

ALLEGHENY COUNTY PARKS ECOLOGICAL ASSESSMENT AND ACTION PLAN

SOUTH PARK

Prepared for the Allegheny County Parks Foundation
March, 2017



FOREWORD

With nine parks encompassing over 12,000 acres, Allegheny County boasts one of the largest regional park systems in the country. While a wide variety of recreational activities make each park a unique destination, nature is the common thread that connects our parks and is our most treasured asset. The abundant resources found in our parks' forests, meadows and streams provide vital habitat for flora and fauna that clean our air and water, pollinate our plants and connect the web of life. We are stewards of these natural sanctuaries and are working to protect them for future generations.

In 2016, the Allegheny County Parks Foundation, together with the Allegheny County Parks Department, partnered with the Western Pennsylvania Conservancy (WPC) to conduct an Ecological Assessment and Action Plan in South Park, the second collaboration of this type. The purpose of this study is to evaluate the natural resources and ecological assets in South Park and determine an implementation plan for protecting, preserving and improving the environmental health of the park.

South Park is a diverse ecosystem with examples of old growth hard wood trees including scarlet and red oaks, American elm, black walnut and butternut hickory; a variety of evergreens; an abundant mix of wildflowers and rare plant species that have a particular conservation value in our region. These include Short's sedge and crepis rattlesnake root, which is listed on the Pennsylvania Natural Heritage Program "Watch List." Several areas of the park have been penetrated by invasive species and the report urges management to protect native species.

WPC recommends converting several mowed areas to native meadows and new forests, a measure that will provide for a richer wildlife and pollinator habitat. It also noted value in restoring forests degraded by pests such as the emerald ash borer and the disease oak wilt. Protecting stream and wetland environments with riparian buffers and constructing bioswales to manage stormwater runoff were also recommended.

WPC suggested adding interpretive signage to help educate the public about significant historic stone structures and ecological features, developing a sustainable trail plan to guide decisions about which trails to restore and maintain and installing deer exclosures to protect tender native plant species from deer browsing while still allowing hikers access. The Allegheny County Parks Foundation is working with Allegheny County Parks to develop a prioritized set of implementation actions.

We are deeply grateful to the PNC Foundation and the Heinz Endowments for providing the funding to make this report possible. We also thank the outstanding staff at the Western Pennsylvania Conservancy and the Allegheny County Parks Department for their expertise and insightful contributions to this report. We look forward to working with the County Parks staff and other partners to implement these recommendations and to continue this important work in all of the Allegheny County Parks.

Caren Glotfelty
Executive Director

January 2017

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SOUTH PARK

PARK YOUR LITTER • DON'T LITTER YOUR PARK

2013 ACRES



Groves and Shelters

1	Alabama	C-1	41	Indiana	B-2
2	Altoona	D-1	44	Lebanon	B-2
3	Babcock	C-3	50	Maryland	B-2
6	Baron	C-2	51	Mercer	C-3
8	Bedford	A-2	52	Millin	B-2
9	Blythe	C-3	53	Mississippi	E-3
10	Bouquet	C-3	54	Missouri	D-2
11	Braddock	C-1	56	Monroe	D-1
13	Bright Star	C-2	57	Montour	B-2
14	Cadman	C-3	59	Nevin	D-2
16	Campbell	C-3	65	Parcell	C-2
18	Celeron	C-2	66	Pitt	A-2
19	Circleview	B-2	67	Quebec	C-1
21	Craig	D-3	72	Stevens	D-3
22	Cravenwood	D-3	75	Stone Manse	C-2
23	Diana	B-2	76	Sunnywood	D-3
25	East Rise	C-1	77	Sunny Slope	D-3
28	Ella	A-2	78	Sunset Hills	C-2
29	Elthelbert	C-2	79	Tamarac	A-2
31	Forbes	C-2	80	Texas	C-2
32	Fort Pitt	B-1	84	Valley Height	C-1
33	Foster	B-2	85	Vista	B-2
34	Georgia	C-1	87	West Virginia	C-1
35	Gist	C-3	88	Willow Tree	C-3
36	Glenaldon	D-3	89	Wilson	C-2
37	Glendale	D-3	91	Woodland Crest	D-2
38	Glenwood	D-3	92	Grant	C-2
39	Harbor	C-2	93	Outlook	D-3

Recreation Facilities

ADMINISTRATION OFFICES		W. Cabin	D-3
A. Administration Bldg.	D-3	X. Community House	D-2
C. Police Park Information	C-1	Y. Cottage	D-3
RECREATIONAL FACILITIES		Z. Rental Buildings	B-3
B. Basketball and Sand Courts	D-3	(NO. 3,4,6)	
C. BMX Track	C-1	AA. Home Economics Building	D-3
D. Corrigan Drive VIP Center	B-2 C	BB. Museum Bldg.	B-3
-Banquet Garden Room		CC. Gazebo & Pond	D-2
-18 hole Miniature Golf		DD. 100 Acre House	C-1
E. Pony Rink	D-3	EE. Silent Brook	B-2
F. Golf Course and Club House	D-2	FF. Spreading Oak	D-1
G. Ice Skating Rink	B-2	GG. Deck Hockey	C-2
H. 3 B's Action Park	C-1	SPECIAL INTEREST AREAS	
-Boards, Bikes, Blades		HH. Camp Rolling Hills	D-3
I. Tennis Courts	D-3	II. Flower Show Bldg.	D-3
J. Wave Swimming Pool	B-2	Conservation Theater	
K. Off Leash Dog Area	C-3	JJ. Game Preserve	C-3
PLAY FIELDS		KK. Girl Scout Cabin	C-2
L. Edgemoor Field	D-3	LL. Horse Show Ring	D-3
M. Fairgrounds Baseball 1	D-3	MM. Oliver Miller Homestead	C-2
N. Fairgrounds Baseball 2	D-3	NN. Round Barn (Horses)	D-3
O. Fairgrounds Softball	D-3	OO. Demo Garden	B-2
P. Alaska Field	C-1	PP. Nature Center	D-3
Q. 100 Acres Field	C-1	QQ. Model Airplane Field	D-3
R. Texas Field	C-2	(Permit Required)	
S. Black Ash Little League	E-3	RR. South Park Amphitheater	D-3
RENTAL FACILITIES		SS. Work Out Trail	D-2
T. Agriculture Hall	B-3	(Maple Springs)	
U. Black Ashes	D-3	TT. Flag Retirement Area	D-3
V. Buffalo Inn	D-3	OTHER	
		UU. Park Maint. Center	C-3

☐ = Accessible C = Operated by Concession

Legend

- Groves
- Sheltered Groves
- Facilities
- Restrooms
- AED Defibrillator
- Recycling Receptacles
- Playgrounds
- Universal Playgrounds
- Accessible
- Park Trails
- Parking Lots
- Wooded Area

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South Park - Paved and Woods Trails



Trail Blazing
(and Double Blazing)

A blaze is a paint mark on a tree next to the trail.

Follow the blazes to follow the trail.

A double blaze (like the one above) indicates a trail intersection and turn, or a sudden turn, or some possible point of confusion that requires your attention.

When you see a double blaze, stop and look for the next blaze!

Trail Legend

- Bison Ridge Trail
6 Miles
- Fairgrounds Trail
1.4 Miles
- Maple Spring Loop
1.75 Miles
(Paved, NOT Blazed)
- Corrigan Walkway
2 Miles
(Paved, NOT Blazed)
- Other Trails

Blaze Symbols:
South Park Trails

The Bison Ridge Trail is marked by a solid white rectangular blaze and is represented by a solid white line on the map.

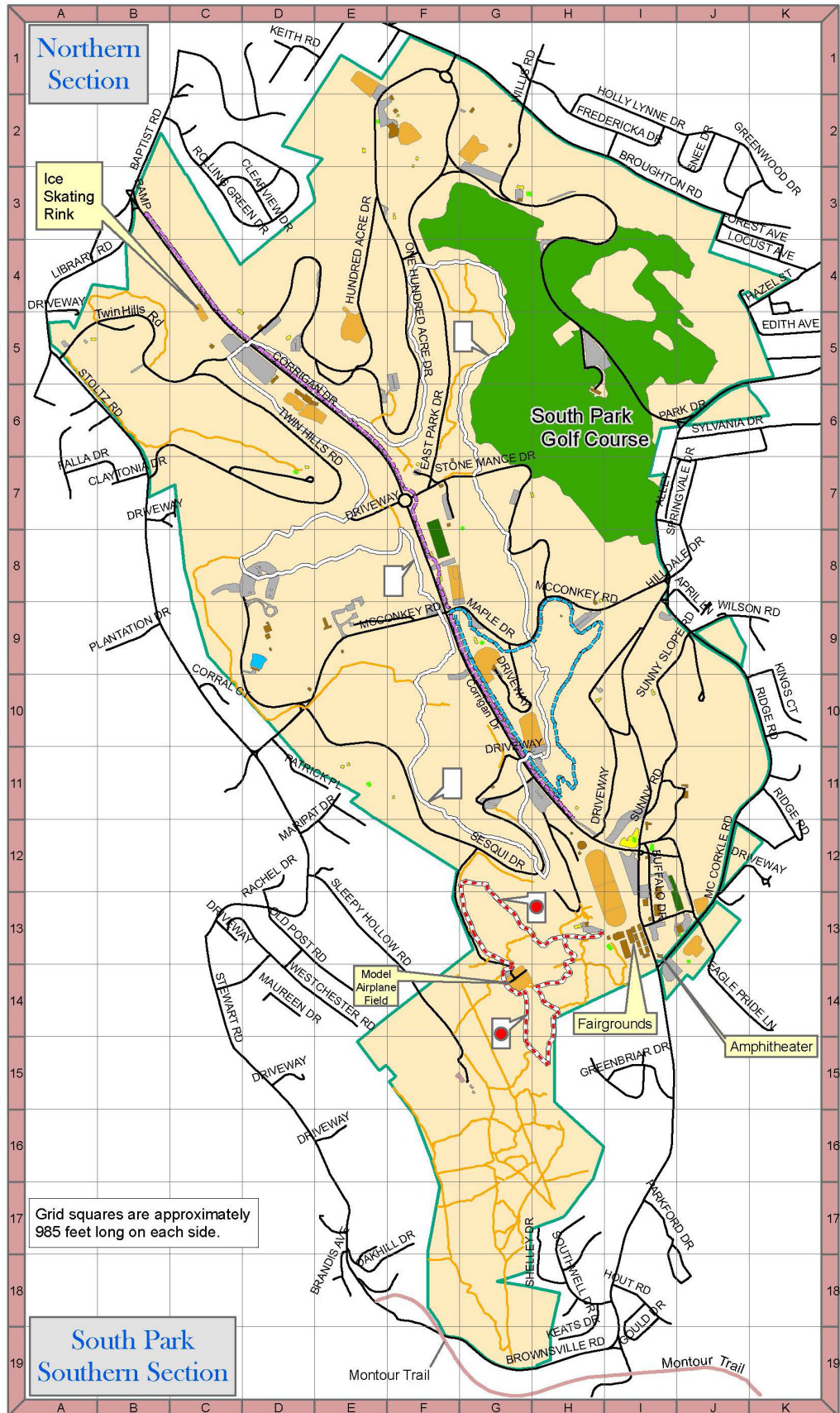
The Fairgrounds Trail is marked by a solid white blaze with a red dot, and is represented by a solid white line overlaid by red dots.

To clarify the blazes, a blaze symbol points to its corresponding blazed trail.

- Bison Ridge Trail
- Fairgrounds Trail

Park Legend

- Boundary
- Parking Lots
- Shelters
- Restrooms
- Pools
- Playgrounds
- Park Bldgs
- Ballfields



INTRODUCTION

1.1 BACKGROUND

History of South Park—Allegheny County Parks System

Allegheny County acquired several large parcels of farmland in what was then Snowden Township in the late 1920s. South Park, dedicated together with North Park on June 18, 1927, is one of the first two public parks in Allegheny County. It immediately became a popular regional recreational attraction, hosting a wide array of amenities and events, including the annual County Fair from 1933 to 1973.

South Park is one of the nine parks that comprise the Allegheny County Parks, a regional system encompassing more than 12,000 acres that is managed by the Allegheny County Parks Department with legislative oversight by Allegheny County Council. Rich in recreational, natural, and historic resources and located within a 15 to 20 mile radius from downtown Pittsburgh, the nine parks - Boyce Park, Deer Lakes Park, Harrison Hills Park, Hartwood Acres Park, North Park, Round Hill Park, Settlers Cabin Park, South Park and White Oak Park - are meant to serve all of the communities and citizens of Allegheny County.

The Allegheny County Parks Foundation

“The Allegheny County Parks Foundation (ACPF) supports the improvement, preservation and restoration of nine county parks consisting of 12,000 acres strategically located throughout Allegheny County. The Parks Foundation assists in the transformation of these parks by assembling resources, improving assets, and mobilizing public and private stakeholders to advance strategies and aspirations to make the parks signature assets in Southwestern Pennsylvania.

“ACPF’s overall mission is to help improve, conserve, maintain, protect, preserve and restore park facilities and open spaces, and also to support educational, recreational, natural and cultural activities. These efforts all work to enhance the quality of life for county residents, promote healthy lifestyles, improve the environment, and stimulate economic growth and vibrancy for the region. In partnership with Allegheny County, ACPF strives to enhance the park experience for all users.”

The Allegheny County Parks Foundation has commissioned this report to provide scientific and technical guidance for future enhancements to South Park.

Western Pennsylvania Conservancy

The Western Pennsylvania Conservancy (WPC) is one of the oldest and largest environmental organizations in the state. It has helped establish many state parks through its land protection programs, it shepherds the state's database of rare and endangered species, it provides assistance to landowners and communities wishing to protect their watersheds, and is the caretaker of Fallingwater. Its community greening program provides technical assistance and programming to communities desiring to enhance their local quality of life through green strategies including community gardens, tree plantings, and green infrastructure projects. This project has combined expertise from the WPC's Community Gardens and Greenspace Program and the Natural Heritage Program.

