected to increase by 8 percent annually and by an additional 14 percent during the winter".

We used the PADCNR Climate Change Adaptation and Mitigation Plan for the Commonwealth of Pennsylvania as a lens to focus statewide issues down to a site-specific level for the Hellam Hills Conservation Area (HHCA). The plan is organized into major facets of climate change and for each facet we discuss the vulnerabilities related to the issue, the general actions prescribed by the DCNR, and then we approach the areas within the HHCA and make site specific action recommendations.

Climate Change & the Hellam Hills Conservation Area

Effects of climate change exacerbated and accelerated by anthropogenic sources is, without question, threatening the likelihood of survivorship for many biota across the globe. Major climatic shifts are altering previously predictable rain events and dominant storm patterns affecting the ability for hydroperiod- and disturbance-dependent species to complete their life cycles. Biogeographic footprints of plants and animals are changing rapidly for some and not at all in others. It appears that those species which cannot adapt to these changing trends may be left behind. Increases in extinction rates compared to baseline rates are observed in most taxa currently, with certain groups suffering more than others (ex. amphibians and birds). For some, climate change may be a primary variable while others may be impacted by secondary or more distant effects from climate change. Geology-specific plants without far-reaching seed dispersal techniques have limited mobility with which to escape from or adapt to climate change (this is an example of climate change as a primary impact) while volant generalists such as red-tailed hawks might appear to thrive temporarily in the face of climate change.

However increased storm intensity coupled with hotter, drier summers in certain regions may result in reduced fecundity/higher natal mortality rates over time, causing shifts in predator-prey dynamics for these generalists, thus causing increased herbivory pressure that catalyzes invasive plant species proliferation (an example of climate change as secondary and tertiary impacts).

When attempting to consider speciation and adaptations within just one or two lifetimes, it seems trivial as these events typically unfold over thousands of years. We are at the precipice of a major ecological shift on a global scale. Resiliency and survival appear to depend on factors such as: inherent and pre-developed plasticity may generally be favored over rigidity, dynamic over static, adaptive over resistant, and connective over fragmented. Efforts to detect and model vulnerability of species, communities, ecosystems, elevations, biomes, etc. are vital for preparing any action-oriented responses, such as combatting invasive plant colonization or supportive actions for retention of natural components. This report leans on the current "knowns" in climate change effects in our region and attempts to address them with site-specific information. More research, monitoring, and study design to inform action-based management will be critical to the long-term sustainability of the natural resources at HHCA. Intervention by humans must be entered into cautiously but we cannot be passive either. As Aldo Leopold sagely advised, "To keep every cog and wheel is the first precaution of intelligent tinkering." We must not determine the fate of species whose adaptability may not only take time, but also impress us with unforeseen plasticity/adaptability and know when it is right to step in and aid in slowing rates of biogeographical change due to human-derived climate change.

The HHCA is a robust and highly functional mosaic of natural plant communities over diverse topography, geology, and soils. The complex is unique and significant at the state and regional level. The connectivity here is greater than most natural areas but not without issue. While the site has some inherent defenses that may allow for better resistance to climate change, it will require proactive planning and an iterative and creative management approach to keep this place in its best possible condition. The following is a HHCA-specific adaptation and mitigation plan following the PADCNR template. Additional guidance is found in the main ecological assessment report. Units are defined broadly by number in the map below (Figure 1). These correlate directly to the ecological recommendations found in the main report as well.

Pennsylvania Department of Conservation & Natural Resources Climate Adaptation Plan Bullet Points

Changing Forest Composition

Vulnerability

- Changing species composition
  - Decline of some species
  - Increase in others
  - Hybridization
  - Immigration of southern species
- Regeneration failures
- Forest fragmentation

General Actions

- Maintain and enhance species and structural diversity
- Retain biological legacies
- Sustain ecological functions
- Facilitate community changes
  - Favor native species that are adaptable
  - Manage for generalist species
  - Establish new mixes of native species
  - Move at risk-species to more suitable locations as needed

Areas

- All units

Specific Actions

The following specific actions have been identified within various forested units in the HHCA. These actions are intended to mitigate against in-situ pressures that are exacerbating the negative changes in forest composition.

- Limit new trails or roads that may increase fragmentation
- Reduce invasive species, particularly control Microstegium
- Cut and stump treat invasive shrubs in the winter
- Protect native woody plants by installing individual tree cages around trees or fence in large clusters of native woody plants to protect from herbivory.
- Selectively thin or entirely remove large stands of existing spruce trees, followed immediately by reforestation efforts with native hardwood tree species and native understory shrub species.
- Decrease herbivory pressure by supporting managed hunting programs
- Do periodic plantings of native species (use community groups and educational opportunities)
- Ensure stability of stream corridors to prevent increased erosion and drop in water table.
  - Lowered water table would negatively impact canopy tree health
- Monitor most vulnerable tree species for mortality (see Table X for vulnerability)
  - Research and develop canopy tree replacement plan to be implemented once the mortality threshold has been exceeded consistently as documented through monitoring

Figure 4.18 Hellam Hills Preserve Management Units

Figure 4.19 Wizard Ranch Preserve Management Units

Rare species

Vulnerability

- Populations will likely decline as habitats and climate shift and food sources change

General Actions

- Identify at-risk species (not just threatened, rare, or endangered)
- Review and expand monitoring of at-risk species
- Establish reserves for at-risk or displaced species
- Manage a range of habitats to increase ecosystem redundancy
- Maintain and enhance genetic diversity

Areas

- All units

Specific Actions

- Rank vulnerabilities based on mobility, habitat specificity, metapopulation dynamics, and current rareness
- Conduct taxa-specific surveys for listed species to determine presence/absence, distribution, and population dynamics. Determine connectivity and plasticity/rigidity of critical habitat areas as a modifier for vulnerability.
- Add invertebrates to crosswalk with Species of Greatest Conservation Need (SGCN) species in Pennsylvania Wildlife Action Plan (vertebrate crosswalk below)

Scientific Name	Common Name	PA Conservation Coefficient	Vulnerability
Acer rubrum	red maple	1	
Betula lenta	Sweet birch	4	
Betula papyrifera	Paper birch	0	
Carya tomentosa	Mockernut hickory	5	
Carya ovata	shagbark hickory	5	MODERATE
Fagus grandifolia	American beech	6	MODERATE
Fraxinus spp.	Ash species		
Liriodendron tulipifera	Tulip poplar	2	
Picea abies	Norway spruce	0	
Pinus strobus	eastern white pine	7	MODERATE
Prunus serotina	Black cherry	1	
Prunus avium	Sweet cherry	0	
Pyrus calleryana	Callery pear	0	
Quercus alba	white oak	4	BENEFIT
Quercus palustris	Pin oak	3	
Quercus montana	chestnut oak	5	LOW
Quercus rubra	red oak	4	LOW
Quercus velutina	black oak	4	BENEFIT
Robinia pseudoaccacia	Black locust	0	
Tilia americana	basswood	5	MODERATE
Ulmus americana	American elm	4	MODERATE

Table 4.1 Vegetation Climate Change Vulnerability Table.
The Conservation Coefficient denotes conservation value in the state of Pennsylvania. Vulnerability is ranked low, medium, high, and some species that may actually benefit from climate change.

- Species documented within HHCA; species identified as SGCN are highlighted in orange. The specific habitat needs of species of greatest conservation need should be taken into consideration and incorporated into overall restoration and management plans.

Reptiles (7)

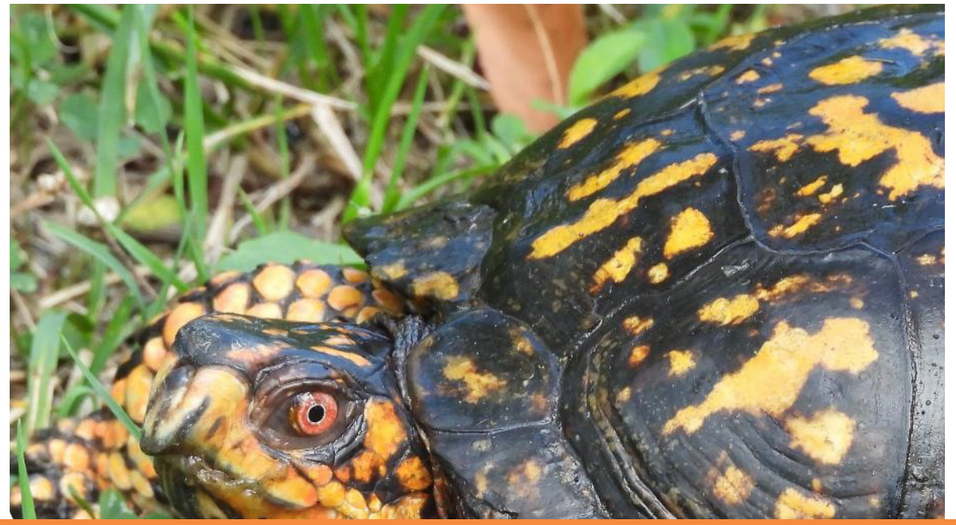
- Northern five-lined skink (Plestiodon fasciatus)
- Northern brown snake (Storeria dekayii)
- northern ringneck snake (Diadophis punctatus edwardsii)
- eastern garter snake (Thamnophis sirtalis sirtalis)
- northern black racer (Coluber constrictor constrictor)
- eastern rat snake (Pantherophis alleghaniensis)
- Eastern box turtle (Terrapene c. carolina)

Amphibians (11)

- Eastern redback salamander (Plethdon cinereus)
- northern two lined salamander (Eurycea bislineata)
- northern dusky salamander (Plethodontid glutinosus)
- spotted salamander (Ambystoma maculatum)
- eastern newt (Notophthalmus viridescens)
- American toad (Anaxyrus americanus)
- northern spring peeper (Pseudacris crucifer crucifer)
- northern gray tree frog (Hyla versicolor)
- pickerel frog (Lithobates palustris)
- wood frog (Lithobates sylvaticus)
- northern green frog (Lithobates clamitans melanota)

Birds (61)

- Acadian flycatcher (Empidonax virescens)
- American crow (Corvus brachyrhynchos)
- American goldfinch (Carduelis tristis)
- American redstart (Setophaga ruticilla)
- American robin (Turdus migratorius)
- Baltimore oriole (Icterus galbula)
- black-and-white warbler (Mniotilta varia)
- bay-breasted warbler (Setophaga castanea)
- belted kingfisher (Megaceryle alcyon)
- blue-gray gnatcatcher (Polioptila caerulea)
- brown-headed cowbird (Molothrus ater)
- blue-headed vireo (Vireo solitarius)
- blue jay (Cyanocitta cristada)
- brown thrasher (Toxostoma rufum)
- black-throated blue warbler (Setophaga caerulescens)
- black-throated green warbler (Setophaga virens)
- broad-winged hawk (Buteo platypterus)
- blue-winged warbler (Vermivora cyanoptera)
- Carolina chickadee (Poecile carolinensis)
- Carolina wren (Thytothorus ludovicianus)
- Canada warbler (Cardellina canadensis)
- cedar waxwing (Bombycilla cedrorum)
- chipping sparrow (Spiza passerine)
- Cape May Warbler (Setophaga tigrine)
- common grackle (Quiscalus quiscula)
- common raven (Corvus corvus)
- common yellowthroat (Geothlypis trichas)



- chestnut-sided warbler (Setophaga pensylvanica)
- downy woodpecker (Dryobates pubescens)
- eastern towhee (Pipilo erythropthalmus)
- eastern wood-pewee (Contopus virens)
- great crested flycatcher (Myiarchus crinitus)
- gray catbird (Dumetella carolinensis)
- hairy woodpecker (Dryobates villosus)
- hooded warbler (Setophaga citrina)
- indigo bunting (Passerina cyanea)
- Kentucky warbler (Geothlypis Formosa)
- Louisiana waterthrush (Parkesia motacilla)
- magnolia warbler (Setophaga magnolia)
- mourning dove (Zenaida macroura)
- Nashville warbler (Oreothlypis ruficapilla)
- northern cardinal (Cardinalis cardinalis)
- northern flicker (Colaptes auratus)
- northern parula (Setophaga americana)
- ovenbird (Seiurus aurocapilla)
- pine warbler (Setophaga pinus)
- pileated woodpecker (Dryocopus pileatus)
- rose-breasted grosbeak (Pheucticus ludovicianus)
- red-bellied woodpecker (Melanerpes carolinianus)
- red-eyed vireo (Vireo olivaceus)
- red-headed woodpecker (Melanerpes erythrocephalus)
- red-winged blackbird (Agelaius phoeniceus)
- scarlet tanager (Piranga olivacea)
- song sparrow (Melospiza melodia)
- Tennessee warbler (Leiothlypis peregrina)
- tree swallow (Tachycineta bicolor)
- tufted titmouse (Baeolophus bicolºr)
- warbling vireo (Vireo gilvus)
- white-breasted nuthatch (Sitta Carolina)
- white-eyed vireo (Vireo griseus)
- worm-eating warbler (Helmitheros vermivorum)
- wild turkey (Meleagris gallopavo)
- Wilson's warbler (Cardellina pusilla)
- winter wren (Troglodytes hiemalis)
- wood thrush (Hylocichla mustelina)
- white-throated sparrow (Zonotrichia albicollis)
- yellow-rumped warbler (Setophaga coronate)
- yellow-throated vireo (Vireo flavifrons)

Mammals (11)

- Deer mouse (Peromyscus sp.)
- Short-tailed shrew (Blarina brevicauda)
- Eastern chipmunk (Tamias striatus)
- Eastern red squirrel (Tamisciurus hudsonicus)
- Eastern grey squirrel (Sciurus carolinensis)
- Groundhog (Marmota monax)
- Viginia opossum (Didelphis virginianus)
- Racoon (Procyon lotor)
- Eastern striped skunk (Mephitis mephitis)
- Eastern coyote (Canis latrans)
- White-tailed deer (Odocoileus virginianus)
- Black bear (Ursus americanus)

Plants

- At least twenty-seven genera

Forest pests

Vulnerability

- More frequent and severe pest outbreaks
- Increased tree mortality
- Influence forest composition
  - Reduce species diversity

General Actions

- Identify and prioritize areas to monitor
- Develop pest response plans
- Manage for diversity of species
- Manage herbivory

Areas

- All units

Specific Actions

- Rank vulnerability based on extant species/current conditions and anticipated new pests from increases in ambient air temperatures and hydrologic variations (wetter in some months, noticeably drier in others from flood/drought intensification models)
- Enact one-time forestry actions to prevent tree pest spread when needed by virtue of tree removal/ canopy gaps
- Conduct semi-regular (once every 3-5 years) faunal studies (following baseline methods and points) to detect changes in populations that may result in
  - Primary consumer overpopulations and resultant increased herbivory and habitat degradation (temporary native pest behavior)
  - Loss of indicator and/or SCGN species

Invasive plants

Vulnerability

- New invasives moving into and increasing in area
- Disrupt succession
- Influence fuel conditions for fires
- Choke waterways
- Kill fish
- Toxic water
- Algae blooms

General Actions

- Remove or control invasive species
- Identify new invasive species

Areas

- All units

Specific Actions

- Numerous aggressive invasive species were documented throughout the MUs which are in need of eradication. Of particular note was the dominance of Microstegium vimineum (Japanese stiltgrass), Ailianthus altissima (tree-of-heaven), Berberis thunbergii (Japanese barbery), and Lonicera maackii (bush honeysuckle).
- See ecological assessment report for additional species and invasive control recommendations.

Fragmented habitats

Vulnerability

- Less resistant to climate impacts
- Decreases species mobility

General Actions

- Create unfragmented corridors
- Conserve key tracts
- Maintain or create refugia

Areas

- All units

Specific Actions

- Conserve all existing natural areas
- Attempt to acquire key adjacent lands for lawn and field conversions to early successional habitats
- Aggressively control invasives on Rights-of-Way
- Do not cut large trails or new roads into the site
- Use rustic trail constructions for access to natural areas
- Reduce/retire the number of trails and consolidate into singular routes, particularly in the HHMU4 area.

Geologic hazards

Vulnerability

- Increased demand for data
  - Hazard prediction
  - Mapping
  - Hydrographic modeling
  - Sinkholes
  - Landslides

General Actions

- Develop research projects that look for relationships between timing and intensity of weather events and geologic events
- Create detailed maps on subsurface geology
- Prepare to respond to unanticipated novel issues

Areas

- Unknown

Specific Actions

- Sinkholes, landslides, and other geological hazards are very unlikely on GMLC geology
- Assess geology and soils to determine if any unique geologies exist that are supporting plant populations that have limited mobility outside of the geologic condition that they are in.
- Develop a species and/or community specific mitigation plan for any scenario as such which should include
  - Genetic sampling and banking
  - Seed collection
  - Establishment of nearest sub-populations and geologic conditions, their vulnerability to climate change, and plans for possible translocation of plants to suitable locations if present

Extended Recreation Season (increased impact)

Vulnerability

- Exceeding carrying capacity
- Increase impact
- Decrease time for maintenance
- Increased need for staff and resources

General Actions

- Determine recreational sustainability and resource carrying capacities
- Limit access or types of uses in sensitive or high-use areas
- Design flexibility in scheduling employees

Areas

- All units

Specific Actions

- Increase educational signage/access to information for new site visitors
  - Promote rules and regulations
  - Provide educational materials to increased use base
- Limit access on certain days/times
- Ensure regular refuse collection at trash areas
- Maintain parking areas

Limited winter recreation

Vulnerability

- Less winter recreation

General Actions

- Reallocate funding to match recreation demand

Areas

- All units as deemed appropriate

Specific Actions

- Assess cross country skiing and archery use in the winter to determine any impacts
- Likely not a critical priority

Increased flood risk

Vulnerability

- Precipitation and flooding are increasing
- Infrastructure at risk includes
  - Dams
  - Trails
  - Roads
  - Bridges
  - Historic and cultural resources
- Affect groundwater supply
- Reduce water quality
- Close recreational facilities
- Cause erosion and sedimentation

General Actions

- Evaluate trends in 50/100/500-year floods
- Protect and restore floodplain and riparian wetlands
- Decrease stormwater runoff
- Increase resiliency of infrastructure
- Avoid rebuilding in flood zones
- Reroute roads out of floodplains when practical
- Pave bridge approaches and armor bank slopes
- Use alternative crossing structures designed to be overtopped that can withstand impacts by woody debris or ice
- Identify and monitor bridges susceptible to flooding
- Deploy flood-proofing on existing high-risk bridges
- Incorporate flood-proof designs
- Monitor flow rates and bankfull totals
- Evaluate lake water depths every 2-3 years to identify shallow areas and dredge if necessary
- Develop communication materials for the public
- Evaluate trail systems and make more resilient to flooding and stormwater runoff
- Assess and replace undersized drainage pipes, culverts, and stormwater conveyance systems
- Evaluate hydraulic capacities of dams and where needed improve
- Remove dams no longer serving their intended purpose

Areas

- 1A, 1B, 3, and 5

Specific Actions

- Develop watershed plan for the two primary drainages Dugan Run and Wildcat Run that incorporate up-watershed impacts/inputs into the system, onsite stream erodibility, and projected impacts from climate change
  - Include streambank and floodplain restoration locations on site to increase flood resiliency and capacity for stormwater catchments in natural systems
  - Collaborate with local municipalities to incorporate restoration efforts with local MS4 goals.
    - By coordinating efforts and leveraging financial resources from various stakeholders, projects can be implemented on a larger watershed scale, resulting in wider reaching benefits to offset climate change.

Warmer water temperatures

Vulnerability

- Increased variability in water-levels
- Changes in the duration and timing of ice cover
- Changes in acidification, dissolved oxygen levels, productivity, destratification
- Community shifts and potential loss of keystone species

General Actions

- Work with the Pennsylvania Fish and Boat Commission to determine if state park and state forest fisheries are being impacted.
- Ensure culverts, bridges and stream crossings allow for connectivity of cold- water stream communities.
- Improve water quality and habitat for native aquatic flora and fauna through the elimination of impoundments having minimal recreational / operational value.
- Restore and enhance hydrologic connectivity between riparian areas and the surrounding landscape, particularly establish floodplain reconnections within Dugan Run and Wildcat Run.
- Moderate stream temperature warming by increasing stream shading, especially in areas of cool water habitat such as low-order headwater streams.
- Protect and restore native riparian forests and vegetative cover to conserve species at risk of decline, such as stream-side salamanders, and to increase water retention and uptake of soils to reduce the impacts of flood events, erosion, and sedimentation.
- Plant species expected to be better adapted to future conditions by favoring currently present species that have wide ecological amplitude and can persist under a wide variety of climate and site conditions.
- Prioritize riparian restoration on streams that are most likely to retain cool, late- summer flows.

Areas

- All Units

Specific Actions

- Stabilize stream banks and bed (where needed) to prevent drop in water table and reduce eroded sediments in waterways (TSS and TDS result in increased water temperatures)
- Maintain native emergent wetland communities along streams to rely on phytoremediation for temperature regulation

Natural disasters/public safety

Vulnerability

- Increased frequency of wildfire, blowdowns, and other natural disturbances
- Damage to trails, roads, and disrupting access to some areas

General Actions

- Reduce the severity or extent of disturbance by altering forest structure or composition to reduce the risk of wildfire or storm damage.
- Prepare for intensifying disturbances by developing plans in advance, thereby, allowing a faster and better coordinated response.
- Use drought monitoring and fire modelling to predict wildfire risk and danger.
- Promptly revegetate sites after a disturbance.
- Build capacity to respond to fire hazards by training more staff and volunteers.
- Increase resources for responding to disturbances,

including trained firefighters and equipment for salvage and wildfire suppression.

- Develop protocols for incorporating climate change into restoration planning after natural disasters, including salvage where necessary and appropriate, revegetation, and invasive plant monitoring and management.
- Restore fire to fire-adapted ecosystems and use prescribed fire to conduct fuel mitigation in wildland urban interface areas for fire-wise communities.
- Establish fuel breaks to slow the spread of catastrophic fire.
- Provide Incident Command System (ICS) training to personnel throughout the department to ensure appropriate levels of staffing during emergency events.
- Continue to coordinate with PEMA and other state and local agencies to increase response effectiveness.

Areas

- All units

Specific Actions

- Needs input from non-ecology team members (maintenance, safety, and other county- and municipality-level members)
- Have a disaster response ecological plan ready
    - If possible, have stored native seed mixes appropriate to various onsite communities
    - Should invasive plants be colonizing a recently disturbed area control the invasives rapidly and hand-cast native seed after removal of invasives to further promote a natural succession. In these cases, it would be wise to consider implementation of the vulnerable tree assessments and plant "replacements" to species beyond the mortality threshold in the region

Energy demand and infrastructure

Vulnerability

- Structures will be affected by higher temperatures, increased flooding, and periodic drought

General Actions

Currently energy using infrastructure is not present within the HHCA. However, should the need for infrastructure arise, the following recommendations should be taken into consideration.