Purpose of the Project

The purpose of this project is to provide information on the current ecological conditions of South Park and present prioritized recommendations for



Allegheny Park rangers lead a class of school children through the Vale of Cashmere section of South Park.

actions that will enhance the quality and function of the park and improve the park experience for all visitors. The last assessment of the environmental conditions of the county parks was conducted for the Allegheny County Parks Comprehensive Master Plan and was released in 2002. A tremendous amount of change has taken place in the region since then. Allegheny County has been undergoing a transformation of its economy and local environment. Significant changes in the landscape are occurring due to pests and diseases that affect trees and plants, including oak wilt and the emerald ash borer which has killed almost all ash trees in the region. Climate change is affecting storm and weather patterns, growth and introduction of invasive plants and animals as well as air and water quality. In addition, scientific knowledge about how to manage ecological systems and stresses has changed, and a new era has begun with the application of green infrastructure to solve issues related to stormwater, erosion, energy consumption and alternative transportation. All of this change brings the Allegheny County Parks to an opportune moment to reassess conditions, identify needs and opportunities, and craft recommendations for improving the parks both as living ecological systems and as beloved spaces for the many citizens who use them regularly. This is the second ecological assessment and recommendation document that the Western Pennsylvania Conservancy has provided for Allegheny County Parks Foundation; Boyce Park concluded in January 2016.

1.2 PROFILE OF SOUTH PARK

South Park is located ten miles south of Pittsburgh's downtown near the southern edge of Allegheny County in the Bethel Park and South Park Township municipalities. The "people's country clubs," as North Park and South Park were once called, were originally farmland and much of the wooded areas were created in the late 1920s.

Paul B. Riis, the first Allegheny County Parks Director, believed in combining scenic beauty with active recreation in a natural environment, when creating a park. He used "prairie style" ideas – conservation, restoration and repetition. Only 90 of the initial 1,400 acres of South Park



BMX track located in South Park. Photo courtesy of Trail Pittsburgh.

were wooded; at least 150,000 trees were planted in the Park in its first four years. Riis also felt as though roads should be implemented only when necessary. He also believed that “native” materials be used whenever possible. This is why there were so many stone and wooden structures in the Park, many that still stand today. In the



COMPLETED CASCADES TO LOWER POOL
The South Park structure Lower Cascades after completion, part of Paul B. Riis' structure using native materials.

1931 Allegheny County Bureau of Parks Annual Report, Riis stated, *“Parks primarily are intended to counteract the effects of pent-up living in cities, the attending irritations and artificialities of civilization. Here the people may find their specific kind of recreation in the wholesome surroundings, atmosphere and spirit of Mother Nature that even for short periods, will tend to recreate the mind and body as nothing else can.”*

Many of Riis' plans for South Park were not fully realized as he was fired in 1932 when an oppositional County Commissioner, Charles C. McGovern, became majority commissioner. The county fair and its needed amenities,



Historic photo of Kilmer Circle, part of the developments made to South Park with the county fair in the early 1930s.

established in 1933 in South Park, forced the most apparent departure from Riis' original intention of a more natural park. Federal relief programs helped to pay for many of the upgrades in the Allegheny County Parks in the 1930s. South Park had many unique stone structures built through the Works Progress Administration and the Civilian Conservation Corps.

Encompassing 2,013 acres, it is the second largest park in the Allegheny County Parks

system. South Park has an 18-hole golf course, various ball fields, basketball and tennis courts, a wave pool, 58 shelters for rental, a BMX track and skate park, a nature center, deck hockey rink, an ice rink and more than 23 miles of multi-use trails, some of which are paved. There are additional facilities available for rental, a model airplane field, amphitheater, horse show ring and game preserve currently with 11 buffaloes.

Historically, South Park has been a popular regional destination for many different reasons since its inception. The Allegheny County Fair was housed in South Park for nearly 40 years with a half-million visitors visiting the fair each year. The fair ceased in the early 1970s due to reduced farming in Allegheny County. During the late 1960s, South Park was home to an experimental automated mass transit project called the Westinghouse Transit Expressway, or Skybus, that ran along Corrigan Drive until 1972.

Literature Cited

- Block, Ronald J. 12 May 2006. "Saving South Park: Discovering the Past, Finding the Future." Chatham College, Pittsburgh, PA.
Friends of South Park - Allegheny County Parks. 2016. website: www.southparkfriends.org
Gangewere, R. Jay. July/August 1986. "Allegheny County Parks." Carnegie Magazine, Pittsburgh, PA.

1.3 ECOLOGICAL ASSESSMENT OF SOUTH PARK METHODS

Team

The WPC team consisted of its community forestry staff, land protection specialist from the Land Conservation Program, field ecologist, senior ecologist, and community forestry director of the Community Gardens and Greenspace Program.

Approach

The team used aerial photographs to identify likely areas with forest cover; these photos were compared to older photos to identify locations that might have longer-term growth signifying potentially more ecologically significant locations. From these preliminary indications, the park was segmented into areas for further exploration. The field team included the WPC ecologist, community forester, community forestry arborist and additional field staff. They visited the entire park and delineated sections and documented types of forest, types of understory vegetation and other features and conditions. The team used a customized Geographical Information System (GIS) data

collection application to map five distinct management zones that were broken into 78 ecological units (EU) (see Section 2.10). Existing conditions of each unit were documented, analyzed and inventoried. Key environmental features were noted such as seeps, rock outcrops, slopes and open areas.

Problems were noted including erosion, soil compaction, dangerous trees or overgrowth, and conflicts between users and ecosystem. A green infrastructure survey was also completed to identify the most strategic locations to apply green infrastructure to manage stormwater runoff and improve the park's ecological function, aesthetics and sustainability.

Intended Users

This report and accompanying set of maps, charts and resources is intended for use by the Allegheny Parks Foundation and the Allegheny Parks Department staff to protect and restore South Park's natural assets.



WPC staff walk the trails of South Park.

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2.1 ECOLOGICAL OVERVIEW

This section provides a basic background and overview of the ecology of South Park. The state of ecosystems today in the park is due to the interaction of the basic environmental conditions in the park; the plants, animals and other living organisms that inhabit our region; and the land management activities of people. Soils and geology are the foundation of the web of life, providing nutrients and shaping growing conditions for plants, which are the base of the food chain. The **Geology** and **Soils** sections below describe these features of the park in more detail.

Upon this environmental foundation, forests, meadows, and shrublands have developed in the natural landscapes of the park. The character of these plant communities reflects both the rich botanical heritage of our region, situated at the northern edge of the Appalachians, and the variety of human land uses over the past century that have had substantial impacts on the natural environment and the plants and animals that inhabit it. **Allegheny County's Ecological Heritage** provides a background for understanding South Park's ecosystems in a regional context, while **Land Use and Ecological History of South Park** describes the ways in which human activities have affected the development of natural communities in the park.

The park contains populations of several uncommon plant species, which should receive special management consideration for their conservation. They are all specialists of high-pH soils, which are a unique environmental feature of the park.

A relatively high fraction of the park's land area (20%) has been developed, including facilities and the golf course (12% of the land area). The major environmental issue related to the developed areas is the challenge of stormwater management and the impacts of runoff on water quality, with such a large area of relatively impervious surface. Furthermore, many waterways in the park, including Catfish Run as well as its smaller tributaries, do not currently have adequate natural riparian buffers. Stormwater management, water quality, and the ecological health of the park's riparian ecosystems can all be improved



WPC staff assessing vegetation in South Park.

by the establishment of natural riparian buffers along natural waterways throughout the park, wherever practical.

About a quarter of the park is semi-maintained “parkscape,” with a scattered tree canopy and periodic maintenance of the herbaceous vegetation; and 4% of the land area is regularly mowed. The major challenges of these landscapes are the economic and environmental costs of maintenance, evaluation of public use to determine if it can be compatible with maintenance reduction, and the question of how best to steward ecologically-oriented restoration of any areas that can be converted to a more natural condition requiring less maintenance.

The remaining half of the park’s land area is natural vegetation that is for the most part unmaintained; about one-third of the park has successional forests (28%) or pine plantations (3%), while one-fifth of the park has older, mature forests that have had relatively little disturbance. These mature forest ecosystems are unique habitats that have developed over a long period of time, and host plant and animal species that cannot be found in younger, more disturbed plant communities. The successional forests of the park occur on lands that were previously cleared for agriculture or other purposes, which have reverted to forest in the decades since the park’s establishment in 1927. In these younger forest landscapes, the legacy of agriculture on the soils and the pervasive presence of invasive species pose significant challenges to the redevelopment of mature native forest communities.



Parking lot in Management Zone 3 for nearby pond, fountain and other park amenities.

2.2 GEOLOGY

Surface geology refers to the bedrock layers closest to the surface of the earth. Bedrock is the foundation material for soil, and also greatly influences the chemistry of water bodies such as streams, rivers, and lakes. Surface geology can be a determining factor in the diversity of plant life on land, and animal life in streams and lakes.

Pennsylvania is divided into physiographic regions based on landforms and geological history. South Park is located in the Pittsburgh Low Plateau section of the Appalachian Plateau province, characterized by low rolling hills that formed by the gradual erosion of stream valleys, rather than the tectonic upheavals that formed the Allegheny and Appalachian ranges. In this region, the surface geology layers were formed through sedimentary processes, and they have not been extensively folded by subsequent tectonic activity; today they lie horizontally or gently undulate over large distances. The Pittsburgh Low Plateau is within the unglaciated portion of the Appalachian Plateau province.



Floodplain Forest in South Park Management Zone 5.

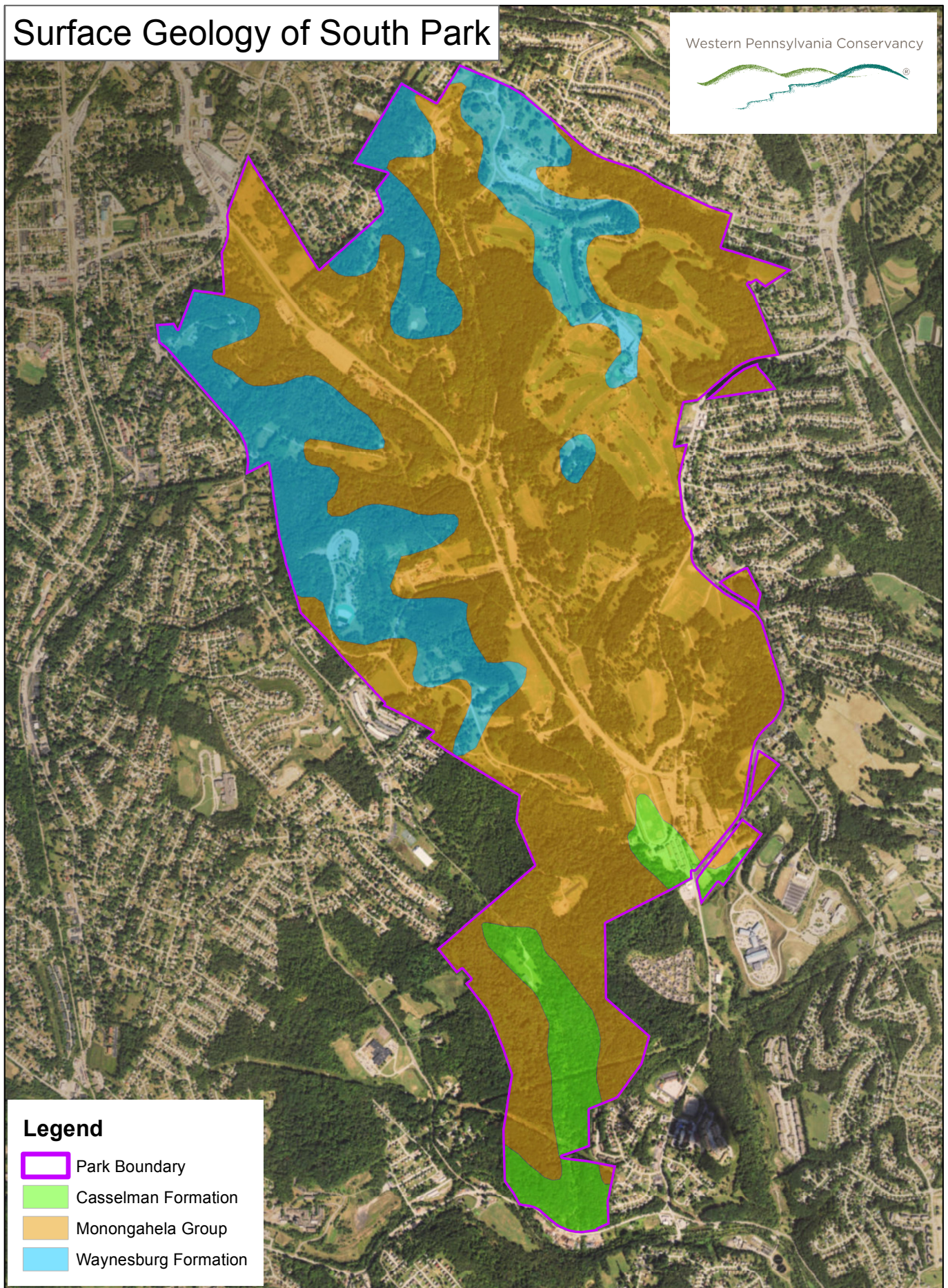
Geologists classify rock layers into groups and formations based on the time period in which they formed. Formations are also described according to their mineral composition, which greatly influences soil materials and plant life. The surface geology of South Park is predominantly Monogahela Group. The hilltops and upper slopes in the northern end of the park are Waynesburg

Formation, and the lower elevations along the stream valleys in the south (Catfish Run and Sleepy Hollow) are Casselman Formation.