- Use sustainable site selection criteria when developing new infrastructure to minimize impacts.
- Develop and enforce more stringent building design and energy conservation standards that will perform well under increasing temperature extremes throughout a building's lifespan.
- Implement energy reduction strategies such as automated lighting controls, occupant energy waste reductions, and increased use of renewable energy sources.
- Implement passive solar and solar thermal conservation strategies such as roof overhangs, tinted glazing, highly insulated windows, mass wall construction, low heat absorbing materials, and expanded landscaping to help control glare, limit thermal gain/loss, and moderate the impact of temperature extremes on indoor environment.
- Prioritize the use of geothermal systems that utilize constant ground temperatures not impacted by outside weather extremes instead of using air heat pumps or fossil fuel burning systems for heating and cooling.
- Implement preventative maintenance schedules and re- or retro-commissioning of building systems to ensure operation at peak design and efficiency.

Areas

- All areas.

Specific Actions

- Needs input from non-ecology team members (maintenance, safety, and other county- and municipality-level members)

Reducing atmospheric carbon

Vulnerability

- The amount of carbon that a forest is able to sequester is directly linked to resource management.
- Land management, activities, forest health, tree productivity, and the ability of forests to adapt to climate change all influence the ability of forests to reduce anthropogenic atmospheric carbon.

General Actions

- Increase forest carbon stocks by increasing forest coverage and avoiding conversion of forest to non-forest uses.
- Decrease forest carbon loss by adjusting timber harvesting intensities and rotations.
- Continue to participate in and advocate for regional studies and funding opportunities for geologic carbon sequestration.
- Utilize durable wood-based products whenever possible in construction projects.

Areas

- All units

Specific Actions

- Follow ecological stewardship actions laid out in ecological assessment to maintain a healthy habitat mosaic

Conclusion

As climate changes, humans must adapt our strategies for conservation, preservation, and survival. Although nature strives for homeostasis, it does so through constant motion. Many temporal scales are beyond our capacity for understanding, but some cycles climax during our lifetime making their effects visible and visceral. To understand ecological changes, we must establish baseline condition and functionality and find effective and efficient ways to monitor short-term changes and long-term trends. Understanding the landscape of the Hellam Hills Conservation Area through the lens of climate change and its effects globally to site specific and temporally from short-term to long-term will benefit the interwoven communities of humans and nature. Understanding, attention, and a willingness to adaptively manage and steward the landscape will shepherd HHCA into the future with resilience and longevity.

PLAN IMPLEMENTATION

5

Future Hellam Hills Conservation Area Goals

Preservation of Forest Canopy & Waterways

The Conservancy's preservation goals for the HHCA continue to grow. The importance of the Hellam Hills forested canopy to the greater Susquehanna Riverlands Conservation Landscape and its streams into the Susquehanna and Chesapeake waterways is undeniable. Where this master plan focuses on recommendations to Hellam Hills Nature Preserve and Wizard Ranch Nature Preserve, it will serve as a model for future plans as the Hellam Hill Conservation Area grows.

Mason-Dixon Trail

The Conservancy sees the Mason-Dixon Trail (M-DT) as a key asset to connecting the Hellam Hills Conservation Area. Though the current plan does not propose a off road trail routes connecting Wizard Ranch Nature Preserve to Hellam Hills Nature Preserve it is still an important project goal that the Conservancy would like to pursue. There are planning tools the Conservancy can pursue with ILMP partners and willing landowners to help create these connections across private lands. Moving towards the future the plan recommends that the Conservancy work with project partners such as the County, Township, and M-DT System, to ensure that this regional trail is protected particularly in areas where off road sections have already been established. Likewise, it is equally important (albeit beyond the scope of this plan), to ensure the continuity of the M-DT as it currently connects Wrightsville Borough (its River Front park, bridge that connects to the Northwest River Trail, and businesses) to the HHCA by traversing private property along the Susquehanna River without a formal, long-term agreement. If ever lost, this connection would severely impact the relationship of the Mason-Dixon Trail to the Conservation Area.

Probable Costs of Proposed Improvements

Cost estimates were prepared for all improvements proposed in the Hellam Hills Conservation Area Master Plan Study. Unit costs are based on previously completed data industry standards, estimates used for other similar park and preserve projects, and based on the consultant team's experience.

The implementation matrix delineates probable cost totals, organized by preserve area and improvement type (ecological stewardship, trails, access, facilities, signage). Initial priority levels where assigned to each improvement based on a 10 year implementation plan. However the nature of the improvements at each preserve allow for LC to be fluid in how they implement improvements allowing them to focus on projects tailors toward Conservancy goals and potential funding sources goals.

COST SUMMARY

	Recommendation Type	Sub Total Cost	Total Cost
HELLAM HILLS NATURE PRESERVE	Stewardship	$ 2,573,144	$ 3,943,957
	Trails	$ 894,139	
	Facilities	$ 476,674	
WIZARD RANCH NATURE PRESERVE	Stewardship	$ 2,183,436	$ 6,241,724
	Trails	$ 539,834	
	Facilities	$ 3,518,454	
TOTAL PROBABLE COST OF DEVELOPMENT & ECOLOGICAL RESTORATION			$ 10,185,700

IMPROVEMENT PHASING COST SUMMARY

PRIORITY / YEAR	HELLAM HILLS NATURE PRESERVE	WIZARD RANCH NATURE PRESERVE	TOTAL COST
Planned - 1	$ 243,299	$ -	$ 243,299
High - 2	$ 175,623	$ 3,031,078	$ 3,206,701
High - 3	$ 240,742	$ 488,342	$ 729,084
High - 4	$ 309,004	$ 291,272	$ 600,276
Medium - 5	$ 70,169	$ 43,162	$ 113,331
Medium - 6	$ 209,880	$ 21,555	$ 231,435
Medium - 7	$ 83,377	$ 66,300	$ 149,677
Low - 8	$ 19,200	$ -	$ 19,200
Low - 9	$ -	$ 99,707	$ 99,707
Low - 10	$ 19,520	$ 16,872	$ 36,392
	$ 5,429,100	ESTIMATED TOTAL OVER 10 YEARS	

ECOLOGICAL RESTORATION PHASING COST SUMMARY

PRIORITY / YEAR	HELLAM HILLS NATURE PRESERVE	WIZARD RANCH NATURE PRESERVE	TOTAL COST
Planned - 1	$ 285,596	$ 342,373	$ 627,969
High - 2	$ 195,673	$ 95,237	$ 290,910
High - 3	$ 325,122	$ 103,565	$ 428,687
High - 4	$ 345,372	$ 589,267	$ 934,639
Medium - 5	$ 356,511	$ 758,219	$ 1,114,730
Medium - 6	$ 230,187	$ 96,947	$ 327,134
Medium - 7	$ 166,049	$ 74,005	$ 240,054
Low - 8	$ 443,886	$ 60,559	$ 504,445
Low - 9	$ 183,638	$ 32,304	$ 215,942
Low - 10	$ 41,110	$ 30,959	$ 72,069
ESTIMATED TOTAL OVER 10 YEARS			$ 4,756,600

TOTAL PROBABLE COST OF ECOLOGICAL RESTORATION & IMPROVEMENTS PER YEAR

Planned - 1	$ 871,268
High - 2	$ 3,497,611
High - 3	$ 1,157,771
High - 4	$ 1,534,915
Medium - 5	$ 1,228,061
Medium - 6	$ 558,569
Medium - 7	$ 389,731
Low - 8	$ 523,645
Low - 9	$ 315,649
Low - 10	$ 108,461
	$ 10,185,700

Susquehanna Riverlands Conservation Landscape: Partner Roles

The SRCL Integrated Land Management Plan (ILMP) identifies and coordinates land management partners within the SRCL region including.

The ILMP partners consist of agencies and organizations that fall under five categories related to land stewardship including:

- Public Land Managers
- Utility Natural Landowners
- Self-Organized User Groups
- Resource Providers
- Municipalities

Within the lens of the groundwork set out in the ILMP its partners will play roles within the Hellam Hills Conservation Area (HHCA) to achieve the greater goals of the Susquehanna Riverland Conservation Landscapes. The following are the list of partners:

Public Land Managers

- Lancaster Conservancy
- Lancaster County Parks And Recreation (LCPR)
- Pennsylvania DCNR / Bureau Of State Parks
- Pennsylvania Fish And Boat Commission (PFBC)
- Pennsylvania Game Commission (PGC)
- York County Parks And Recreation (YCPR)

Utility Natural Landowners

- Brookfield Renewable Partners
- Exelon
- Lancaster Solid Waste Management Authority (LCSWMA)
- PPL Electric Utilities
- Safe Harbor And Clean Power Co.

Self-Organized User Groups

- Lancaster Hiking Club
- Mason-Dixon Trail System, Inc.
- York Hiking Club

Resource Providers

- DCNR/Bureau of Forestry/William Penn District
- DCNR/Bureauof Recreation And Conservation
- Lancaster County Planning Commission (LCPC)
- National Park Service/Captain John Smith Chesapeake National Historic Trail
- Pennsylvania Natural Heritage Program (PNHP)
- York County Planning Commission (YCPC)

Municipalities in The Hellam Hills Area:

- Hellam Township
- Hallam Borough
- Wrightsville Borough

HELLAM HILLS NATURE PRESERVE - ACCESS, FACILITIES, SIGNAGE RECOMMENDATIONS

Map	Recommendation	Priority	Quantity	Cost	HHP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Access Improvements																
H-A1	Buzzard Roost trailhead asphalt parking (30) / Gate / Preserve Sign	Planned - 1	1,680 SY	$ 126,100		$ 126,100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 126,100
H-A1	Buzzard Roost trailhead asphalt parking expansion (30)	Medium - 6	1,680 SY	$ 121,000		$ -	$ -	$ -	$ -	$ -	$ 121,000	$ -	$ -	$ -	$ -	$ 121,000
H-A2	MDT trailhead gravel parking (10) / Gate	High - 2	400 SY	$ 17,800		$ -	$ 17,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 17,800
H-A2	MDT trailhead gravel parking expansion (10)	Low - 8	400 SY	$ 15,400		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,400	$ -	$ -	$ 15,400
H-A3	Hunting Skills trailhead gravel parking (10)	Medium - 5	400 SY	$ 17,800		$ -	$ -	$ -	$ -	$ 17,800	$ -	$ -	$ -	$ -	$ -	$ 17,800
H-A3	Hunting Skills trailhead gravel parking expansion (10) / Gate	Low - 10	400 SY	$ 15,400		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,400	$ 15,400
H-A4	Hunting Skills trailhead Chimney Rock Rd Crosswalk	Low - 10	1 LS	$ 4,120		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,120	$ 4,120
Facilities Improvements																
H-F1	Buzzard Roost trailhead composting toilet Facility	High - 2	1 EA	$ 12,800		$ -	$ 12,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,800
H-F2	Buzzard Roost educational pavilion: 30x20	High - 4	1 EA	$ 96,000		$ -	$ -	$ -	$ 96,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 96,000
H-F3	Buzzard Roost ADA Overlook	Planned - 1	1 EA	$ 1,200		$ 1,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200
H-F4	Wildcat Gorge-Overlook ADA	High - 3	1 EA	$ 1,200		$ -	$ -	$ 1,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200
H-F5	Wildcat Gorge-Overlook	High - 3	1 EA	$ 1,200		$ -	$ -	$ 1,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200
H-F6	Wildcat Reservoir ADA Overlook Platform	High - 3	1 EA	$ 8,700		$ -	$ -	$ 8,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,700
H-F6	Wildcat Bluff ADA Overlook	High - 2	1 EA	$ 1,200		$ -	$ 1,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200
H-F7	Wild Cat bluff camping	Medium - 5	3 EA	$ 6,600		$ -	$ -	$ -	$ -	$ 6,600	$ -	$ -	$ -	$ -	$ -	$ 6,600
H-F8	Susquehanna River Overlook	High - 2	1 EA	$ 1,200		$ -	$ 1,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200

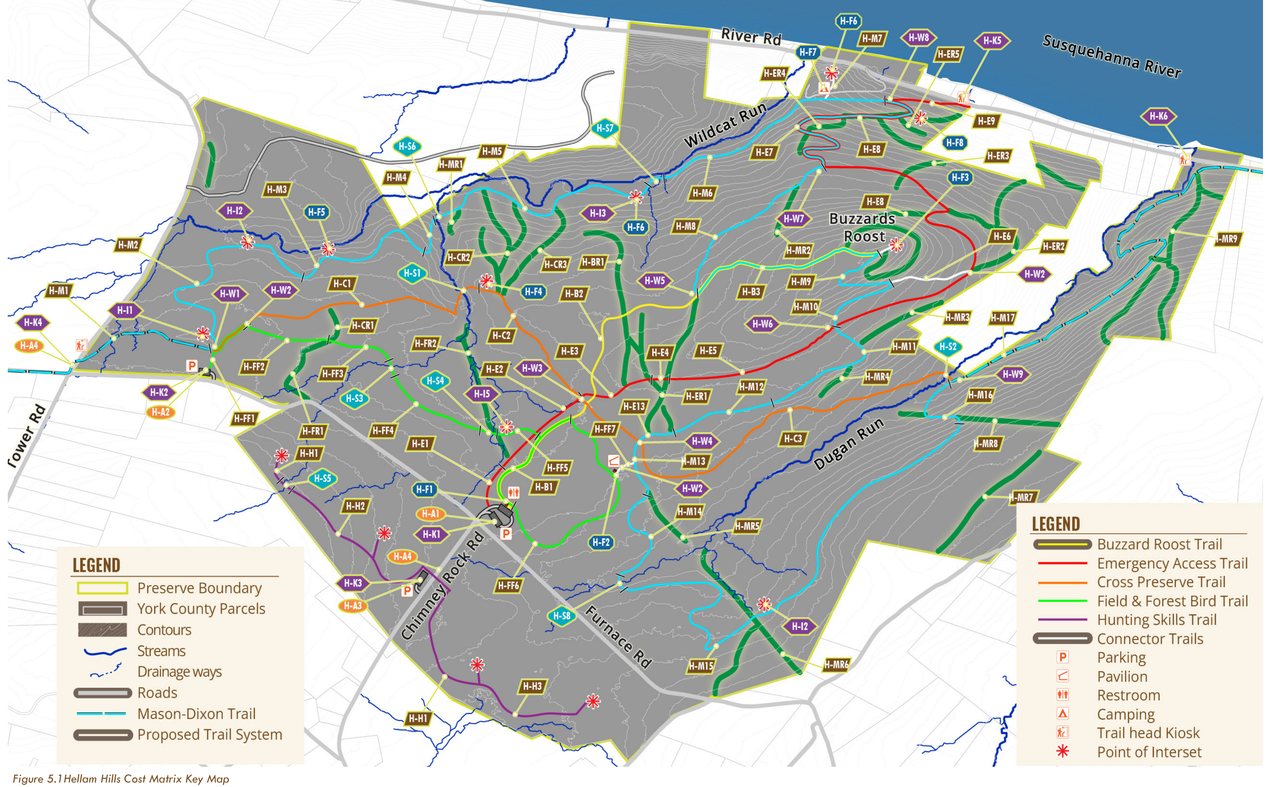


Figure 5.1 Hellam Hills Cost Matrix Key Map

HELLAM HILLS NATURE PRESERVE - ACCESS, FACILITIES, SIGNAGE RECOMMENDATIONS

Key	Recommendation	Priority	Quantity	Unit	HHP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Signage Improvements																
H-K1	Buzzard Roost trailhead kiosk	Planned - 1	1	EA.	$ 3,600		$ 1,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,600
H-K2	Mi-DF trailhead kiosk	High - 2	1	EA.	$ 3,600		$ -	$ 1,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,600
H-K3	Hunting Skills Trailhead kiosk	Medium - 5	1	EA.	$ 3,600		$ -	$ -	$ -	$ -	$ 1,600	$ -	$ -	$ -	$ -	$ -	$ 1,600
H-K4	Emergency Access River Road Trailhead kiosk	High - 2	1	EA.	$ 3,600		$ -	$ 1,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,600
H-K5	Mi-DF River Road Trailhead kiosk	High - 2	1	EA.	$ 3,600		$ -	$ 1,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,600
H-I1	Mine Pit Overlook Interpretive Signage	Low - 8	1	EA.	$ 1,900		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000	$ -	$ -	$ 1,900
H-I2	Wildcat Run Homestead Ruins Interpretive Signage	Medium - 6	1	EA.	$ 1,900		$ -	$ -	$ -	$ -	$ -	$ 1,900	$ -	$ -	$ -	$ -	$ 1,900
H-I3	Wildcat Reservoir Overlook Interpretive Signage	Medium - 6	1	EA.	$ 1,900		$ -	$ -	$ -	$ -	$ -	$ 1,900	$ -	$ -	$ -	$ -	$ 1,900
H-I4	Wildcat Bluff Overlook Interpretive Signage	High - 3	1	EA.	$ 1,900		$ -	$ -	$ 1,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900
H-I5	Farmstead Ruins Interpretive Signage	Low - 8	1	EA.	$ 1,900		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000	$ -	$ -	$ 1,900
H-W1	Wayfinding: Mason Dixon / Birding / Cross Preserve Trail Intersection	High - 2	6	EA.	$ 198		$ -	$ 198	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 198
H-W2	Wayfinding: Field & Forest / Cross Preserve Trail Intersection	High - 4	4	EA.	$ 132		$ -	$ -	$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W3	Wayfinding: Cross Preserve Trail / Emergency Access Trail Intersection	Planned - 1	4	EA.	$ 132		$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W4	Wayfinding: Cross Preserve / Mi-DF Trail Intersection	Planned - 1	4	EA.	$ 132		$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W5	Wayfinding: Buzzard Roost / Mi-DF Trail Intersection	Planned - 1	4	EA.	$ 132		$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W6	Wayfinding: Mi-DF / Emergency Access Trail Intersection	High - 2	4	EA.	$ 132		$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W7	Wayfinding: Mi-DF / Emergency Access Trail Intersection	High - 2	4	EA.	$ 132		$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W8	Wayfinding: Mi-DF / Emergency Access Trail Intersection	High - 2	4	EA.	$ 132		$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
H-W9	Wayfinding: Mi-DF / Cross Preserve Trail Intersection	Medium - 7	4	EA.	$ 132		$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$ -	$ -	$ -	$ 132
							$ 131,200	$ 64,464	$ 15,032	$ 61,332	$ 28,132	$ 124,800	$ 132	$ 16,200	$ -	$ 19,020	$ 474,814

HELLAM HILLS NATURE PRESERVE - ECOLOGICAL RECOMMENDATIONS

Management Code /	Area	Goal	Recommendation	Priority	IMLP Partner	Cost Notes	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
HHMU 3 - Mesic Mixed Hardwood Forest	17 AC	Invasive Management	Winter brush (cut and stump treat) invasive vines following a phased approach	High - 4		Phased brushing over Years 1-3	$ -	$ -	$ -	$ 12,631	$ 12,631	$ 12,631	$ -	$ -	$ -	$ -	$ 37,893
	17 AC	Breeding Bird & Pollinator Habit Enhancements	Enhance utility ROW plantings to better promote successional breeding birds and pollinating insects	High - 4		Planting 750 #1 shrubs in Year 1 with replacement planting Year 2	$ -	$ -	$ -	$ 26,652	$ 1,385	$ -	$ -	$ -	$ -	$ -	$ 28,037
	17 AC	Watershed Health	Install low-tech grade control elements such as BDAs (Beaver Dam Analogs)	High - 4			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	88 AC	Breeding Bird & Pollinator Habit Enhancements	Discuss with ROW company re-seeding in certain areas to increase pollinators and promote diversity	High - 3		Year 1 seeding - includes site prep and tilling	$ -	$ -	$ 11,477	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,477
	88 AC	Breeding Bird & Pollinator Habit Enhancements	Expand meadow/opening area and transition to successional forest and mature second growth in a mosaic	High - 4		Brushing, mowing, seeding and planting	$ -	$ -	$ -	$ 52,523	$ -	$ -	$ -	$ -	$ -	$ -	$ 52,523
HHMU4 - Dry-Mesic Mixed Hardwood Forest	380 AC	Invasive Management	Invasives control	Planned - 1		Basal bark Yr 1 with follow up foliar; Spot spray years 3, 5, 7, and 9	$ 285,596	$ -	$ 124,939	$ -	$ 124,939	$ -	$ 124,939	$ -	$ 124,939	$ -	$ 785,352
	380 AC	Forest Regeneration Health	Reduce/retire trails to promote one fixed trail route			See Trail Improvments Cost priotity based on Fall line trails and Watershed Protection	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	380 AC	Invasive Management	Clear all tree-of-heaven (Ailanthus altissima) from the woods, especially near Buzzard's Roost to increase aesthetics	Planned - 1		included in above invasives management	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	380 AC	Foster Forest Diversity	Conduct taxa-specific plant and wildlife studies along river bluff and dry ridge forest communities (targeting RTE species); Potential for rare lithophilic plants and rare snakes	High - 4			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
HHMU5 - Wildcat Run Floodplain Primary Channel	40 AC	Watershed Health	Establish a reach-wide stream restoration plan	High - 2		Brushing Year 1 with Foliar Treatment Years 2-5	$ -	$ 51,914	$ 49,414	$ 49,414	$ 49,414	$ 49,414	$ -	$ -	$ -	$ -	$ 249,570
	40 AC	Watershed Health	Enroll project in MS4 program or compensatory stream bank mitigation program	High - 2			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
							$ 285,596	$ 195,673	$ 325,122	$ 345,372	$ 356,511	$ 230,187	$ 166,049	$ 443,886	$ 183,638	$ 41,110	$ 2,573,144

HELLAM HILLS NATURE PRESERVE - ECOLOGICAL RECOMMENDATIONS

Management Code /	Area	Goal	Recommendation	Priority	IMLP Partner	Cost Notes	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
HHMU1 - Degan Run Floodplain	99 AC	Watershed Health	Develop a channel restoration plan to include streambank stabilization, streambed elevation, grade control structures, invasive species management, etc.	High - 2		Brushing Year 1 with Foliar Treatment Years 2-5		$ 51,914	$ 49,414	$ 49,414	$ 49,414	$ -	$ -	$ -	$ -	$ -	$ 249,570
	99 AC	Watershed Health	Coordinate with municipality for MS4 credit for lbs of sediment removed	High - 2			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	99 AC	Watershed Health	Improve hydrology in riparian-associated wetlands - monitor changes in plant community	High - 4			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
HHMU1B - Degan Run North Facing Drainages	12 AC	Watershed Health	Control invasive shrubs. Seed/plant OH. shrubs to aid in preventing recolonization	High - 2		Yr 1 - Herbicide and follow up foliar treatment, seeding (12 acres) and planting 1800 #1 shrubs; Yr 2- Brushing and follow-up foliar treatment and replacement planting	$ -	$ 11,555	$ 11,481	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 107,246
	12 AC	Watershed Health	Monitor hydrological changes from floodplain reconnection	High - 4			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
HHMU2 - Norway Spruce Forest	125 AC	Forest Regeneration Health	Continue white-tailed deer hunting in this area and consider extending hunting across Furnace Road	Planned - 1			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	88 AC	Breeding Bird & Pollinator Habit Enhancements	Discuss with ROW company re-seeding in certain areas to increase pollinators and promote diversity	High - 3		Year 1 seeding - includes site prep and tilling	$ -	$ -	$ 11,477	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,477
	125 AC	Forest Regeneration Health	Selectively thin spruce trees or remove in full sections followed immediately by planting white pines, oaks, birch, and hemlock as well as dogwoods, viburnums, and laurels; Perform all invasives under bench understory treestrubs (cut and stump treat), spot spray herbaceous invasives, overseed with native mix, design space to provide forage for deer as well as other wildlife species	Low - 3		Yr. 1 - Thin spruce trees, plant 8000 #2 trees, 4000 #1 shrubs with herbivory protection; Yr. 2 replacement planting	$ -	$ -	$ -	$ -	$ -	$ -	$ 402,276	$ 13,689	$ -	$ -	$ 433,965
	125 AC	Invasive Management		High - 3		Yrs 1-3 - winter brushing with follow up foliar; Yrs 4-7 Spot Spray Treatment	$ -	$ -	$ -	$ 164,738	$ 118,728	$ 118,728	$ 41,110	$ 41,110	$ 41,110	$ 41,110	$ 566,634
	88 AC	Breeding Bird & Pollinator Habit Enhancements	Create meadow/opening area and transition to successional forest and mature second growth in a mosaic	High - 3		Year 1 seeding - includes site prep and tilling	$ -	$ -	$ 69,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 69,000