The Monogahela Group consists of many layers of limestone, shale, sandstone, and coal. It has a fairly high proportion of calcareous materials, because some of the limestone layers are relatively thick, and some of the sandstone and shale layers are also calcareous. These calcareous materials in turn influence

Surface Geology of South Park

Western Pennsylvania Conservancy



Legend

-  Park Boundary
-  Casselman Formation
-  Monongahela Group
-  Waynesburg Formation

the calcium content and pH of the soil. Many plants grow best in soils with pH between 5.0 and 6.5, because in this range, most nutrients are readily available, while toxic metals are chemically bound. However, Pennsylvania's natural diversity of plant species also includes specialists who thrive on acidic or calcareous soils. Although most of South Park has bedrock geology that supports soil chemistry in the mid-range of plant growth, there are some areas where the calcareous materials of the Monongahela are manifest and soil pH is fairly high, 6.0-7.0, creating the potential to host very diverse plant communities, as well as some calcareous specialists. This type of environment is somewhat uncommon today in Allegheny County, because calcareous geology is a minority component in the county; the Monongahela group has the highest fraction of calcareous materials of the four geological groups mapped in Allegheny County.

Because calcium dissolves readily in water, and leaches out of soils quickly, the influence of calcareous bedrock materials is strongest on slopes, where erosion removes surface materials and exposes new bedrock relatively quickly (Ciolkosz et al. 1995; Bennie et al. 2006). Floodplains also sometimes have a strong calcareous influence, because of the accumulation of materials eroded from the slopes above. Calcareous soils and bedrock affect aquatic ecosystems as well, because they tend to raise the pH of stream waters, and provide



Casselmann Formation in the floodplain of Sleepy Hollow.

buffering capacity that counteracts acidic inputs such as acid rain or acid mine drainage.

The Monongahela Group includes the Pittsburgh coal seam, a very thick and economically important coal layer. The Pittsburgh coal occurs at the lower edge of the Monongahela Group where it borders the Casselman Formation; it does not appear to have been mined extensively within the area of the park, probably due to the early date at which the park was established, but there is acid mine drainage evident at the boundary of the Monongahela and Casselman formations along Sleepy Hollow.

The Casselman Formation consists of layers of shale, siltstone, sandstone, red beds, thin impure limestone, and thin nonpersistent coal. It contains only a minimal amount of calcareous materials. Because the Casselman underlies lower slopes and stream valleys in South Park, soils over this formation likely reflect both Casselman-derived materials that have weathered in place, and the addition of Monongahela-derived bedrock materials that have eroded from upper slopes.

The Waynesburg Formation consists primarily of sandstone and siltstone layers, with some more minor limestone and coal components. As with the Casselman Formation, the Waynesburg Formation does not contain many calcareous materials and contributes to slightly acidic soil chemistry. The Waynesburg Coal layer (at the base of the formation where it meets the Monongahela Group) is commercially mined.

2.3 SOILS

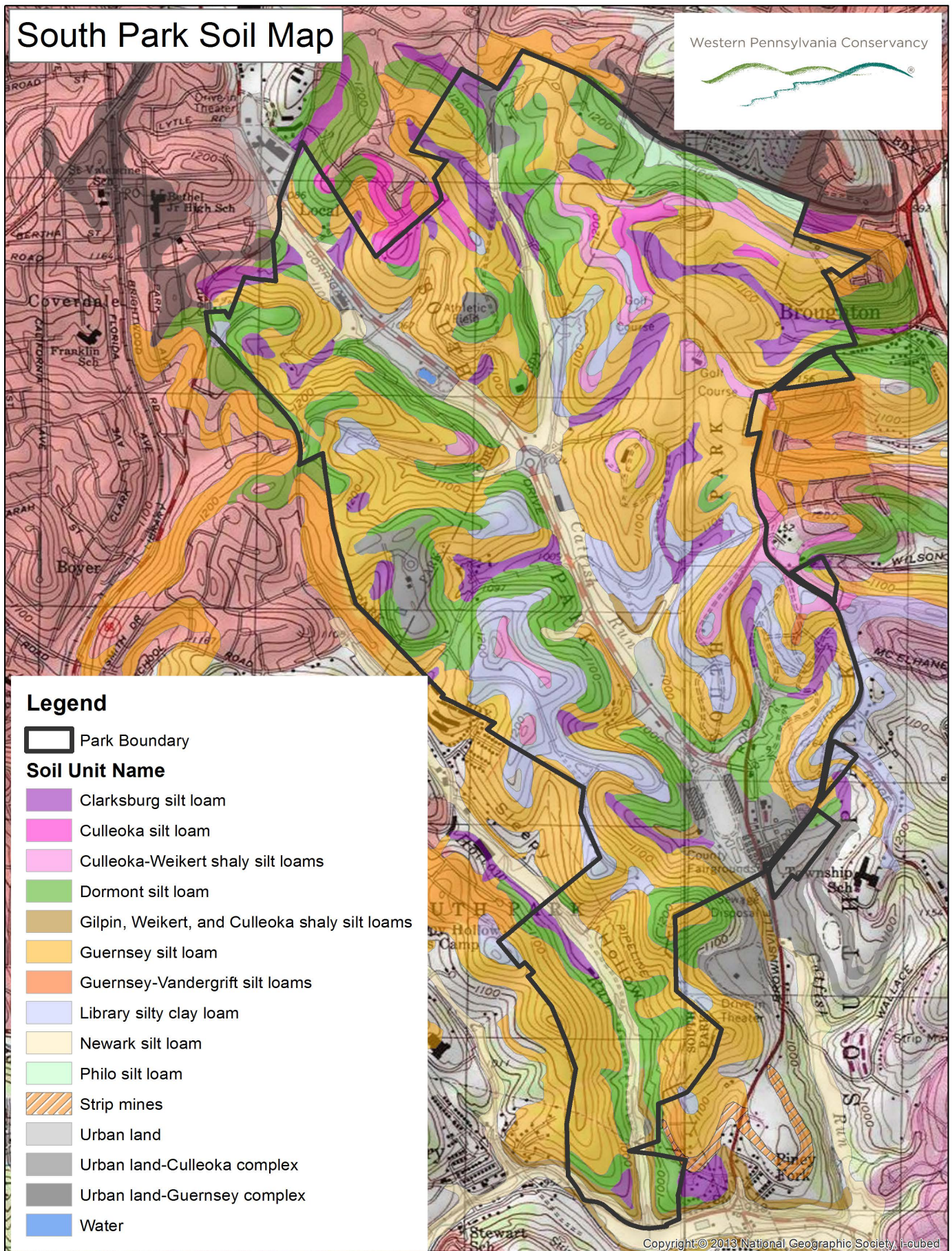
A variety of soil types are found within the park, but they do not differ greatly in their characteristics, and differences between soil types appear to be a fairly minor influence on plant community type. Soils in the park tend to be deep, well-drained, and with high water holding capacity. All of the plant community types documented within the park are



Soil testing in the Vale of Cashmere floodplain.

South Park Soil Map

Western Pennsylvania Conservancy



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relatively mesic, which is consistent with the lack of shallow-to-bedrock, well-drained or very well-drained soils. The Allegheny County Soil Survey describes most types found within the park as moderately to strongly acidic; in-situ soil testing at several locations found pH values of 5.5-7.0, consistent with the “moderately acidic” range.

2.4 ALLEGHENY COUNTY’S ECOLOGICAL HERITAGE

This region’s natural ecosystems have developed over tens of thousands of years. Further south, the Southern Appalachian Mountains are one of the world’s biodiversity hot spots, in part because of a hospitable climate and in part because ecological development was never reset by glaciation. Southwestern Pennsylvania is at the northern edge of this bioregion; the character and diversity of its plant and animal life show both an Appalachian and Midwestern influence, and it is markedly different than previously glaciated ecosystems just a short distance to the north. Southern influences extend into Allegheny County in particular because of the moderate climates along the major river corridors: the Ohio, Allegheny, Monongahela, and Youghiogheny.

There are no detailed descriptions of the region’s ecosystems preserved before about 1900. Historical ecological assessment techniques such as pollen analysis conducted in other areas of the northeast show that significant ecosystem changes were set in motion in the 1600 and 1700s by the arrival of Europeans and the decline of Native American societies, who had influenced and managed natural landscapes for several thousand years previous to the arrival of European colonists. Furthermore, by the early 1900s, clearcutting for agricultural development and timber sale was already well advanced in the region, and early documentarians could only assess the remaining forest areas. However, despite these limitations, their work remains the best reference we have available for the original character of our region’s forest ecosystems.

In the early 1900s, E. Lucy Braun catalogued the natural forest ecosystems of eastern North America, in a definitive work that can never be replicated because these systems have been so extensively altered in the years since. She placed southwestern Pennsylvania within the Cumberland and Allegheny Plateaus section of the original Mixed Mesophytic forest region (Braun 1950). This region extends from northern Alabama to glaciated northeastern Pennsylvania; Allegheny County is at the far northern end. The Mixed Mesophytic Forest is characterized by an exceptionally diverse tree canopy, and by a rich Appalachian-influenced herbaceous layer. {Dominant species of the climax forest in this region are the American beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), basswood (*Tilia sp.*), sugar maple (*Acer saccharum*), American chestnut (*Castanea dentata*), sweet buckeye (*Aesculus octandra*), red oak (*Quercus rubra*), white oak (*Q. alba*), and eastern hemlock (*Tsuga canadensis*)}. According to Braun’s work, Allegheny County lies within

a subdivision of this region called the Low Hills Belt, characterized by a larger proportion of oak than is typical for Mixed Mesophytic Forest.

Otto Jennings of the Carnegie Museum of Natural History also wrote pioneering baseline ecological descriptions for the region in the early 1900s. He described two forest types for the region, a “White Oak Association” and a “Sugar maple – Beech Association”. The White Oak Association is found on rolling uplands and rounded hills, and it is dominated by white oak, shagbark hickory, red maple, and other oak species. The Sugar maple – Beech Association is found on richer, moister soils such as floodplains, valleys, and lower slopes, and the canopy dominants are sugar maple, American beech, hickories (*Carya* spp.), red oak, white oak, white ash (*Fraxinus americana*), and American basswood.

This ecological baseline of the early 1900s has undergone unprecedented changes. Today’s landscape reflects both the rich ecological heritage of the region, and the impact of many modern challenges such as forest pests, fragmentation, invasive species, and post-agricultural forest recovery. Tree species that were once a ubiquitous part of our region’s forests, such as the American chestnut, American elm, white ash, and green ash, have been eliminated or greatly reduced in our forests by the introduction of exotic forest pests and diseases. More species may still be lost; oak species, hemlock, and American beech are threatened by the gypsy moth, hemlock wooly adelgid, and beech bark disease complex, respectively. Invasive plant species have been introduced that are displacing native species on a large scale. Excessive deer browse is also a modern problem that threatens forest regeneration and diversity, as deer were previously held in check by keystone predators such as wolves. Our challenge in landscapes such as the Allegheny County Parks is to safeguard and improve the health of our remaining natural diversity, and to restore ecological health where it has been impaired.



Mature forest in South Park Management Zone 5.

2.5 LAND USE AND ECOLOGICAL HISTORY OF SOUTH PARK

Before South Park was established in 1927, the land that now falls within park boundaries had a variety of other uses, which have left a lasting legacy on its present-day ecological condition. Furthermore, when South Park was first established, extensive naturalistic landscaping work was done between 1927 and 1932 at the direction of designer Paul Riis. Thousands of trees, including many native species, were transplanted to reestablish forest on former agricultural lands; naturally occurring woodlands were thinned or managed in some cases; and naturalistic design features such as bridges or cascade pools were installed or sculpted out of the native stone. Although many of these landscape design elements have not been maintained in recent decades, this early work has influenced the development of the parks' ecosystems. They also present an opportunity for historic restoration and preservation.

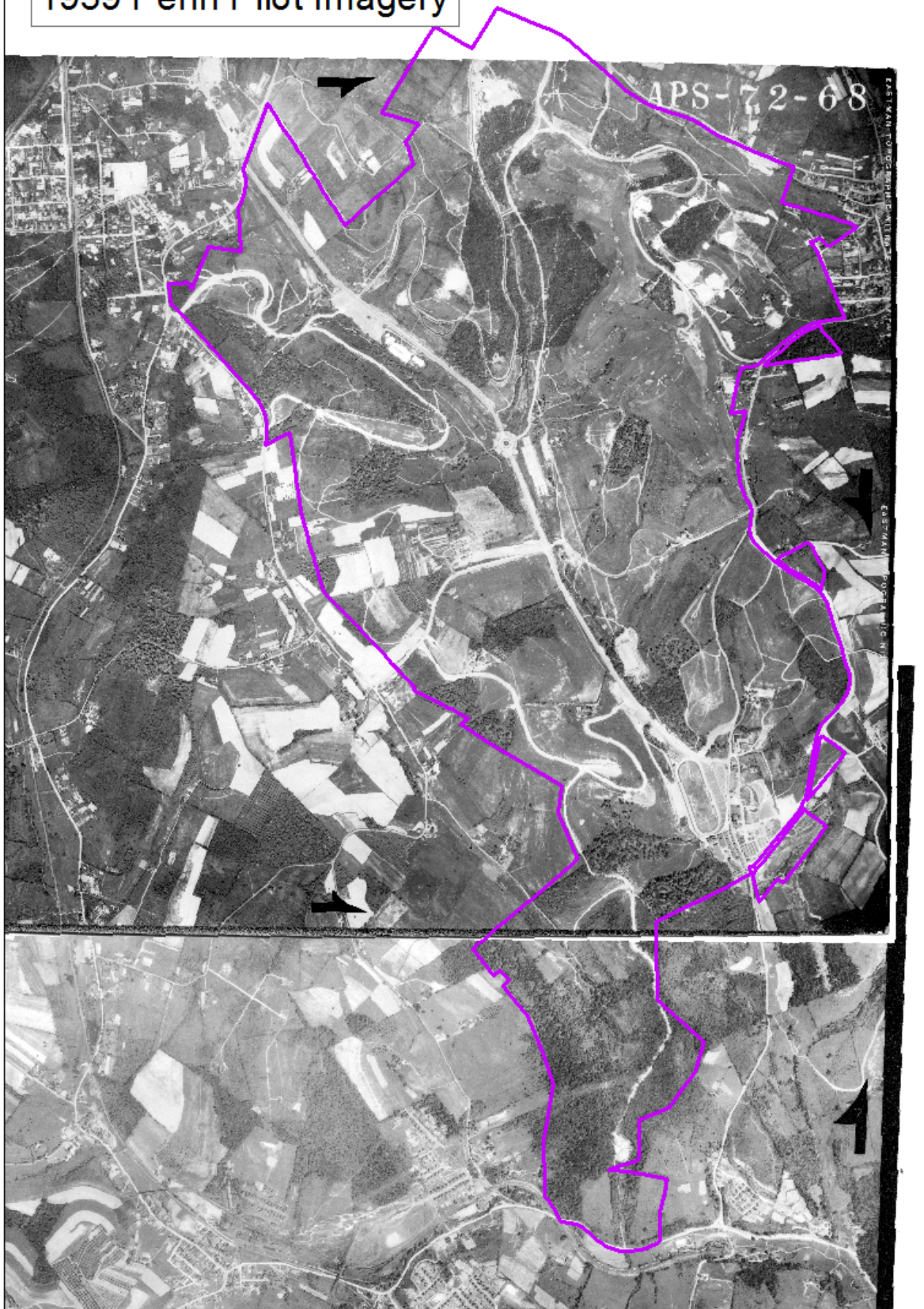
Many of the key distinctions in the present-day ecological condition of natural communities in the park can be traced back to early land use, visible in early 20th century aerial photography. The earliest available aerial photographs