Figure 5.2 Hellam Hills Management Unit Map

HELLAM HILLS NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Buzzard Roost Trail - Yellow	H-B1	Accessible stone dust trail 5' wide new through meadow	Planned - 1	1,336 LF	$ 22,178		$ 22,178	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 22,178
	H-B2	Accessible compacted native soil trail 5' wide new through forest	Planned - 1	2,183 LF	$ 18,774		$ 18,774	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,774
	H-BR1	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-BR1	Trail / Forest Restoration	Planned - 1	1,500 LF	$ 18,000		$ 18,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,000
	H-BR2	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-BR2	Trail / Forest Restoration	Medium - 6	1,290 LF	$ 15,480		$ -	$ -	$ -	$ -	$ -	$ 15,480	$ -	$ -	$ -	$ -	$ 15,480
	H-BR2	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-BR2	Trail / Forest Restoration	Medium - 6	870 LF	$ 10,440		$ -	$ -	$ -	$ -	$ -	$ 10,440	$ -	$ -	$ -	$ -	$ 10,440
	H-B3	Accessible compacted native soil trail 5' wide existing trail bed add resting landings	Planned - 1	2,087 LF	$ 1,878		$ 1,878	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,878
	H-BR4	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-BR4	Trail / Forest Restoration	Medium - 6	2,280 LF	$ 27,360		$ -	$ -	$ -	$ -	$ -	$ 27,360	$ -	$ -	$ -	$ -	$ 27,360
	H-B4	Accessible compacted native soil 5' wide existing trail bed minor accessibility improvements	Planned - 1	157 LF	$ 141		$ 141	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 141
Cross Preserve Trail - Orange	H-C1	Single track hiking 3' wide trail existing trail no improvements		3,170 LF	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	H-CR1	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-CR1	Trail / Forest Restoration	Medium - 6	325 LF	$ 3,900		$ -	$ -	$ -	$ -	$ -	$ 3,900	$ -	$ -	$ -	$ -	$ 3,900
	H-S1	Stream crossing existing low flow no improvement		-	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	H-C2	Accessible stone dust trail 5' wide existing trail bed minor accessibility improvements	Planned - 1	1,570 LF	$ 26,062		$ 26,062	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 26,062
	H-CR2	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-CR2	Trail / Forest Restoration	High - 2	2,365 LF	$ 28,380		$ -	$ 28,380	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 28,380
	H-CR3	Trail Closure	Planned - 1	1 LF	$ 250		$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-CR3	Trail / Forest Restoration	High - 2	1,250 LF	$ 15,000		$ -	$ 15,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000
	H-C3	Gravel Trail 10' wide existing access road no improvement		4,648 LF	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	H-S2	Stream crossing existing low flow no improvement		-	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

HELLAM HILLS NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Emergency Access Trail - Red	H-E1	Gravel Trail 8' wide new from parking area with vehicular access gate	High - 3	441 LF	$ 15,906		$ -	$ -	$ 15,906	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,906
	H-E2	Gravel Trail 8' wide existing access road no improvments		1,089 EA	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	H-E3	Gravel Trail 8' wide existing existing trail bed widening improvements	High - 3	781 LF	$ 4,887		$ -	$ -	$ 4,887	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,887
	H-E4	Gravel Trail 8' wide new trail	High - 3	186 LF	$ 5,654		$ -	$ -	$ 5,654	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,654
	H-ER1	Trail Closure	Planned - 1	4 LF	$ 1,000		$ 1,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000
	H-ER1	Trail / Forest Restoration	Medium - 6	970 LF	$ 11,640		$ -	$ -	$ -	$ -	$ -	$ 11,640	$ -	$ -	$ -	$ -	$ 11,640
	H-E5	Gravel Trail 8' wide existing existing trail bed minor improvements	High - 3	6,374 LF	$ 7,011		$ -	$ -	$ 7,011	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,011
	H-E6	Single track hiking 3' wide Buzzard Roost connector trail existing trail minor improvements	High - 3	869 LF	$ 1,369		$ -	$ -	$ 1,369	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,369
	H-ER2	Trail Closure	Planned - 1	2 LF	$ 500		$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	H-ER2	Trail / Forest Restoration	High - 3	1,800 LF	$ 21,600		$ -	$ -	$ 21,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 21,600
	H-ER3	Trail Closure	Planned - 1	2 LF	$ 500		$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	H-ER3	Trail / Forest Restoration	Planned - 1	750 LF	$ 9,000		$ 9,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,000
	H-E7	Gravel Trail 8' wide new through forest steep slope	High - 3	1,640 LF	$ 18,314		$ -	$ -	$ 18,314	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,314
	H-ER4	Trail Closure	Planned - 1	2 LF	$ 500		$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	H-ER4	Trail / Forest Restoration	Planned - 1	810 LF	$ 9,720		$ 9,720	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,720
	H-E8	Gravel Trail 8' wide exsting access road minor improvments	High - 3	1,100 LF	$ 1,210		$ -	$ -	$ 1,210	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,210
	H-ER5	Trail Closure	Planned - 1	3 LF	$ 750		$ 750	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 750
	H-ER5	Trail / Forest Restoration	Medium - 6	1,355 LF	$ 16,260		$ -	$ -	$ -	$ -	$ -	$ 16,260	$ -	$ -	$ -	$ -	$ 16,260
	H-E9	Gravel Trail 8' wide exsting access road no improvments		905 LF			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

HELLAM HILLS NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Field & Forest Bird Trail ADA Green	H-FF1	Accessible stone dust trail 5' wide new through meadow	High - 4	185 LF	$ 3,071		$ -	$ -	$ -	$ 3,071	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,071
	H-FF2	Accessible stone dust trail 5' wide exsiting trail bench major improvements	High - 4	663 LF	$ 11,006		$ -	$ -	$ -	$ 11,006	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,006
	H-FR1	Trail Closure	High - 4	1 LF	$ 250		$ -	$ -	$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-FR1	Trail / Forest Restoration	High - 4	890 LF	$ 10,680		$ -	$ -	$ -	$ 10,680	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,680
	H-FF3	Accessible stone dust trail 5' wide new through forest	High - 4	930 LF	$ 15,438		$ -	$ -	$ -	$ 15,438	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,438
	H-S3	Accessible boardwalk 5' wide new through forest	High - 4	170 LF	$ 42,500		$ -	$ -	$ -	$ 42,500	$ -	$ -	$ -	$ -	$ -	$ -	$ 42,500
	H-FF4	Accessible stone dust trail 5' wide new through forest	High - 4	930 LF	$ 15,438		$ -	$ -	$ -	$ 15,438	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,438
	H-S4	Accessible boardwalk 5' wide new through forest	High - 4	180 LF	$ 45,000		$ -	$ -	$ -	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 45,000
	H-FR2	Trail Closure	High - 4	1 LF	$ 250		$ -	$ -	$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-FR2	Trail / Forest Restoration	High - 4	1,500 LF	$ 18,000		$ -	$ -	$ -	$ 18,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,000
	H-FF5	Accessible stone dust trail 5' wide new through forest	High - 4	489 LF	$ 8,117		$ -	$ -	$ -	$ 8,117	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,117
	H-FF6	Accessible stone dust trail 5' wide new through meadow	High - 4	2,548 LF	$ 42,297		$ -	$ -	$ -	$ 42,297	$ -	$ -	$ -	$ -	$ -	$ -	$ 42,297
	H-FF7	Accessible stone dust trail 5' wide connector trail	High - 4	250 LF	$ 825		$ -	$ -	$ -	$ 825	$ -	$ -	$ -	$ -	$ -	$ -	$ 825
Hunting Skills Trail - Purple	H-H1	Accessible compacted native soil trail 5' wide new through forest	Medium - 5	150 LF	$ 1,290		$ -	$ -	$ -	$ -	$ 1,290	$ -	$ -	$ -	$ -	$ -	$ 1,290
	H-S5	Accessible boardwalk 5' wide new through forest	Medium - 5	10 LF	$ 2,500		$ -	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ 2,500
	H-H2	Accessible compacted native soil trail 5' wide new through forest	Medium - 5	2,010 LF	$ 17,286		$ -	$ -	$ -	$ -	$ 17,286	$ -	$ -	$ -	$ -	$ -	$ 17,286
	H-H3	Accessible compacted native soil trail 5' new through forest	Medium - 5	2,441 LF	$ 20,993		$ -	$ -	$ -	$ -	$ 20,993	$ -	$ -	$ -	$ -	$ -	$ 20,993

HELLAM HILLS NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Maxon-Dixon Trail - Light Blue	H-M1	Single track hiking 3' wide existing trail no improvements		1,675 LF	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	H-M2	Single track hiking 3' wide new through forest	High - 2	2,697 LF	$ 16,991		$ -	$ 16,991	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,991
	H-M3	Single track hiking 3' wide new through forest / diffucult terrain	High - 2	1,567 LF	$ 11,909		$ -	$ 11,909	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,909
	H-S6	Stream crossing new low flow	High - 2	1 EA	$ 820		$ -	$ 820	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 820
	H-MR1	Trail Closure	High - 2	1 LF	$ 250		$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-MR1	Trail / Forest Restoration	High - 2	325 LF	$ 3,900		$ -	$ 3,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,900
	H-M4	Single track hiking 3' wide new through forest / steep slope	High - 2	407 LF	$ 3,093		$ -	$ 3,093	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,093
	H-M5	Single track hiking 3' wide existing unmarked trail minor improvments	High - 2	2,614 LF	$ 2,353		$ -	$ 2,353	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,353
	H-S7	Accessible boardwalk 5' wide new across boulder field	High - 3	150 LF	$ 37,500		$ -	$ -	$ 37,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 37,500
	H-M6	Accessible compacted native soil trail 5' wide existing trail bed minor drainage improvments	High - 2	2,547 LF	$ 2,103		$ -	$ 2,103	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,103
	H-M7	Accessible stone dust trail 5' wide connector trail Wildcat Bluff open lawn	High - 2	273 LF	$ 4,532		$ -	$ 4,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,532
	H-M8	Single track hiking 3' wide existing trail bed minor improvments	High - 2	1,981 LF	$ 1,387		$ -	$ 1,387	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,387
Maxon-Dixon Trail - Light Blue	H-MR2	Trail Closure	High - 2	1 LF	$ 250		$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-MR2	Trail / Forest Restoration	High - 2	485 LF	$ 5,820		$ -	$ 5,820	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,820
	H-M9	Single track hiking 3' wide existing trail bed minor improvments steep slope	High - 2	1,076 LF	$ 898		$ -	$ 898	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 898
	H-M10	Single track hiking 3' wide new trail through forest steep slope	High - 2	811 LF	$ 6,164		$ -	$ 6,164	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,164
	H-M11	Single track hiking 3' wide existing trail minor improvments	High - 2	1,537 LF	$ 1,120		$ -	$ 1,120	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,120
	H-MR3	Trail Closure	High - 2	1 LF	$ 250		$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-MR3	Trail / Forest Restoration	High - 2	910 LF	$ 10,920		$ -	$ 10,920	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,920