Sun shining through a wooded canopy near the Sesqui Drive and Brackenridge Drive Intersection.

are from 1939, about 12 years after work began to establish South Park. Back then, most of the park was cleared land, with hedgerows separating former agricultural fields still visible. Most roads and major developments, such as the golf course and the horse track, already in place. About a third of the land had some degree of forest cover, much of it in small scattered fragments, although larger forest patches were present in the southern end of the park and just west of the golf course. Even in 1937, little of the forest in the park appeared to be original; the tree canopy size indicated regeneration in the range of 10-40 years old, although scattered older individuals could certainly be present. The areas that host mature forest today are all centered around forest patches that are visible in these early

1939 Penn Pilot Imagery



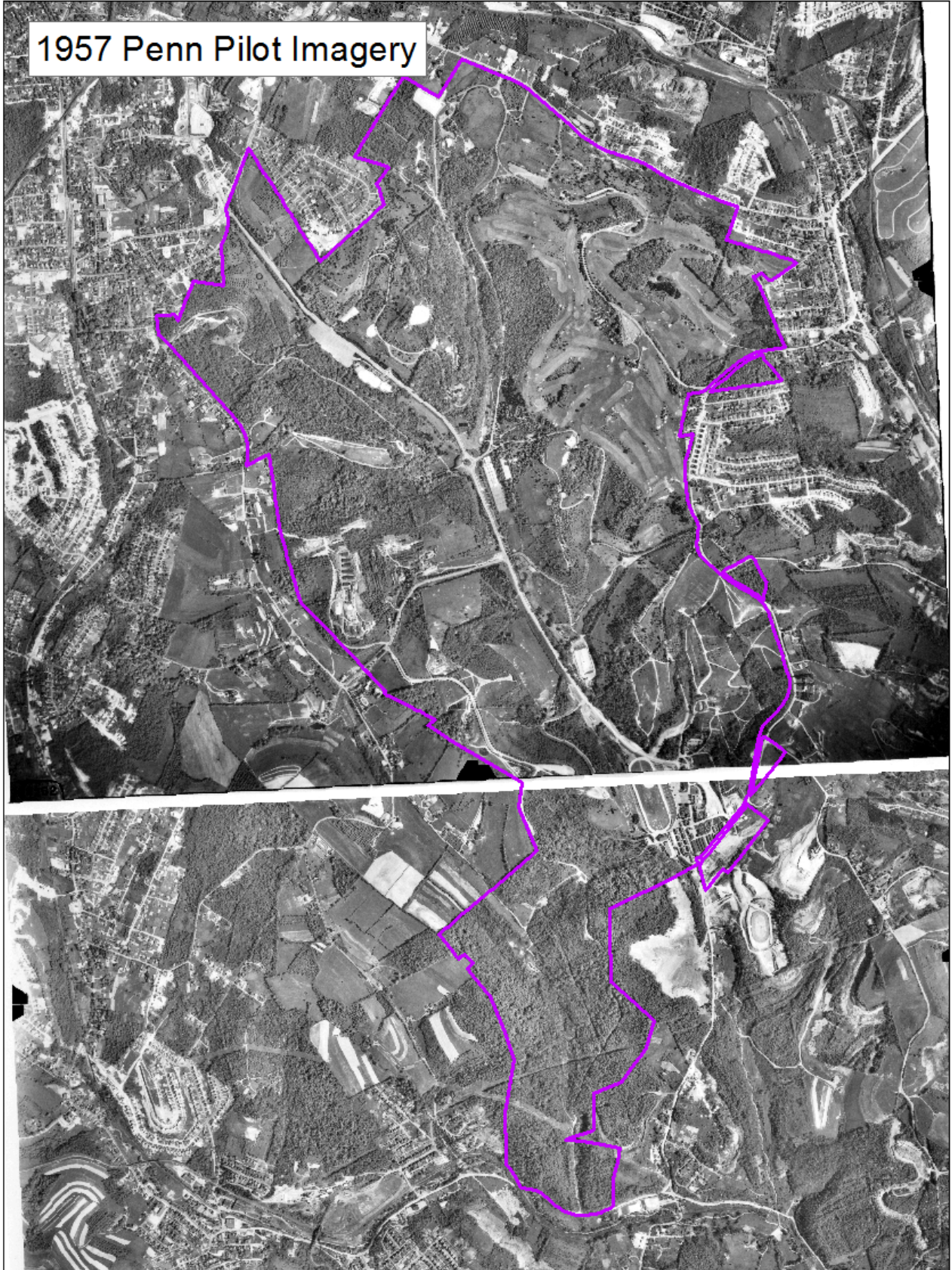
aerial photos, although some present-day mature forest patches also include adjacent areas which likely re-established quickly due to the availability of seed source nearby.

In 1957 aerial photographs, there is substantially more forest cover in the park, with many areas having regenerated in the two decades since the original 1937 photos. Most of the forest cover that is present today had established by this time. There are also extensive areas of the park that today are semi-forested “park-scape”, with scattered to patchy tree canopy and an open understory; in 1957 the tree canopy in these areas is visible, but very young in most cases.

The second-growth forests that established after the creation of the park are today primarily classified as successional forest, due to smaller diameter trunks and a composition that includes more early-successional species and more exotic species than is typical of a mature forest community. The present-day compositional differences between the areas which are visibly forested in 1939 vs. those that regenerated after 1939 are likely due to differences in land use prior to the park’s establishment. The earliest regeneration may have occurred after timbering, rather than agricultural use, while most areas that appear as cleared land in 1939 were likely previously used for agriculture.



1957 Penn Pilot Imagery



Agricultural use has a profound impact on the trajectory of subsequent reforestation. When forests are cut but the land is not tilled, regeneration often occurs from resprouting of tree stumps and of the underground parts of herbaceous plants that have been disturbed, or from the seed bank. Tillage removes all existing native plant material, and deeply buries the seed bank. Many native forest species have poor capacity to spread long distances, or to establish outside of an intact forest ecosystem; for example, they may spread mainly by clonal increase, or depend on ants for seed dispersal. These species will recolonize post-agricultural landscapes extremely slowly, or not at all. Tillage also fundamentally alters the soil in ways that are not favorable to native forest ecosystems; the soil strata are intermingled, and the living soil ecosystem shifts from dominance by mycorrhizal fungi to dominance by bacteria. Many native species depend on mycorrhizal fungi, and either cannot germinate or grow poorly without them. In post-agricultural landscapes that are left to regenerate naturally, these soil changes put native species at a further competitive disadvantage with invasive exotic species, which typically do not depend on mycorrhizae.

Today, the problem of forest regeneration is further compounded by the ubiquitous presence of exotic invasive species, which often out-compete native species, and are favored by disturbed environments. In the post-agricultural landscapes of the park, which today contain early successional forests with a mixture of native and exotic species, mature native forest communities are unlikely to develop again without intervention; in some cases, the density of exotic shrubs and vines may prevent mature forest cover of any kind from regenerating.

The most ecologically intact portions of the park are centered around the largest blocks of forest that pre-date the formation of the park; the area centered around Sleepy Hollow in the southern end of the park, and the area centered around East Park Drive just west of the golf course. These areas contain mature forest communities that are predominantly native in species composition. However, species composition is generally less diverse than would be expected in an untilled, remnant native forest in a similar environment, with relatively few conservative forest species present. This lack of diversity may be a legacy of the disturbances associated with early park landscaping projects, or it may also reflect decades of overbrowsing by white-tailed deer.

Mature Forest Reservoirs - Core Forests and Buffers

Western Pennsylvania Conservancy

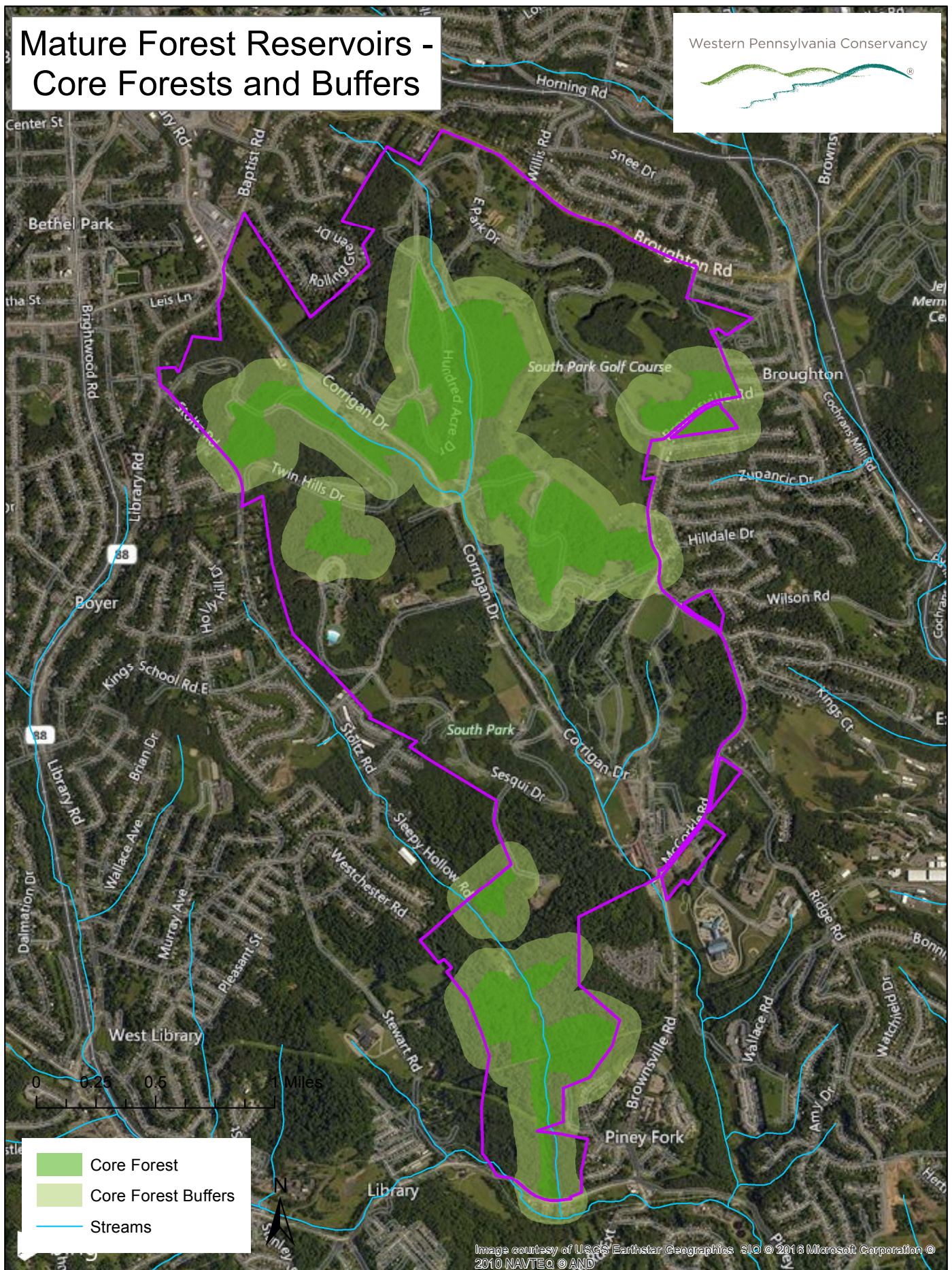


Image courtesy of USGS Earthstar Geographics, SIO © 2011 Microsoft Corporation © 2010 NAVTEQ © AND

2.6 BOTANICAL RESERVOIRS FOR FOREST PLANT SPECIES

The oldest forests in the park serve as reservoirs for “conservative” plant species that require intact forest habitat and do not re-establish quickly after disturbance. These species have special conservation value, because they are difficult to re-establish once lost. They can also provide seed and propagule stock for restoration efforts elsewhere in the park, if they are managed to develop healthy populations and sustainably harvested. However, these mature forest areas currently face several threats to the viability of their conservative species populations. Deer browse has greatly reduced the herbaceous layer, to the point that some species only have a few scattered individuals remaining. In a few locations, trail development and recreational impacts threaten plant growth. Invasive species are also becoming established, which threatens to displace native species.



Catfish Run near the ice skating rink parking lot.

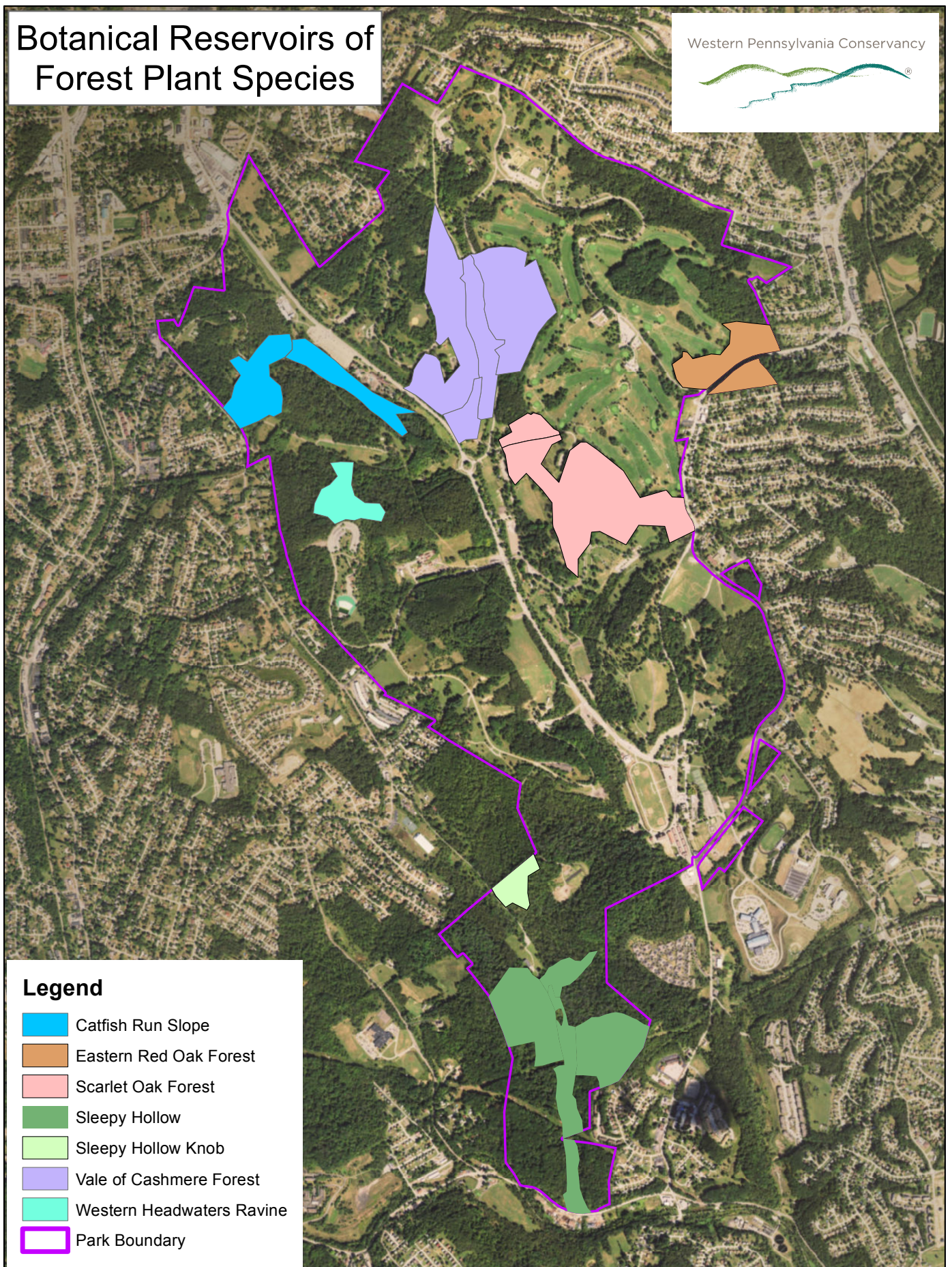
The following Forest Reservoir Areas are found in South Park:

2.6.1 CATFISH RUN SLOPE

This slope above the floodplain of Catfish Run is the only extensive remnant forest area along the park’s largest stream. The forest community is classified as Sugar maple forest; it is similar to the Sugar Maple Floodplain Forest type (although slightly more upland in character), and contains unique floristic elements because of its position on a lower slope near a large floodplain. The canopy is dominated by sugar maple (*Acer saccharum*) and black maple (*Acer nigrum*), which indicate rich soil, and there are some very large silver maples (*Acer saccharinum*) at the southern end of this area, which are typical of mature floodplain forests. The herb layer contains many sensitive wildflower species also typical of rich soils found on floodplains or lower slopes, including giant blue cohosh (*Caulophyllum giganteum*), cow parsnip (*Heracleum lanatum*), honewort (*Cryptotaenia canadensis*), waterleaf (*Hydrophyllum*

Botanical Reservoirs of Forest Plant Species

Western Pennsylvania Conservancy



sp.), silvery glade fern (*Athyrium filix-femina*), green-headed coneflower (*Rudbeckia laciniata*), skunk cabbage (*Symplocarpus foetidus*), elderberry (*Sambucus canadensis*), zigzag goldenrod (*Solidago flexicaulis*), Christmas fern (*Polystichum acrostichoides*), and red trillium (*Trillium erectum*). The Catfish Run Slope does have some invasive species established that could threaten this diverse assemblage if not managed, including privet, Japanese honeysuckle, narrowleaf bittercress (*Cardamine impatiens*), and Japanese stiltgrass (*Microstegium vimineum*).

2.6.2 VALE OF CASHMERE FOREST

This area of mature forest is centered around the stream tributary and its floodplain where the Vale of Cashmere is located; it also includes the slopes to the east and west of the floodplain. Although these three areas are separated by roads and include some landscaped or developed features, together they form one of the largest blocks of mature forest in the park.

Located in the center of this forest at the tributary to Catfish Run is the remnant stonework of a collection of rock pools, created by Paul B. Riis in the early 1930s. The water was made to flow over several stone ledges, creating a series of waterfalls. While this feature no longer directs water flow today, portions of the old stone can still be observed within the relatively intact floodplain forest.



Old stone structures that still exist in the Vale of Cashmere floodplain.

The Mid-Atlantic High Terrace floodplain forest between East Park Drive and One Hundred Acre Drive is one of the best examples of this type of community in the park. The canopy includes a distinctive mix of rich hardwoods like sugar maple and white ash and floodplain specialists such as bitternut hickory (*Carya cordiformis*), hackberry (*Celtis occidentalis*), and American elm (*Ulmus americana*). The herbaceous layer is less diverse than would be expected for a typical well-developed example of this community, but still notable within the park. Woodland phlox (*Phlox divaricata*) forms extensive patches that offer a profusion of blue-purple blooms in the spring, and other distinctive floodplain wildflowers include wild lily (*Lilium sp.*) and skunk cabbage (*Symplocarpus foetidus*). There are some issues with trail erosion and invasive species in this area.



Trillium erectum blooming in spring in the Vale of Cashmere floodplain.

Heavy usage, especially by mountain bikers, during wet time periods and the surrounding topography does cause some scattered trail erosion at the bottom of the floodplain. The forests were minimally invaded with manageable populations of garlic mustard, privet, and multiflora rose within the floodplain and immediately around the Vale of Cashmere. Japanese barberry and Japanese honeysuckle were observed further upslope.

The upland forest east of East Park Drive is one of the most intact and diverse forest communities in the park. It is best characterized as a Red oak – Mixed Hardwood Forest Community, with a canopy of red oak (*Quercus rubra*), black cherry (*Prunus serotina*), American beech (*Fagus grandifolia*), and occasional sugar maple (*Acer saccharum*) or red maple (*Acer rubrum*). This area hosts many sensitive wildflower species, including red trillium (*Trillium erectum*), Solomon's seal (*Polygonatum pubescens*), false Solomon's seal (*Maianthemum racemosum*), woodland phlox (*Phlox divaricata*), stonecrop (*Sedum ternatum*), and early meadow-rue (*Thalictrum dioicum*). However, some of these species

currently have very small populations, only present as scattered individuals in difficult-to-reach areas such as steep slopes along stream ravines. This is most likely the result of overbrowsing by deer, although it may also be related to past land use from which the populations still have not recovered. In general, this area has one of the more diverse and invasive-free wildflower communities in the park, and should receive particular conservation attention to maintain this condition.

The forested area to the west of One Hundred Acre Drive is also an upland Red Oak – Mixed Hardwood community type, which has a typical mature forest canopy with some very mature trees, but a somewhat less diverse wildflower community and more problems with patches of invasive species such as privet shrubs. It can benefit from reduction of invasive species, and possible reintroduction of typical native wildflowers.

These three patches of mature forest should be managed together as a natural area, with the goal of maintaining and restoring mature forest community habitat for native plants and animals.



Sleepy Hollow Run in the north part of Management Zone 2.

2.6.3 SLEEPY HOLLOW

The forest communities on the floodplain of Sleepy Hollow and the nearby slopes are some of the most diverse and intact found within the park. The community type on the floodplain is a High-Atlantic High Terrace hardwood forest, and the forest canopy is dominated by sugar maple (*Acer saccharum*) and black maple (*Acer nigrum*), with white oak (*Quercus alba*), bitternut hickory (*Carya cordiformis*), and basswood (*Tilia americana*) also present. The very diverse wildflower community includes several species that are typical of high pH soils, including the Short's sedge (*Carex shortii*), which has a state legal status of Pennsylvania Rare, and the crepis rattlesnake root (*Prenanthes crepidinea*), which is a Pennsylvania Watch List species. Other notable wildflowers include yellow trout lily (*Erythronium americanum*), Jacob's ladder (*Polemonium reptans*), false Solomon's seal (*Maianthemum racemosum*), spring beauty (*Claytonia virginica*), green-headed cone flower (*Rudbeckia laciniata*), bee balm (*Monarda sp.*), and false mermaid (*Floerkea proserpinacoides*).



Heavy infestation of Japanese stilt grass in the Sleepy Hollow floodplain.

The forests on the adjacent slopes to the east and west of Sleepy Hollow Run are classified as Sugar maple forest and are more variable in quality. The eastern slope has a good variety of wildflower species, including sensitive, slow-to-establish species and several that were not found elsewhere such as bloodroot (*Sanguinaria canadensis*), golden ragwort (*Packera obovata*), and rue anemone (*Thalictrum thalictroides*), but this slope also has a fairly high population of highly invasive Japanese stiltgrass (*Microstegium vimineum*) that can displace native flora. The forests of the western slope have a typical mesic forest canopy composition, with sugar maple (*Acer saccharum*), red oak (*Quercus rubra*) and slippery elm (*Ulmus rubra*), but the wildflower community has a surprisingly low diversity, lacking in sensitive species that are slow to establish. This may indicate past tillage or other disturbance to the soil. The western slope also is experiencing damage from ATV use.

Although the quality of the natural communities present in different portions of the Sleepy Hollow forest reservoir is somewhat variable, together they form a fairly large block of mature natural forest, and they should be managed as natural area unit with the goal of maintaining and restoring high quality mature forest community habitat for native plants and animals. Habitat value can be further improved by restoring the patches of successional forest that are adjacent to and in some cases in between mature forest community patches, through invasive species reduction and seeding of native species from nearby areas.

2.6.4 SLEEPY HOLLOW KNOB

This is a fairly small mature forest remnant surrounded by successional forest communities; it is notable because it has a good diversity of wildflowers, and also a slightly different species composition because the slope is somewhat drier than many of the other mature forest remnants. It can serve as a reservoir for restoration of the nearby early successional forest communities, many of which are highly invaded with exotic species. It is classified as a Red oak-Mixed hardwood forest.

2.6.5 EASTERN RED OAK FOREST

This area hosts a fairly typical example of a Red oak – Mixed Hardwood Forest community for the park, with red oak (*Quercus rubra*), black maple (*Acer nigrum*), slippery elm (*Ulmus rubra*) in the canopy. It is notable because it hosts a plant species with the state legal status of Pennsylvania Vulnerable, goldenseal (*Hydrastis canadensis*). This species is found in rich forests with high-pH soil, and it is threatened by collection for medicinal use or sale in the medicinal plant trade. The overall quality of the forest community here is reduced by fairly high cover of invasive species, including as Amur honeysuckle

(*Lonicera maackii*), Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), and privet (*Ligustrum sp.*)

2.6.6 WESTERN HEADWATERS RAVINE

This is a small area of mature forest situated in a steep ravine, surrounded by early successional forest, but it is notable for a fairly diverse tree canopy due in part to steep slopes that range from mesic to drier within a small area. The canopy includes tuliptree (*Liriodendron tulipifera*), red oak (*Quercus rubra*), black gum (*Nyssa sylvatica*), American beech (*Fagus grandifolia*), white ash (*Fraxinus americana*), ironwood (*Carpinus caroliniana*), and red maple (*Acer rubrum*). The wildflower community is not tremendously diverse, but does contain some moderately sensitive species such as black cohosh (*Actaea racemosa*), Virginia waterleaf (*Hydrophyllum virginianum*), lady fern (*Athyrium filix-femina*), and several perennial sedge species (*Carex albursina*, *Carex laxiculmis*, *Carex amphibola*). The ravine has a fairly high density of trails, with some erosion issues present that should be addressed. It is classified as a Red oak-Mixed hardwood forest community.



Mature forested area in Sleepy Hollow floodplain area, in South Park Management Zone 1.

2.6.7 SCARLET OAK FOREST

This mature forested area is fairly large, and notable for its unique canopy composition, with greater dominance of scarlet oak (*Quercus coccinea*) than other areas. Other canopy species include red oak (*Quercus rubra*), tuliptree (*Liriodendron tulipifera*), American elm (*Ulmus americana*), black walnut (*Juglans nigra*), and bitternut hickory (*Carya cordiformis*). This forest community has a fairly high incidence of invasive species present, and the wildflower layer is not highly diverse with native species. The very northern end of this mature forest area has a different aspect and is more mesic, with sugar maple (*Acer saccharum*) dominant and even a small component of basswood (*Tilia americana*) present. Despite the variation in canopy, this area is best classified as a Red oak-Mixed hardwood forest community.

2.7 MANAGEMENT RECOMMENDATIONS FOR FOREST RESERVOIRS

- Manage deer populations in the park to reduce browsing pressure. Immediate deer fencing around especially sensitive areas may be a good way to stop further loss of plant diversity, as long-term deer management plans are developed. Areas with particularly unique wildflower communities, such as the eastern slope of the Vale of Cashmere Forest reservoir, the Sleepy Hollow floodplain



Deer enclosure example. Photo courtesy of Cougar Rewilding Project (cougarrewilding.org)

community, and the Catfish Run Slope, are priority targets for deer fencing.