HELLAM HILLS NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Maxon-Dixon Trail - Light Blue	H-MR4	Trail Closure	High - 2	1 LF	$ 250		$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-MR4	Trail / Forest Restoration	High - 2	665 LF	$ 7,980		$ -	$ 7,980	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,980
	H-M12	Single track hiking 3' wide new trail through forest	High - 2	1,073 LF	$ 6,760		$ -	$ 6,760	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,760
	H-M13	Single track hiking 3' wide existing trail minor improvments	Medium - 7	984 LF	$ 689		$ -	$ -	$ -	$ -	$ -	$ -	$ 689	$ -	$ -	$ -	$ 689
	H-MR5	Trail Closure	High - 3	1 LF	$ 250		$ -	$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	H-MR5	Trail / Forest Restoration	High - 3	565 LF	$ 6,780		$ -	$ -	$ 6,780	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,780
	H-M14	Single track hiking 3' wide new trail through forest steep slope	Medium - 7	1,164 LF	$ 7,333		$ -	$ -	$ -	$ -	$ -	$ -	$ 7,333	$ -	$ -	$ -	$ 7,333
	H-S8	Boardwalk 3' wide new through forest	Medium - 7	50 LF	$ 12,500		$ -	$ -	$ -	$ -	$ -	$ -	$ 12,500	$ -	$ -	$ -	$ 12,500
	H-M15	Single track hiking 3' wide new trail through forest	Medium - 7	5,670 LF	$ 35,721		$ -	$ -	$ -	$ -	$ -	$ -	$ 35,721	$ -	$ -	$ -	$ 35,721
	H-MR6	Trail Closure	High - 3	2 LF	$ 500		$ -	$ -	$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	H-MR6	Trail / Forest Restoration	High - 3	2,570 LF	$ 30,840		$ -	$ -	$ 30,840	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,840
	H-MR7	Trail Closure	Medium - 7	2 LF	$ 500		$ -	$ -	$ -	$ -	$ -	$ -	$ 500	$ -	$ -	$ -	$ 500
	H-MR7	Trail / Forest Restoration	Medium - 7	1,660 LF	$ 19,920		$ -	$ -	$ -	$ -	$ -	$ -	$ 19,920	$ -	$ -	$ -	$ 19,920
	H-M16	Single track hiking 3' wide new trail through forest steep slope	Medium - 7	866 LF	$ 6,582		$ -	$ -	$ -	$ -	$ -	$ -	$ 6,582	$ -	$ -	$ -	$ 6,582
	H-MR8	Trail Closure	High - 3	2 LF	$ 500		$ -	$ -	$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	H-MR8	Trail / Forest Restoration	High - 3	1,500 LF	$ 18,000		$ -	$ -	$ 18,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,000
	H-M17	Single track hiking 3' wide existing trail no improvements		4,878 LF	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	H-MR9	Trail Closure	Planned - 1	5 LF	$ 1,250		$ 1,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,250
	H-MR9	Trail / Forest Restoration	High - 3	4,785 LF	$ 57,420		$ -	$ -	$ 57,420	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 57,420
				13.5 MI	**of Trail**		**$ 112,003**	**$ 131,129**	**$ 227,742**	**$ 212,872**	**$ 42,069**	**$ 85,080**	**$ 83,245**	**$ -**	**$ -**	**$ -**	**$ 894,139**

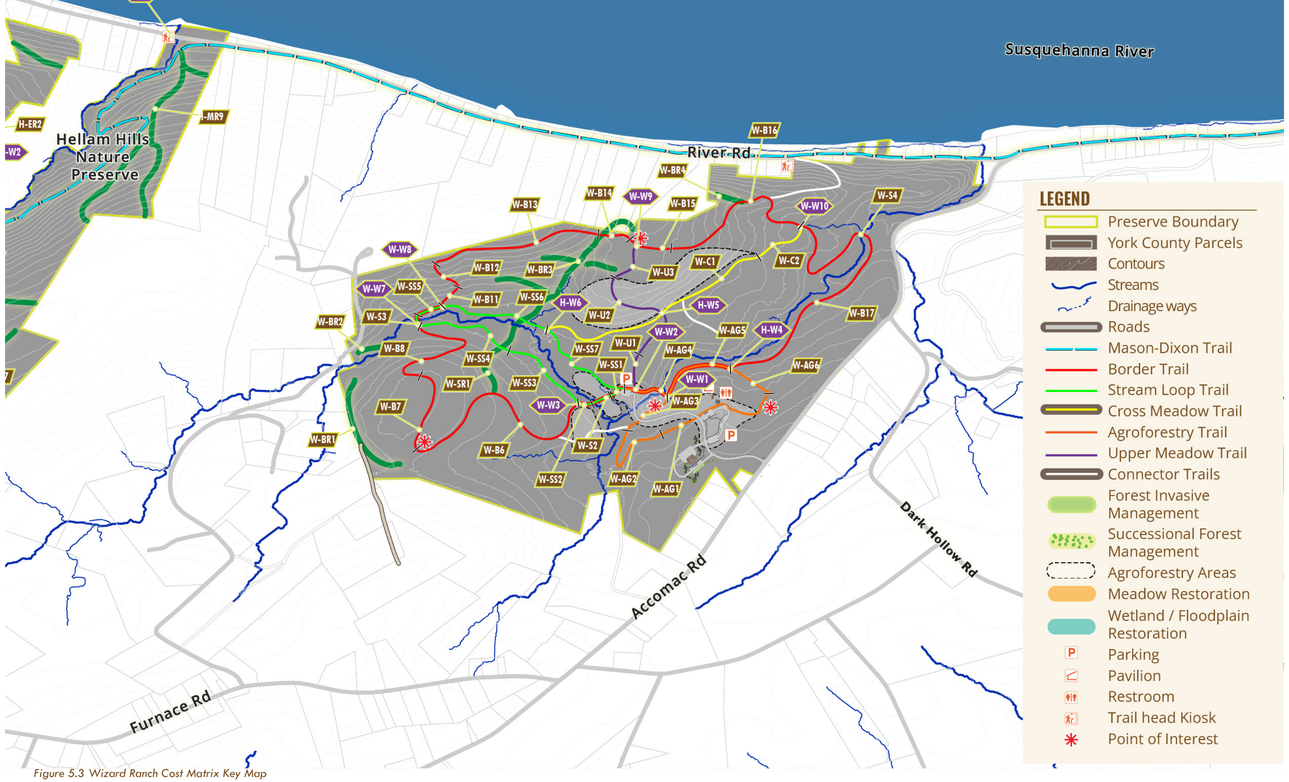


Figure 5.3 Wizard Ranch Cost Matrix Key Map

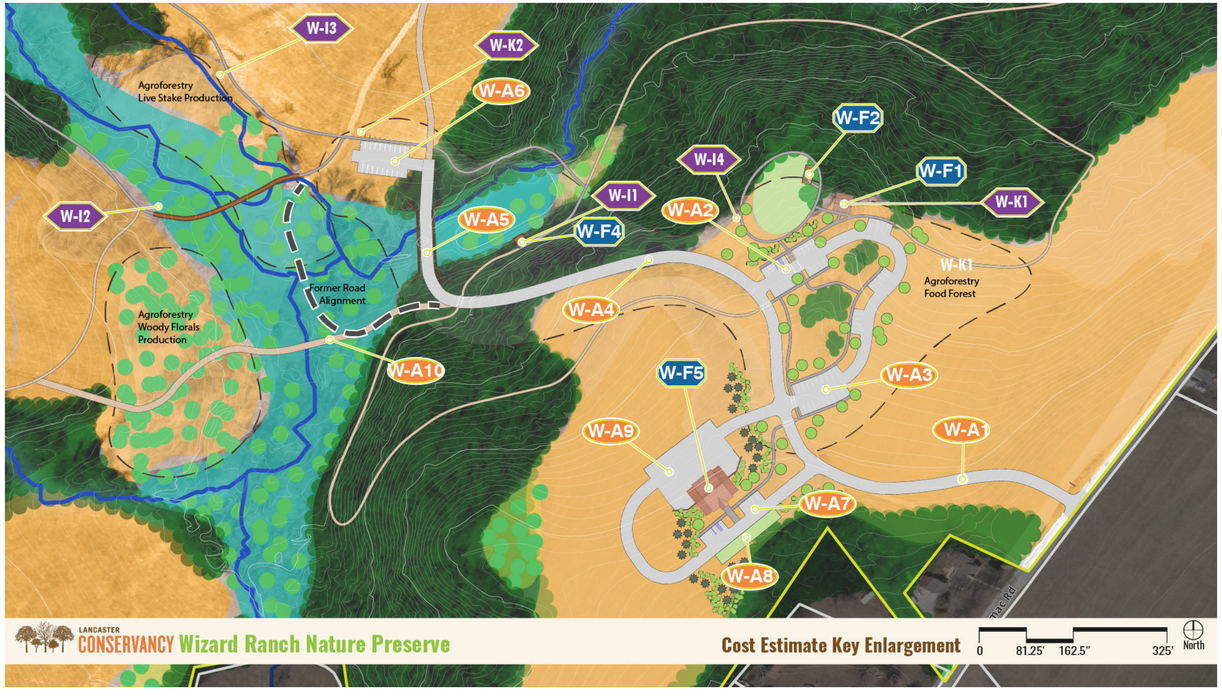


Figure 5.4 Wizard Ranch Cost Matrix Key Enlargement

WIZARD RANCH NATURE PRESERVE - FACILITIES RECOMMENDATIONS

Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Access Improvements																
W-A1	Improved Entrance Driveway - Asphalt / Gate / Preserve Sign	High - 2	2,090 SY	$ 155,600		$ -	$ 155,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 155,600
W-A2	Educational Hub Parking Area (30) -Asphalt	High - 2	2,410 SY	$ 173,600		$ -	$ 173,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 173,600
W-A3	Educational Hub Parking Expansion (25) -Asphalt	Medium - 7	920 SY	$ 66,300		$ -	$ -	$ -	$ -	$ -	$ -	$ 66,300	$ -	$ -	$ -	$ 66,300
W-A4	Improved Site Driveway - Gravel	High - 2	1,870 LF	$ 64,000		$ -	$ 64,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 64,000
W-A5	Vehicular Bridge	High - 2	1 LS	$ 410,000		$ -	$ 410,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 410,000
W-A6	Develop Universal Access Trail head parking (20) - Asphalt	High - 4	700 LF	$ 50,400		$ -	$ -	$ -	$ 50,400	$ -	$ -	$ -	$ -	$ -	$ -	$ 50,400
W-A7	Stewardship Center Staff Entrance Drive & Parking Area (10) -Asphalt	High - 2	940 SY	$ 67,700		$ -	$ 67,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 67,700
W-A8	Stewardship Center Overflow Parking - Grass Pave (15)	High - 4	350 SF	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
W-A9	Stewardship Center Driveway & Yard Area / 2 gates	High - 2	2,570 SY	$ 92,900		$ -	$ 92,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 92,900
W-A10	Western Meadow Access Drive & Ford Crossing	High - 2	1 LS	$ 15,300		$ -	$ 15,300	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,300
Facilities Improvements																
W-F1	Educational Hub Cabin Renovations and Restroom Addition	High - 3	1,000 SF	$ 300,000		$ -	$ -	$ 300,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 300,000
W-F2	Educational Pavilion; Timber Structure 20x30	High - 3	1 LS	$ 96,000		$ -	$ -	$ 96,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 96,000
W-F3	Stewardship Hub	High - 2	8,000 SF	$ 2,000,000		$ -	$ 2,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000,000
W-F4	Wetland Observation Platform 10 x10	High - 4	1 EA	$ 8,700		$ -	$ -	$ -	$ 8,700	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,700