- Trail development should be limited in the mature forest areas. If mountain biking cannot be contained to trails, trails should be restricted to foot traffic.
- Interpretive signage regarding the biodiversity value of the mature forest areas, including requests not to pick flowers or other native vegetation, and to refrain from damaging recreational activities, may help with public cooperation in conservation-oriented management of these areas.
- Mature forest areas should be a special focus for invasive species management, to preserve these ecosystems while they are still in reasonably good condition.

2.8 BOTANICAL CONSERVATION TARGETS AT SOUTH PARK

The park contains several populations of plant species that are rare in the state or region. Conservation of these species should be a particular management goal. All of these species are found only in calcareous soils.

Short's sedge (*Carex shortiana*). This species has the legal conservation status of Pennsylvania Rare. It is a tufted, grass-like plant with chocolate-brown cylindrical seed columns. It is a specialist of calcareous soils that can grow in forested floodplains, but also tolerates more disturbed habitats such as open wet meadows or even former agricultural fields. In South Park, the species occurs in the forested floodplain community along Sleepy Hollow, and also in a patch alongside a trail.

Management recommendations:

- Monitor and control invasive species as needed, to



Short's sedge (*Carex shortiana*)

prevent establishment of exotic shrub or herbaceous species that might outcompete the Short's sedge. Control techniques should be used that do not harm the Short's sedge or other native vegetation.

- Adapt trail maintenance to avoid damage to the Short's sedge plants. The plants may be favored by existing maintenance practices that create a low-level disturbance or openings in the herbaceous layer; trail rerouting or other significant alterations in current management are not needed, but care should be taken during maintenance activities to avoid damage to the actual Short's sedge plants, especially before seeds have fallen.

Goldenseal (*Hydrastis canadensis*). This species has a legal status of Pennsylvania Vulnerable, due to the potential impact on this species of collection for medicinal use and for sale in the medicinal plant trade. It is known from only one area of the park.

Management recommendations:

- Monitor and manage invasive species in the area occupied by goldenseal, using control techniques that do not harm native species. Invasive species are currently moderately prevalent in the forested area occupied by goldenseal, with some dense populations nearby; this is the highest priority management need for the species at this time.
- Currently there are no trails or public use facilities near the goldenseal population; because this species is vulnerable to collection, as well as to forest degradation from edge effects, it is best to



Goldenseal, *Hydrastis canadensis*.

continue to avoid placement of any facilities resulting in public traffic or forest disturbance near the population.

Crepis rattlesnake root (*Prenanthes crepidinea*). The crepis rattlesnake root is listed on the Pennsylvania Natural Heritage Program “Watch List”, because it is uncommon and possibly in danger of becoming rare without conservation action. This species requires high pH soils, and therefore has somewhat limited available habitat in the region. In South Park, this species is found on the Sleepy Hollow floodplain forest.

Management
Recommendations:

- Monitor and manage invasive species in the area occupied by crepis rattlesnake root, using control techniques that do not harm native species.
- Because this area is a periodically wet floodplain, it is a sensitive environment that could easily be degraded by excessive use. Trails are currently routed around this area, and any future trail development should continue to avoid the floodplain.



Crepis rattlesnake root leaf (*Prenanthes crepidinea*).

Conservative Plant Species of South Park:

The following table lists plant species found in South Park that require intact natural habitats with little disturbance. The “Coefficient of Conservatism” (C-Value) is a rating developed to estimate how strongly a plant requires such a habitat; a species rated “10” will almost never be found outside of a very intact natural habitat, while a species rated “1” can easily colonize disturbed areas. The presence of species rated “5” or above can serve as a guide to indicate good quality natural habitats (Swink and Wilhelm 1994). They are also important conservation targets because many of the species rated “6” or above generally re-establish extremely slowly once lost (this is especially true for herbaceous species, less so for woody species).

Some natural habitats depend on natural disturbances, such as floodplains or fire. Although species that inhabit these ecosystems generally have low coefficients of conservatism, this does not diminish their ecological importance.

Scientific name	Common name	*C-value
<i>Anemone americana</i>	Liverleaf	8
<i>Carex albursina</i>	Sedge	8
<i>Carex shortiana</i>	Sedge	8
<i>Conopholis americana</i>	squaw-root	8
<i>Galium concinnum</i>	shining bedstraw	8
<i>Hydrastis canadensis</i>	goldenseal	8
<i>Maianthemum canadense</i>	Canada mayflower	8
<i>Phlox divaricata</i>	wild blue phlox	8
<i>Prenanthes crepidinea</i>	Crepis rattlesnake root	8
<i>Acer nigrum</i>	black maple	7
<i>Anemone quinquefolia</i>	wood anemone	7
<i>Symphyotrichum shortii</i>	Short's aster	7
<i>Cardamine diphylla</i>	two-leaved toothwort	7
<i>Carex amphibola</i>	Sedge	7
<i>Carex copulata</i>	Sedge	7
<i>Carex laxiculmis</i>	Sedge	7
<i>Caulophyllum giganteum</i>	giant blue cohosh	7
<i>Galium asprellum</i>	rough bedstraw	7
<i>Ostrya virginiana</i>	hop-hornbeam	7
<i>Solidago flexicaulis</i>	zigzag goldenrod	7
<i>Tilia americana</i>	basswood	7

<i>Trillium erectum</i> var. <i>album</i>	purple trillium, white variety	7
<i>Trillium erectum</i> var. <i>erectum</i>	purple trillium	7
<i>Viola canadensis</i>	Canada violet	7
<i>Zizia trifoliata</i>	golden-alexander	7
<i>Acer saccharum</i>	sugar maple	6
<i>Actaea racemosa</i>	black snakeroot	6
<i>Athyrium filix-femina</i>	lady fern	6
<i>Carex gracilescens</i>	Sedge	6
<i>Carpinus caroliniana</i>	hornbeam	6
<i>Carya ovata</i>	shagbark hickory	6
<i>Elymus canadensis</i>	Canada wild-rye	6
<i>Erythronium americanum</i>	yellow trout-lily	6
<i>Fagus grandifolia</i>	American beech	6
<i>Festuca subverticillata</i>	nodding fescue	6
<i>Galium circaezans</i>	wild licorice	6
<i>Hydrophyllum canadense</i>	Canadian waterleaf	6
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	6
<i>Laportea canadensis</i>	wood nettle	6
<i>Nyssa sylvatica</i>	blackgum	6
<i>Polygonatum pubescens</i>	Solomon's-seal	6
<i>Quercus alba</i>	white oak	6
<i>Quercus rubra</i>	northern red oak	6
<i>Quercus velutina</i>	black oak	6
<i>Quercus rubra</i>	northern red oak	6
<i>Sedum ternatum</i>	wild stonecrop	6
<i>Thalictrum dioicum</i>	early meadow-rue	6
<i>Acer saccharinum</i>	silver maple	5
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	5
<i>Botrychium virginianum</i>	rattlesnake fern	5
<i>Cardamine concatenata</i>	cutleaf toothwort	5
<i>Carex rosea</i>	Sedge	5
<i>Carya cordiformis</i>	bitternut hickory	5

<i>Claytonia virginica</i>	Virginia spring-beauty	5
<i>Dryopteris carthusiana</i>	spinulose wood fern	5
<i>Dryopteris intermedia</i>	intermediate wood fern	5
<i>Eurybia divaricata</i>	white wood aster	5
<i>Floerkea proserpinacoides</i>	false-mermaid	5
<i>Fraxinus americana</i>	white ash	5
<i>Galium triflorum</i>	sweet-scented bedstraw	5
<i>Glyceria striata</i>	fowl mannagrass	5
<i>Hamamelis virginiana</i>	witch-hazel	5
<i>Heracleum lanatum</i>	cow-parsnip	5
<i>Lindera benzoin</i>	spicebush	5
<i>Liriodendron tulipifera</i>	tuliptree	5
<i>Maianthemum racemosum</i>	false Solomon's-seal	5
<i>Menispermum canadense</i>	moonseed	5
<i>Osmorhiza longistylis</i>	anise root	5
<i>Podophyllum peltatum</i>	mayapple	5
<i>Polystichum acrostichoides</i>	Christmas fern	5



Spring native wildflowers blanket the ground in portions of Management Zone 2 at the southern end of South Park.

<i>Prunus virginiana</i>	choke cherry	5
<i>Ranunculus hispidus</i>	hairy buttercup	5
<i>Rudbeckia laciniata</i>	cutleaf coneflower	5
<i>Sanguinaria canadensis</i>	bloodroot	5
<i>Symplocarpus foetidus</i>	skunk-cabbage	5
<i>Ulmus americana</i>	American elm	5
<i>Viburnum prunifolium</i>	black-haw	5
<i>Viburnum recognitum</i>	arrow-wood	5

*The values used in this report are Pennsylvania-specific and for the Appalachian Plateau ecoregion (Chamberlain and Ingram 2012).

2.9 PLANT COMMUNITY TYPES OF SOUTH PARK

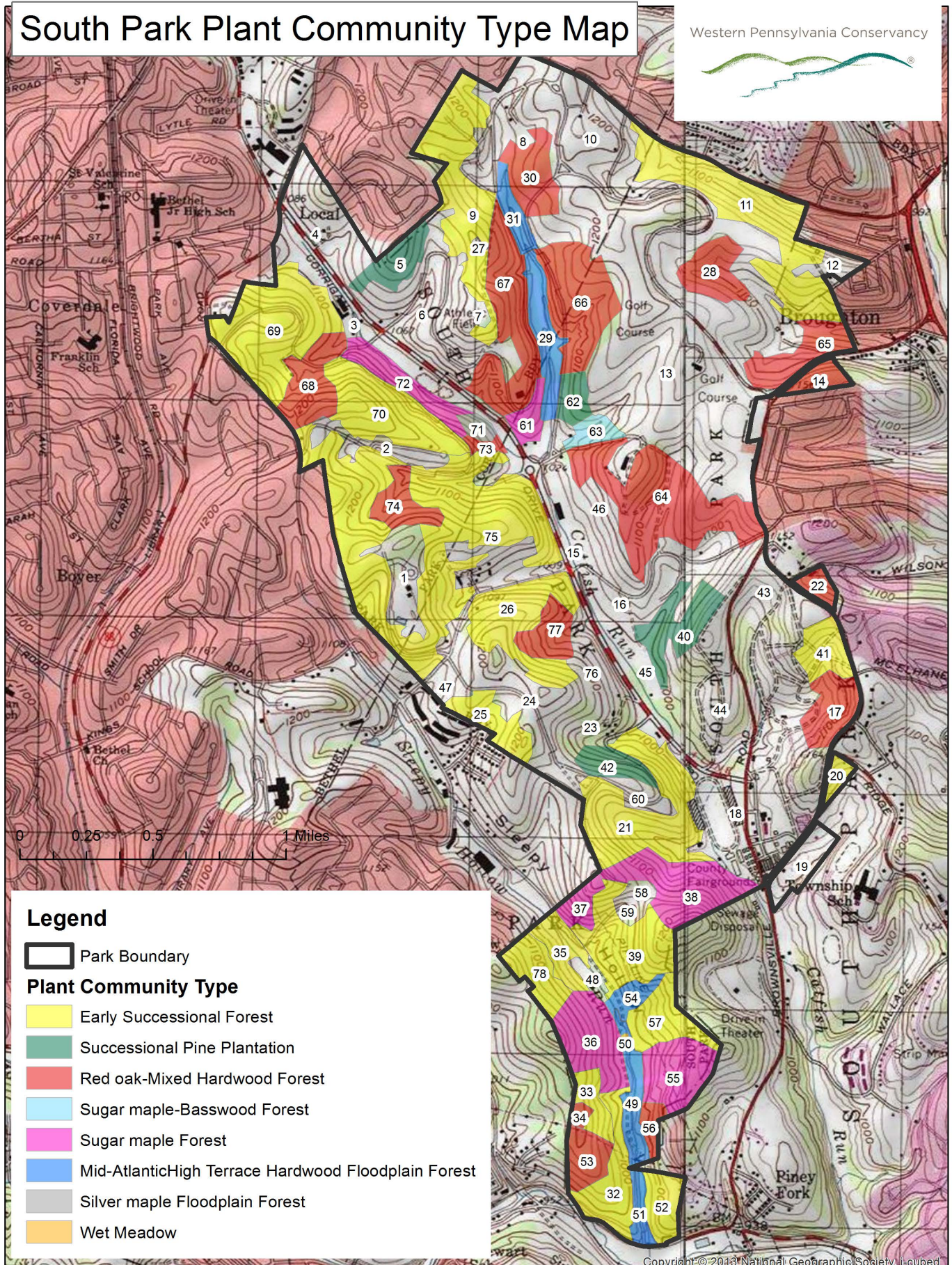
Community types are assigned using the Pennsylvania Natural Heritage Program's plant community classification system (PNHP 2016) and the U.S. National Vegetation Classification (USNVC 2016). There are five mature forest



Early successional forest in the northern portion of South Park, EU9.

South Park Plant Community Type Map

Western Pennsylvania Conservancy



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community types found in the park, variously sited on upland slopes and on floodplains. These host many of the highly conservative species of the park (see table above); herbaceous species that are unique to mature forests because they re-establish very slowly after disturbance. These species are not found in other areas of the park. Early successional forest in the park is all combined into a single type, as early successional forest is extremely variable, and generally does not form distinct repeated and recognizable types. These forests have established more recently than the mature forests and also may have experienced more disturbance, including soil tillage or mining. They are dominated by early-successional, disturbance tolerant species, a high proportion of which are often exotic. There is one wetland community type identified in the park, although some areas of floodplain forest may also qualify as wetland.

2.9.1 Mature forest types

Red oak – Mixed Hardwood Forest. This is the most common mature forest type in the park, occupying about 14% of the land area. It is found on mid- and upper- slopes, on well-drained soils, with a broad range of pH values. Red oak is a canopy dominant, often accompanied by white oak (*Quercus alba*), with smaller components of sugar maple (*Acer saccharum*), red maple



Red oak Mixed Hardwood forest, EU 64.

(*Acer rubrum*), black cherry (*Prunus serotina*), bitternut hickory (*Carya cordiformis*), American beech (*Fagus grandifolia*), slippery elm (*Ulmus rubra*), and, less frequently, American elm (*Ulmus americana*). Tuliptree (*Liriodendron tulipifera*) and black maple (*Acer nigrum*) are also sporadically present. White ash (*Fraxinus americana*) was previously a minor component, but most have died due to emerald ash borer infestation. The shrub layer may include spicebush (*Lindera benzoin*), witch hazel (*Hamamelis virginiana*), and a variety of exotic species such as bush honeysuckles or Japanese barberry (*Berberis thunbergii*). The herbaceous layer typically has a somewhat lower diversity of native species than would be expected for highly intact examples of this community; this may reflect overbrowsing by white-tailed deer, as well as the impacts of past land use and forest fragmentation. Species such as mayapple (*Podophyllum peltatum*), white wood aster (*Eurybia divaricata*), stonecrop (*Sedum ternatum*), and violets (*Viola spp.*) were typical, while more conservative species such as red trillium (*Trillium erectum*), Solomon's seal (*Polygonatum pubescens*), wood anemone (*Anemone quinquefolia*), and zigzag goldenrod (*Solidago flexicaulus*) were less frequent.

Sugar maple - Basswood Forest. This forest type is typically found on lower slopes and coves over rich, mesic soils. Sugar maple (*Acer saccharum*) is dominant; basswood (*Tilia americana*) is typically present and may be co-dominant. A rich herbaceous layer is typically present with mesic, conservative species such as Trillium species, waterleaf (*Hydrophyllum spp.*), wild ginger (*Asarum canadense*) and others. In South Park, only a small fragment of this community type remains, on a north-facing slope in the valley of a small tributary to Catfish Run. The herbaceous layer is not particularly diverse compared to more intact examples of this type.

Sugar maple Forest. This type is not defined in the Pennsylvania Community Classification system; local conditions and land use history have resulted in a variation that does not fit existing types. Sugar maple (*Acer saccharum*) is the dominant canopy species, with red oak (*Quercus rubra*), red elm (*Ulmus rubra*), American elm (*Ulmus rubra*) also common, and other species listed under the red oak mixed hardwood canopy more scattered. It is slightly more mesic than many of the examples of red oak mixed hardwood forest, and it occurs on north- or east-facing slopes, in coves, and along streams. The herbaceous layer ranges from very low in numbers and species diversity (the western slope in the southern end of the park) to fairly rich and diverse (the slope along Catfish run in the northern end of the park). Under less disturbed conditions, these areas may have developed to Sugar maple - Basswood forest.

Mid-Atlantic High Terrace Hardwood Floodplain Forest. This forest type is found in rich soils of broad, high floodplain terraces that flood very infrequently. A distinctive feature is that it includes both wetland and upland species in the canopy and herbaceous layers. In South Park, this community

type is present at the confluence of Sleepy Hollow and a small tributary valley, and also near the Vale of Cashmere along the floodplain of a sizable tributary to Catfish Run. The forest canopy include a mixture of rich species that are typically upland, mainly sugar maple (*Acer saccharum*), black maple (*Acer nigrum*), basswood (*Tilia americana*), and white oak (*Quercus alba*), in combination with typical floodplain species such as bitternut hickory (*Carya cordiformis*), hackberry (*Celtis occidentalis*), and American elm (*Ulmus americana*). The very diverse wildflower community includes several species that are typical of high pH soils. In one location of this type in the park, this includes the Short's sedge (*Carex shortii*), which has a state legal status of Pennsylvania Rare, and the crepis rattlesnake root (*Prenanthes crepidinea*), which is a Pennsylvania Watch List species. Other notable wildflowers include woodland phlox (*Phlox divaricata*), yellow trout lily (*Erythronium americanum*), Jacob's ladder (*Polemonium reptans*), false Solomon's seal (*Maianthemum racemosum*), spring beauty (*Claytonia virginica*), green-headed cone flower (*Rudbeckia laciniata*), bee balm (*Monarda sp.*), and false mermaid (*Floerkea proserpinacoides*).



Catfish Run cutting through an example of Mid-Atlantic High Terrace Hardwood Floodplain Forest in EU 49.

Silver Maple Floodplain Forest. This forest type is found on broad, low terraces of floodplains of large streams and rivers. The canopy is strongly dominated by silver maple (*Acer saccharinum*); other canopy trees, when present, typically include red maple (*Acer rubrum*), black willow (*Salix nigra*), box-elder (*Acer negundo*), American elm (*Ulmus americana*), and slippery elm (*Ulmus rubra*). In South Park, there is one small example of this community type along Catfish Run, where sugar maple (*Acer saccharum*) and black maple (*Acer nigrum*) are minor components along with the dominant silver maple. The herbaceous layer is heavily dominated by jewelweed (*Impatiens* sp.). Typical examples of this type will have a more diverse herbaceous layer with species such as ostrich fern (*Matteuccia struthiopteris*), Turk's-cap lily (*Lilium superbum*), clearweed (*Pilea pumila*), rice cutgrass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*), Jack-in-the-pulpit (*Arisaema triphyllum*), green-dragon (*Arisaema dracontium*), stout woodreed (*Cinna arundinacea*), false nettle (*Boehmeria cylindrica*), common blue violet (*Viola sororia*), and jumpseed (*Persicaria virginianum*). This type is typically wetter and floods more frequently than the sugar maple floodplain forest.

2.9.2 Successional forest types

Early successional forest. These areas have young forest cover dominated by early successional species. Black cherry (*Prunus serotina*) is the most ubiquitous and the most abundant. Other common species are: tuliptree (*Liriodendron tulipifera*), sassafrass (*Sassafrass albidum*), black walnut (*Juglans nigra*), elms (*Ulmus americana*, *Ulmus rubra*), and bitternut hickory (*Carya cordiformis*). Ash trees (*Fraxinus americana*, *Fraxinus pennsylvanica*) were formerly an important part of the canopy in these forests, but have recently died due to infestation with the Emerald ash borer. Exotic invasive shrubs, and grapevine tangles, are



Early successional forests make up a large portion of South Park's wooded areas, including this location in EU 78.

common. The shrub layer is typically dominated by multiflora rose (*Rosa multiflora*) and spicebush (*Lindera benzoin*). The herbaceous layer is often somewhat limited by the dense shrub layer. Early successional, disturbance adapted native and exotic species are common, and conservative forest species are almost absent. Wingstem (*Verbesina alternifolia*) is often a herbaceous dominant; jumpseed (*Persicaria virginiana*) and white snakeroot (*Ageratina altissima*) are common native species.

2.9.3 Wetlands

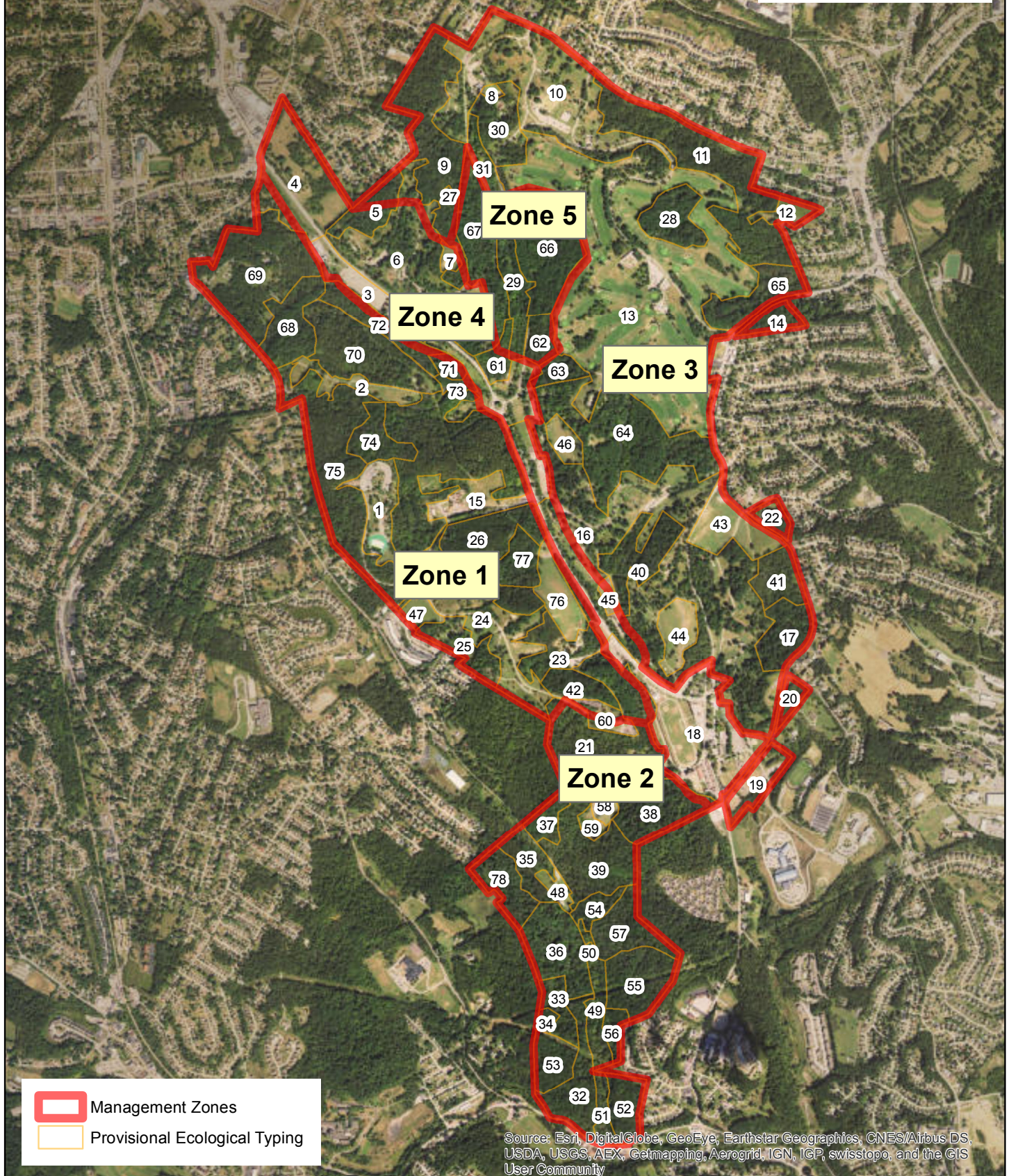
Wet Meadow. There is one area classified as a wet meadow community in South Park. This area, located in Sleepy Hollow (50 on the map on page 42), is dominated by many leaved bulrush (*Scirpus polyphyllus*), with reed canarygrass (*Phalaris arundinacea*), cinnamon fern (*Osmundastrum cinnamomea*), and the exotic Japanese stiltgrass (*Microstegium vimineum*) also common. This habitat can be important for amphibian breeding, although in South Park its habitat value may be impacted by abandoned mine discharge pollution.

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South Park Management Zones and Ecological Units

Western Pennsylvania Conservancy



2.10 SOUTH PARK MANAGEMENT ZONES AND ECOLOGICAL UNITS, PRIORITY MAINTENANCE TASKS AND POTENTIAL PROJECTS

Based on community usage and community practice, some of the small segments have been clustered to provide clear management zones toward which recommendations can be focused. Five distinct management zones broken into 78 ecological units (EU) are depicted on the preceding map.

2.10.1 MANAGEMENT ZONE 1: SOUTH PARK WEST

Geography

The western management zone of South Park holds 501 acres to the west of Corrigan Drive and north of Sesqui Drive. A large portion of its territory is made up of developed areas and fragmenting features, including the wave pool and game preserve.

Summary of Contents

- Ecological Units: 1, 2, 23, 24, 25, 26, 42, 47, 60, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77

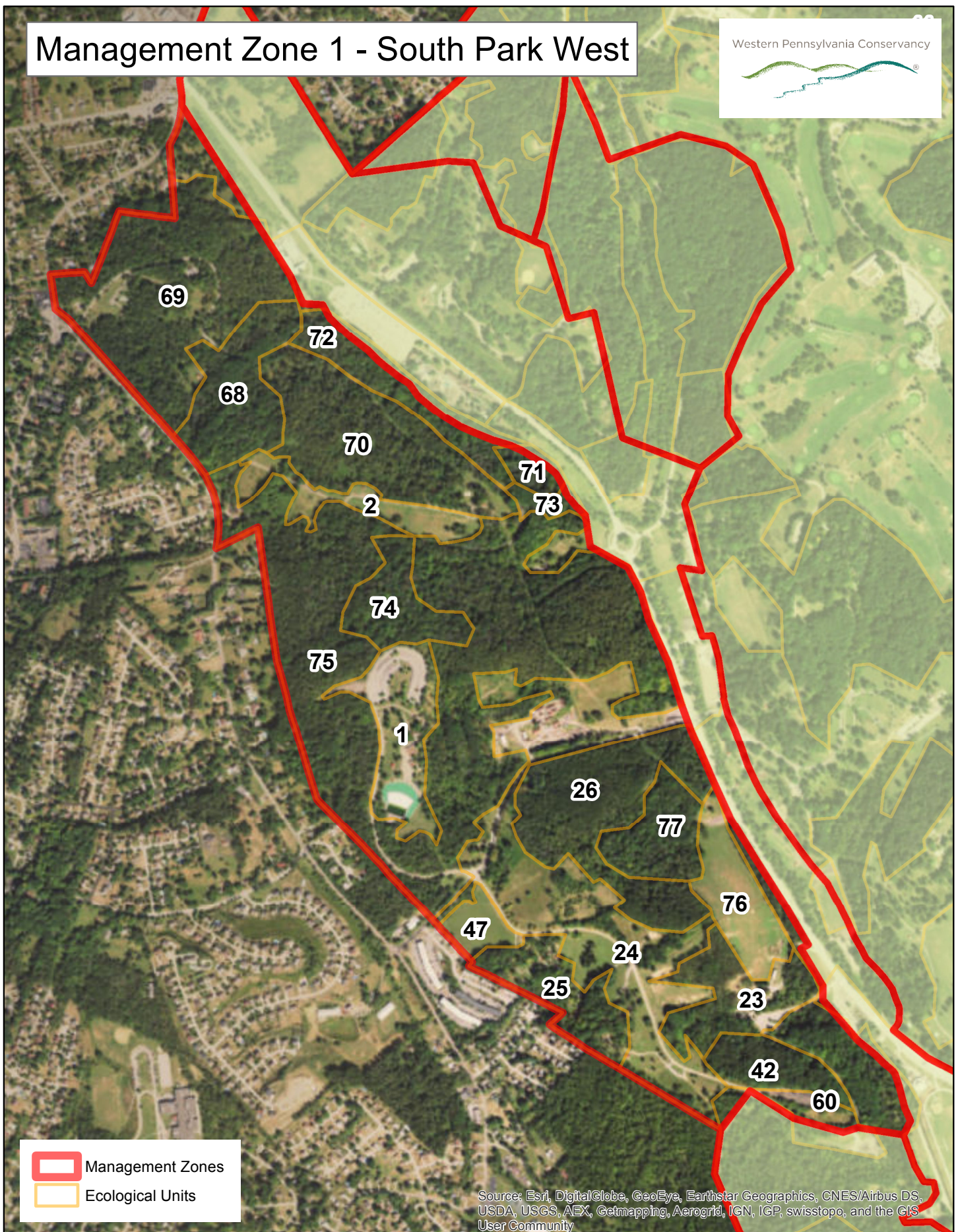
The majority of forest cover in the western region consists of less intact, early successional forest patches with a higher degree of nonnative vegetation. A few isolated patches of mature red oak-mixed hardwood forest are found upslope of Catfish Run (**EU 68**), within a headwaters ravine just north of the wave pool (**EU 74**), and between McConkey Rd and the Game Preserve (**EU 77**). A colony of naturalized invasive



Heavy invasive cover into South Park along the southern edge of Management Zone 1.