WIZARD RANCH NATURE PRESERVE - FACILITIES RECOMMENDATIONS

Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Signage Improvements																
W-K1	Educational Hub trailhead kiosk	High - 2	1 EA	$ 3,600		$ -	$ 3,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,600
W-K2	Streamside ADA trailhead kiosk	High - 3	1 EA	$ 3,600		$ -	$ -	$ 3,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,600
W-I1	Wetland Observation Interpretive Signage	High - 3	1 EA	$ 1,900		$ -	$ -	$ 1,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900
W-I2	Floodplain Restoration / sotrmwater Interpretive Signage	High - 3	1 EA	$ 1,900		$ -	$ -	$ 1,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900
W-I3	Agroforestry Interpretive Signage	High - 4	2 EA	$ 3,800		$ -	$ -	$ -	$ 3,800	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,800
W-I4	Food Forest Interpretive Signage	High - 4	1 EA	$ 1,900		$ -	$ -	$ -	$ 1,900	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900
W-W1	Wayfinding Arogforesty / Border Trail Intersection	High - 3	4 EA	$ 132		$ -	$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
W-W2	Wayfinding Arogforesty / Border / Upper Meadow Trail Intersection	High - 3	4 EA	$ 132		$ -	$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132
W-W3	Wayfinding Border / Streamside Trail Intersection	Medium - 5	4 EA	$ 132		$ -	$ -	$ -	$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ 132
W-W4	Wayfinding Arogforesty / Border Trail Intersection	Low - 9	4 EA	$ 132		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$ -	$ 132
W-W5	Wayfinding Cross Meadow / Upper Meadow Trail Intersection	Low - 9	4 EA	$ 132		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$ -	$ 132
W-W6	Wayfinding Border / Streamside Trail Intersection	Medium - 5	4 EA	$ 132		$ -	$ -	$ -	$ -	$ 132	$ -	$ -	$ -	$ -	$ -	$ 132
W-W7	Wayfinding Streamside / Cross Meadow Trail Intersection	Low - 9	4 EA	$ 132		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$ -	$ 132
W-W8	Wayfinding Border / Streamside Trail Intersection	Medium - 6	4 EA	$ 132		$ -	$ -	$ -	$ -	$ -	$ 132	$ -	$ -	$ -	$ -	$ 132
W-W9	Wayfinding Upper Meadow / Border Trail Intersection	Medium - 6	3 EA	$ 99		$ -	$ -	$ -	$ -	$ -	$ 99	$ -	$ -	$ -	$ -	$ 99
W-W10	Wayfinding Cross Meadow / Border Trail Intersection	Medium - 6	3 EA	$ 99		$ -	$ -	$ -	$ -	$ -	$ 99	$ -	$ -	$ -	$ -	$ 99
						$ -	**$ 2,982,700**	**$ 403,664**	**$ 64,800**	**$ 264**	**$ 330**	**$ 66,300**	**$ -**	**$ 396**	**$ -**	**$ 3,518,454**

WIZARD RANCH NATURE PRESERVE - ECOLOGICAL RECOMMENDATIONS

Management Code /	Area		Goal	Recommendation	Priority	IMLP Partner	Cost Notes	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
WRMU1 - Accomac Tributary Floodplain	36	AC	Watershed Health	Conduct an assessment for feasibility of this stream reach to be enrolled as a stream and wetland mitigation bank – this could fund the restoration, tie in adjacent landowners, and potentially even be a revenue generator for LC	Planned - 1													$ -
	36	AC	Watershed Health	If the above is not feasible, conduct assessment for all stream reaches to be restored through the MS4 compliance vehicle. This involves assessing the erodibility of the stream banks to calculate the pounds of sediment removed annually from restoring the system. This method includes partners and funding sources so costs could be greatly mitigated if planned properly (ex. grant applications, etc.)	Planned - 1													$ -
	36	AC	Watershed Health	Include design of floodplain wetlands into this plan. Robust potential for restoring and reconnecting hydrology to the existing floodplain with dynamic faunal and floral habitat results	Planned - 1													$ -
	36	AC	Habitat Enhancement	Conduct acoustic monitoring of bats in the breeding season (next April – August) to determine what species are currently occupying the space. This can inform any potential tree removal and drive spatial ecology of the designs moving forward.	High - 2													$ -
	36	AC	Watershed Health	Consider modification of the onsite pond to be hydrologically connected to the stream and function more as a wetland rather than an open water feature (included in either design approach above)	Planned - 1													$ -
	36	AC	Watershed Health	In the interim, control invasives via physical and chemical applications and hand-distribute seed wherever significant invasive colonies are removed. Use PA Piedmont Physiographic Wet-Mesic and Obligate Wetland seed mixes. Do not plant any woody plants in this area until the overall stream complex restoration plan is developed and permitted.	High - 2		Yrs. 1-2 - winter brushing with follow-up foliar treatment; Yrs 3, 5, 7, and 9 spot spray treatment	$ 68,898	$ 15,253	$ 11,861		$ 11,861		$ 11,861		$ 11,861		$ 131,595
	2	AC	Invasive Management	Woody Floral Agroforesty Area	High - 4							$ 16,400						$ 16,400
	2	AC	Invasive Management	Live Stack Production Agroforesty Area	High - 3					$ 13,900	$ 13,900							$ 27,800

WIZARD RANCH NATURE PRESERVE - ECOLOGICAL RECOMMENDATIONS

Management Code /	Area		Goal	Recommendation	Priority	IMLP Partner	Cost Notes	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
WRMN2 - Northwest Forest	25	AC	Invasive Management	Winter brush invasive shrubs	High - 2		Brushing - Yr. 1	$ 20,782										$ 20,782
	25	AC	Invasive Management	Cruise woods in the spring and summer for invasive herbaceous species	High - 2		Follow-up Foliar Spray Years 1 and 2; Spot Spray Years 3, 5, 7, and 9	$ 10,576	$ 10,576	$ 8,225		$ 8,225		$ 8,225		$ 8,225		$ 54,052
	25	AC	Foster Forest Diversity	Hand-distribute seed in areas where non-natives are removed. Use Shade-tolerant mix(es) appropriate to PA Piedmont Hardwood Forests (can provide lists if interested)	High - 2			$ 45,455										$ 45,455
	25	AC	Foster Forest Diversity	Deer herbivory is prevalent. Plant clusters of oaks, hickories, cherries, and a selection of shrubs (with seed) and enclose with deer fencing.	Medium - 5		3750 #1 shrubs, 2500 #2 trees, herbivory protection, replacement plantings in year 2					$ 255,705	$ 14,665					$ 270,370
WRMU3 - Western Forest	37	AC	Invasive Management	Control invasive shrubs along the margins/ecotones via winter brushing	High - 2		Brushing Year 1 and follow up foliar yr 1 and 2	$ 39,305	$ 15,713									$ 55,018
	37	AC	Foster Forest Diversity	Plant native trees and shrubs in clusters with deer protection	Medium - 5		5550 #1 shrubs, 3700 #2 trees,					$ 378,688	$ 21,723					$ 400,411
	37	AC	Invasive Management	Control invasive herbaceous material via spring and summer surgical applications of herbicide followed by overseeding	High - 2		Spot Spray years 3, 5, 7, and 9; Seeding Yr. 1	$ 37,187		$ 12,218		$ 12,218		$ 12,218		$ 12,218		$ 86,059
WRMU4 - Southeast Forest	37	AC	Invasive Management	Conduct winter brushing (rose and privet) and planting following the methods above. Exclude areas that would be included in the stream restoration. Lower priority as it is harder to access but important to include.	High - 3		Yrs. 1-2 - winter brushing with follow-up foliar treatment; Yrs 3, 5, 7, and 9 spot spray treatment		$ 53,695	$ 15,660	$ 12,177		$ 12,177		$ 12,177		$ 12,177	$ 118,063
	9.5	AC	Food Forest	Implement in Phases Cost includes Deer controls	High - 3					$ 41,701		$ 41,701		$ 41,701				$ 125,104
WRMU5 - Northeast Forest	57	AC	Invasive Management	Clear invasives from old logging roads and margins using a forestry mower/skid steer. Celebrate successional woods in this area where clearings occur by	High - 2		Forestry Mow Yr 1	$ 6,170										$ 6,170
	45	AC		o Installing meadow seed, woody seeds, and planting clusters of shrubs and trees	High - 4		Yr 1 - Seed and plants				$ 533,590	$ 33,421						$ 567,011
	57	AC		o Monitor progress post establishment to protect volunteer trees from deer herbivory, control invasives, and protect planted investments	High - 2		Invasives Mgmt Yrs 3, 5, 7, and 9						$ 18,782		$ 18,782		$ 18,782	$ 56,346
	57	AC		o Monitor breeding birds in response to this effort	High - 2													$ -
	57	AC		Open area around ruins. Be careful to retain exotic but non-native trees (fruit trees, etc.) that help interpret the historical occupancy of the site	High - 2													$ -
	12	AC		Pole Production Agroforesty Area	High - 2						$ 29,600		$ 29,600		$ 29,600			$ 88,800
WRMU6-Agricultural fields	76	AC		Meadow Establishment	High - 2			$ 114,000										$ 114,000
								$ 342,373	$ 95,237	$ 103,565	$ 589,267	$ 758,219	$ 96,947	$ 74,005	$ 60,559	$ 32,304	$ 30,959	$ 2,183,436

Figure 5.5 Wizard Ranch Management Unit Map

WIZARD RANCH NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Agroforestry Trail - Orange	W-AG1	Accessible stone dust trail 5' wide new through meadow	High - 4	1,298 LF	$ 21,547		$ -	$ -	$ -	$ 21,547	$ -	$ -	$ -	$ -	$ -	$ -	$ 21,547
	W-AG2	Accessible compacted native soil trail 5' wide new through forest - Steep terrain	High - 4	954 LF	$ 9,826		$ -	$ -	$ -	$ 9,826	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,826
	W-AG3	Accessible stone dust trail 5' wide new through lawn	High - 4	516 LF	$ 8,566		$ -	$ -	$ -	$ 8,566	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,566
	W-AG4	Accessible stone dust trail 5' wide new through meadow	High - 4	417 LF	$ 6,922		$ -	$ -	$ -	$ 6,922	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,922
	W-S1	Stream crossing Timber Foot Bridge - 5' Clear deck	High - 4	140 SF	$ 22,960		$ -	$ -	$ -	$ 22,960	$ -	$ -	$ -	$ -	$ -	$ -	$ 22,960
	W-AG5	Accessible compacted native soil trail 5' wide existing trail bed add resting landings	High - 4	824 LF	$ 742		$ -	$ -	$ -	$ 742	$ -	$ -	$ -	$ -	$ -	$ -	$ 742
	W-AG6	Accessible compacted native soil trail 5' wide existing trail bed add resting landings	High - 4	445 LF	$ 401		$ -	$ -	$ -	$ 401	$ -	$ -	$ -	$ -	$ -	$ -	$ 401
Streamside ADA Trail - Green	W-SS1	Accessible stone dust trail 5' wide new through meadow	High - 4	163 LF	$ 2,706		$ -	$ -	$ -	$ 2,706	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,706
	W-S2	Accessible boardwalk 8' wide (accom equipment) new through floodplain	High - 4	1,880 SF	$ 147,392		$ -	$ -	$ -	$ 147,392	$ -	$ -	$ -	$ -	$ -	$ -	$ 147,392
	W-SS2	Accessible stone dust trail 5' wide new through meadow	High - 4	166 LF	$ 2,706		$ -	$ -	$ -	$ 2,706	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,706
	W-SS3	Accessible stone dust trail 5' wide new through forest	High - 4	731 LF	$ 2,706		$ -	$ -	$ -	$ 2,706	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,706
	W-SR1	Trail Closure	High - 2	2 EA	$ 500		$ -	$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	W-SR1	Trail / Forest Restoration	High - 2	938 LF	$ 11,256		$ -	$ 11,256	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,256
	W-SS4	Accessible stone dust trail 5' wide new through forest	High - 3	1,184 LF	$ 2,706		$ -	$ -	$ 2,706	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,706
	W-S3	Stream crossing Timber Foot Bridge - 5' Clear deck	High - 3	140 SF	$ 22,960		$ -	$ -	$ 22,960	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 22,960
	W-SS5	Accessible stone dust trail 5' wide new through forest	High - 3	304 LF	$ 2,706		$ -	$ -	$ 2,706	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,706
	W-SS6	Accessible stone dust trail 5' wide new through forest	High - 3	1,046 LF	$ 17,364		$ -	$ -	$ 17,364	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 17,364
	W-SS7	Accessible stone dust trail 5' wide new through meadow	High - 3	1,015 LF	$ 16,849		$ -	$ -	$ 16,849	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,849

WIZARD RANCH NATURE PRESERVE - TRAIL RECOMMENDATIONS

Trail	Key	Recommendation	Priority	Quantity	Cost	IMLP Partner	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL
Border Trail - Red	W-B1	Accessible Mown /compacted native soil trail 5' wide	Medium - 5	2,258 LF	$ 23,257		$ -	$ -	$ -	$ -	$ 23,257	$ -	$ -	$ -	$ -	$ -	$ 23,257
	W-BR1	Trail Closure	High - 2	2 EA	$ 500		$ -	$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	W-BR1	Trail / Forest Restoration	Low - 10	1,125 LF	$ 13,500		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,500	$ 13,500
	W-BR2	Trail Closure	High - 2	2 EA	$ 500		$ -	$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	W-BR2	Trail / Forest Restoration	Low - 10	281 LF	$ 3,372		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,372	$ 3,372
	W-B2	Single track hiking 3' wide new trail through forest	Medium - 5	764 LF	$ 4,813		$ -	$ -	$ -	$ -	$ 4,813	$ -	$ -	$ -	$ -	$ -	$ 4,813
	W-B3	Single track hiking 3' wide new trail through forest steep slope	Medium - 5	1,525 LF	$ 11,590		$ -	$ -	$ -	$ -	$ 11,590	$ -	$ -	$ -	$ -	$ -	$ 11,590
	W-B4	Single track hiking 3' wide new trail through forest	Medium - 6	245 LF	$ 1,544		$ -	$ -	$ -	$ -	$ -	$ 1,544	$ -	$ -	$ -	$ -	$ 1,544
	W-B5	Single track hiking 3' wide new trail through forest steep slope	Medium - 6	351 LF	$ 2,668		$ -	$ -	$ -	$ -	$ -	$ 2,668	$ -	$ -	$ -	$ -	$ 2,668
	W-B6	Single track hiking 3' wide new trail through forest	Medium - 6	1,698 LF	$ 10,697		$ -	$ -	$ -	$ -	$ -	$ 10,697	$ -	$ -	$ -	$ -	$ 10,697
	W-BR3	Trail Closure	High - 2	1 EA	$ 250		$ -	$ 250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250
	W-BR3	Trail / Forest Restoration	High - 2	2,906 LF	$ 34,872		$ -	$ 34,872	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 34,872
	W-B7	Single track hiking 3' wide new trail through forest	Medium - 6	323 LF	$ 2,035		$ -	$ -	$ -	$ -	$ -	$ 2,035	$ -	$ -	$ -	$ -	$ 2,035
	W-B8	Single track hiking 3' wide new trail through meadow	Medium - 6	404 LF	$ 3,070		$ -	$ -	$ -	$ -	$ -	$ 3,070	$ -	$ -	$ -	$ -	$ 3,070
	W-BR4	Trail Closure	High - 2	2 EA	$ 500		$ -	$ 500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500
	W-BR4	Trail / Forest Restoration	Low - 9	281 LF	$ 3,372		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,372	$ -	$ 3,372
Border Trail - Red	W-B9	Single track hiking 3' wide existing trail Minor improvments	Medium - 6	1,730 LF	$ 1,211		$ -	$ -	$ -	$ -	$ -	$ 1,211	$ -	$ -	$ -	$ -	$ 1,211
	W-S4	Stream crossing Timber Foot Bridge - 5' Clear deck	Low - 9	280 SF	$ 45,920		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 45,920	$ -	$ 45,920
	W-B10	Single track hiking 3' wide new trail through forest steep slope	Low - 9	3,402 LF	$ 25,855		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,855	$ -	$ 25,855
				5.1 MI	of Trails		$ -	$ 48,378	$ 84,678	$ 226,472	$ 42,898	$ 21,225	$ -	$ -	$ 99,311	$ 16,872	$ 539,834

Nature Preserve Security

Crime deterrence is a combination of good rules, occasional policing, and community participation in the HHCA stewardship. Conservancy rules should be clearly posted in each Nature Preserve trailhead areas. The basic Conservancy rule of restricting park use from sunrise to sunset should be followed, with exceptions for night guided programing and reservation trail camping if applicable. The onsite staff and adjacent residences will serve as immediate eyes and ears of the community to help monitor conservation area activities. In additional the Conservancy should continue to maintain working relationships with area local responders and keep them apprised of projects within the Conservation Area, particular in regard to access and trail network evolution and collaborative development of an emergency response plan.

The Conservation Area has a dedicated user group. They will serve as the eyes and ears of "authority" armed with cell phones. People who engage in negative activities do not wish to be seen and will typically go elsewhere once they are identified for their bad behavior. Additionally, the rapid response of the Conservancy to repair damage or vandalism will help to mitigate bad behavior.

Nature Preserve users should also be encouraged to help the Conservancy to volunteer for trail maintenance crews or stewardship crews. When there are problems, it is critical that trail users can notify the Conservancy about the issue. Conservancy office phone numbers and email addresses should be posted at the parking area and trail connection access points as a part of Conservation Area signage.

Maintenance and Operation Demands

The Conservancy is an impressive organization with a long and successful history of preserving and stewarding lands. With the quick growth of acquisition within the HHCA the Conservancy recognizes the immediate need for staff and equipment hub within the Conservation Area. An early implementation project of this plan will be the development of the Stewardship Hub. The hub will provide the Conservancy with the resources they need to maintain their land holdings in the HHCA. The plan lays out a number of stewardship projects. Many of these projects will have heavy funding lifts in during their implementation stages however once the restoration is complete the cost of monitoring and occasionally stewardship cost should be relatively low.

The Conservation Area trails will offer one of the largest routine demands on staff maintenance. Trails should be routinely inspected (weekly) to ensure trail beds are clear and free of obstruction and have proper drainage. Trails should be closed if there are obstruction of poor drainage conditions until the issue can be address. Poor drainage issues should be addressed in a timely manner to insure the maintenance of a sustainable trail bed. Inspection of water crossings, culverts, and boardwalks should be routinely inspected (monthly) to ensure they are in good condition.

Potential Funding Sources

The following is a summary of grants, programs, funds, and other potential partnerships/sources that can assist with the funding of HHCA. Various sources can be pursued during Preserve improvement phases, based on availability of funds aligning goals of partner agencies, and Conservancy 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. 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

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. The grant awards can be competitive however the award amounts are typically larger than a C2P2 funding.

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

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-gtrp/

Watershed Restoration and Protection Program (WRPP)

DCED Watershed Restoration and Protection Program is a funding program to restore and maintain restored stream reaches impaired by the uncontrolled discharge of non-point source polluted runoff. Funds may be used for construction, improvement, expansion, repair, maintenance, or rehabilitation of new or existing watershed protection BMPs; stream bank bioengineering; and design services. Grant applications cannot exceed $300,000 and require 15% matching funds. Applications are typically due in June for consideration in September.

More information can be found at:

https://dced.pa.gov/programs/watershed-restoration-protection-program-wrpp/

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. Recommendations for HHCA 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. United States Environmental Protection Agency (EPA) nationally administer the funds and the program.

More information can be found 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 information can be found 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 information can be found at: https://www.fs.usda.gov/managing-land/urban-forests/ucf/nucfac

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.

Innovative Nutrient and Sediment Reduction Grants

The National Fish and Wildlife Foundation (NFWF), in partnership with the U.S. Environmental Protection Agency and the federal-state Chesapeake Bay Program, has invested more than $97 million through its Innovative Nutrient and Sediment Reduction Grants Program (INSR Program), aimed at significantly accelerating the rate and scale of water quality improvements in the Chesapeake Bay watershed. The focus of the INSR Program is to catalyze, strengthen and mature regional-scale partnerships based on evidence that collaboratives of this scale are effective mechanisms for achieving and sustaining water quality improvements by inspiring engagement, improving capacity and advancing impact over time.

INSR Program grants range from $750,000 to $1 million. Grantees are required to provide matching contributions equal to the amount of the grant request (a 1:1 match). Projects located within NFWF's Targeted Rivers and Watersheds will be prioritized, HHCA falls within the priority Hartman Run-Susquehanna River.

More information can be found at:

https://www.nfwf.org/programs/chesapeake-bay-stewardship-fund/innovative-nutrient-and-sediment-reduction-grants

Small Watershed Grants

The Small Watershed Grants (SWG) program for projects within the Chesapeake Bay watershed that promote voluntary, community-based efforts to protect and restore the diverse and vital habitats of the Chesapeake Bay and its tributary rivers and streams. The grant supports both Implementation, typically 75,000-500,000 and Planning and Technical Assistance with awards up to $75,000. No non-federal matching funds are required but the application process encourage application to describe any matching funds. Grants are typically due in April and announced in September.

More information can be found at:

https://www.nfwf.org/programs/chesapeake-bay-stewardship-fund/small-watershed-grants

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.

Awards range from $20,000 to $50,000 with an average size of $35,000 and about 50 grants awarded per year. Grants are typically due in January.

More information can be found 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.

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. Current United States grant programs include American Bird Conservancy – Linking Managed Forest, and NatureServe – Biodiversity.

More information can be found at:

https://www.forests.org/conservationgrants/

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

As the Conservancy expands into the York Region, there should look to connect with regional corporations and foundations that support public works such as land preservation. 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 hiking clubs are two such examples. These groups might get involved with club, fundraising events, and preserve stewardship days. A school faculty might incorporate a nature preserve into various curricula with students helping to develop and volunteer time to maintain the nature preserve as part of a classroom assignment or after school club. While the amount of funds raised may be small, this process builds constituents and support that is critical to the long-term success.

Hellam Hills Conservation Area Master Plan

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50 YEARS *of* SAVING NATURE