Management Zone 1 - South Park West

Western Pennsylvania Conservancy



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Norway maple trees is located on the northern boundary of the Twin Hills Road mature forest patch **(EU 74)**.

An elongated area of higher quality sugar maple forest is found along the slopes of a steep ravine at Catfish Run **(EU 72)**. The tree canopy is fairly diverse due to the large topographic change in a small area. The wildflower community is not tremendously diverse, but does contain some moderately sensitive species such as black cohosh (*Actaea racemosa*), Virginia waterleaf (*Hydrophyllum virginianum*), lady fern (*Athyrium filix-femina*), and several perennial sedge species **(EU 71)**. A power line right-of-way in the northern part of this unit was full of all common invasive plant species.

Dead ash trees were found throughout this zone in both natural and landscaped areas. Just outside of the park is a large patch of dead ash trees covered in invasive oriental bittersweet **(EU 25)**. An especially significant quantity of dead ash was found in **EU 26** creating a very disturbed forest patch heavily invaded by Japanese stiltgrass, barberry, multiflora rose, and garlic mustard. To the north, **EU 69** has many standing dead ash trees in



Large dead ash trees are found in Management Zone 1 and throughout South Park, including near open space gathering areas such as the one above off of Twin Hills Drive.

close proximity to roads and playgrounds. Pockets of tuliptree mortality and spicebush dieback were noted in **EU 74** and **EU 72**, respectively.

Several large mowed areas are located in this zone and could be candidates for restoration projects to reduce the need for mowing. The mowed hillside north of the game preserve (**EU 76**) and a mowed field near the intersection of Sesqui Drive and McConkey Road (**EU 47**) are ideal candidates for the installation of meadows and/or forest restoration projects.

Several sites were identified for the planting of large landscape trees, including open mowed fields along Sesqui Drive and the wave pool parking area. An opportunity for landscape trees also exists along Twin Hills Road near Stoltz Road to help mitigate the loss of many ash trees.

Priority projects

1. Remove hazardous dead ash trees near high use areas along Twin Hills Road (**EU 69 & 70**).
2. Control invasive plant species along the power line right-of-way in the mature forest patch near Catfish Run (**EU71**).
3. Monitor invasive oriental bittersweet at park boundary (**EU 25**) and treat as needed.
4. Address erosion issues in the mature forest ravine and revise the dense trail network (**EU 74**).
5. Treat the colony of invasive Norway maple trees in the Twin Hills Road mature forest patch to prevent them from naturalizing further into the unit (**EU 74**).
6. Treat invasive plant species in the disturbed dead ash forest of **EU 26** to prevent them from spreading into the mature forest patch near the game preserve.

Potential Projects

1. Conduct a reforestation project and/or install a meadow on the hillside next to the game preserve to reduce the need for mowing (**EU 76**).
2. Conduct a reforestation project and/or install a meadow in the open field near Sesqui Drive and McConkey Road to reduce the need for mowing and soften the view of nearby infrastructure on Patrick Place (**EU 47**).
3. Perform a landscape tree planting with volunteer groups along Twin Hills Road, Sesqui Drive, and the wave pool parking area to reduce the need for mowing, mitigate ash mortality, and increase visual appeal to park users.

Management Zone 2 - Sleepy Hollow

Western Pennsylvania Conservancy



2.10.2 MANAGEMENT ZONE 2: SLEEPY HOLLOW

Geography

The Sleepy Hollow Management Zone contains 298.53 acres of the southernmost region of the park. It is bounded on the north by the fairgrounds and Sesqui Drive.

Summary of Contents

- Ecological Units: 21, 32, 33, 34, 35, 36, 37, 38, 39, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 78

The majority of this zone is contiguous forest cover that is bisected north to south by Sleepy Hollow. The Mid-Atlantic high terrace floodplain forest directly along Sleepy Hollow Run and the adjacent slopes contain the most diverse and intact plant communities within South Park **(EU 49-51)**. The very diverse wildflower community includes several species that are typical of high pH soils, including the Short's sedge (*Carex shortii*), which has a state legal status of Pennsylvania Rare, and the crepis rattlesnake root (*Prenanthes crepidinea*), which is a Pennsylvania Watch List species.

The forests further upslope of the floodplain are variable in quality, ranging from mature red oak-mixed hardwood and sugar maple forests (EU 36, 53, 56) to less intact, early successional patches more highly invaded by nonnative plant species **(EU 32, 39, 52, 57)**. The western slope has a surprisingly low diversity, lacking in sensitive species that are slow to establish. This may indicate past tillage or other disturbance to the soil **(EU 78)**. The western slope also is experiencing damage from ATV use. Multiple overhead and underground utility right-of-ways intersect the southern areas of this management zone and provide vectors of entry for invasive plant species and ATV users **(EU 32, 53)**.

A small wetland area, dominated by reed canary grass (*Phalaris arundinacea*), is located



Heavy soil disruption from ATV usage, as well as discarded televisions in EU 32 in Zone 2.

in the center of this zone **(EU 50)**. Colored seepage, which may be the result of early mining practices, was observed to be entering the water system here from multiple sources.

A dump site and model airplane field are found in the north, just off of Sesqui Drive **(EU 58-59)**. The forest quality surrounding these developed areas is much more disturbed than the forests closer to the floodplain. Invasive shrub honeysuckles and multiflora rose dominate the understory of these early successional forest patches. Waste disposal inconsistent with posted “clean-fill only” instructions was observed at the dump site.

Priority Projects

1. Maintain and restore high quality mature forest community habitat for native plants and animals.
2. Invasive species control and seeding of native species in patches of successional forest that are adjacent to, and in some cases in between, areas of mature forest **(EU 32, 52, 39, 57)**.
3. Invasive species control along existing utility right-of-ways.
4. Address illegal ATV use to prevent damage to sensitive plant species, mitigate trail destruction, and prevent trash dumping.
5. Prevent further encroachment of park dumping grounds into nearby forest patches and ensure that unwanted material adheres to best management practices for waste disposal.

Potential Projects

1. Install additional interpretive signage at trail entrances with maps to create a recognized trail head.
2. Conduct long term monitoring of water quality and potential AMD seepage.
3. Provide guided nature walks of the floodplain and its diverse plant species for park users.



Invasives are in the early successional forests in Zone 2 (EU 78).

2.10.3 MANAGEMENT ZONE 3: SOUTH PARK EAST

Geography

At 825.89 acres, the eastern management zone is the largest area of the park. It is north of the fairgrounds and east of the Corrigan Drive and Vale of Cashmere management zones. The South Park Golf Course comprises a significant portion of the northern half of this zone.

Summary of Contents

- Ecological Units: 5, 8, 9, 10, 11, 12, 13, 14, 16, 17, 20, 22, 27, 28, 30, 31, 40, 41, 43, 44, 46, 63, 64, 65

Forest cover in the eastern management zone is highly variable with large patches of both mature and early successional forest present. A mature sugar maple-basswood forest (**EU 63**) and scarlet oak forest (**EU 64**) are immediately south of the golf course. Red oak-mixed hardwood forest types are located to the course's north (**EU 30**) and east (**EU 65**), which hosts goldenseal (*Hydrastis canadensis*), a plant species with the state legal status of Pennsylvania Vulnerable. The overall quality of the forest community here is reduced by fairly high cover of invasive species, including as Amur honeysuckle (*Lonicera maackii*), Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), and privet (*Ligustrum spp.*) Entirely surrounded by the golf course, **EU 28** contains several very large northern red oak trees (*Quercus rubra*) found near a prominent ravine. Two mature red oak-mixed hardwood forest exclaves are located on the east side of Brownsville Road, with significant standing dead ash trees near the roadway at **EU 14** and **EU 22**.

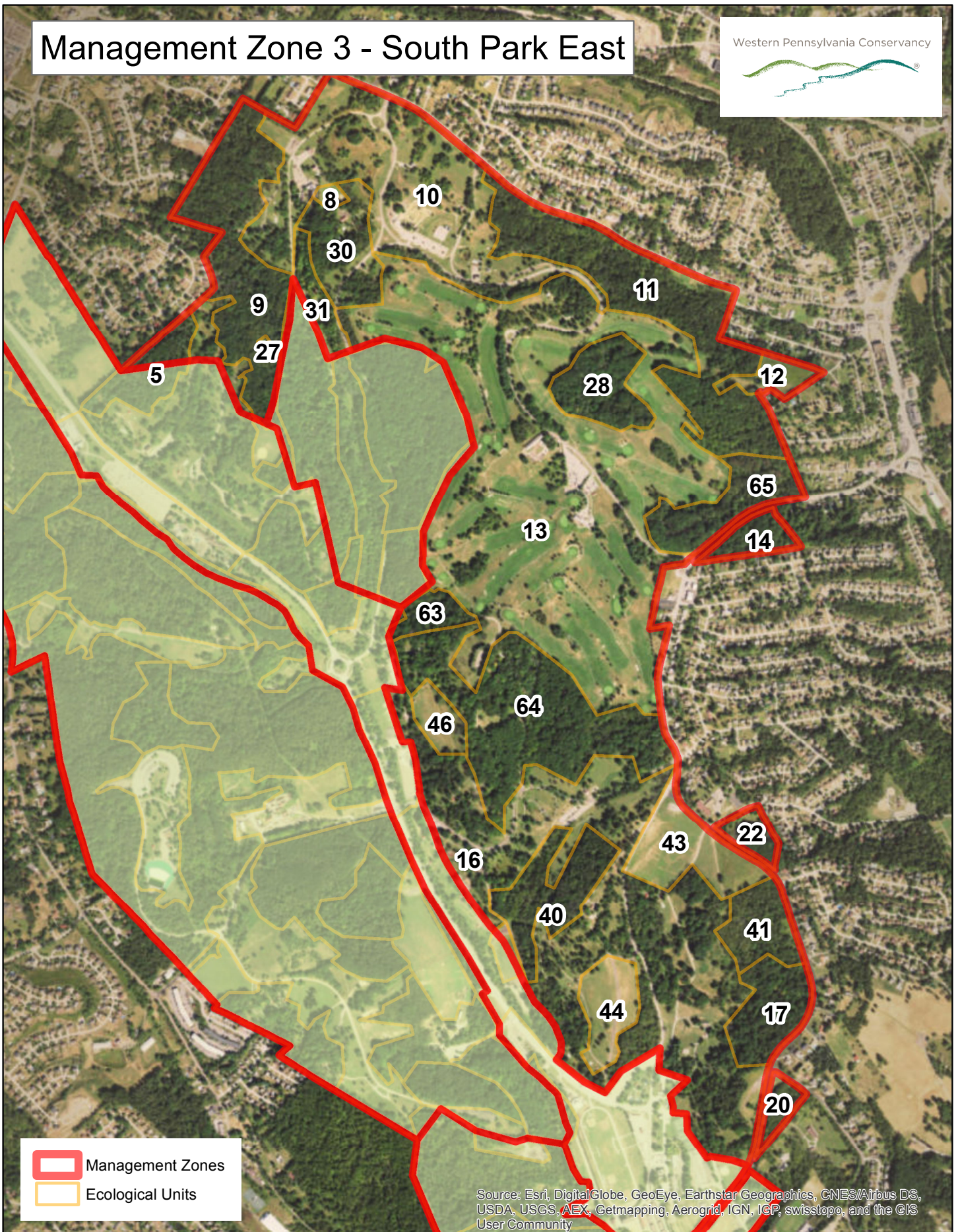
Directly across from this exclave is a large open mowed area with erosion issues originating from Brownsville Road (**EU 43**). Opportunities for green infrastructure could be explored here to mitigate erosion damage, stabilize the ground, and calm traffic along park property.



Further south is a mix of more red oak forest (**EU 17**) and early successional forest (**EU 41**) with some tuliptree mortality. A large field of invasive Canada thistle (*Cirsium arvense*), which is recognized as a noxious weed by the Pennsylvania Department of Agriculture, was found in **EU 16** along Sunny Slopes Road. This field is intentionally retained by park staff and is surrounded by signage labeling it as a 'Field Restoration Project'.

Several opportunities for tree plantings and field restoration exist north of the golf course. Significant drainage concerns were observed near the skate park and standing water was found in fields near East Park Drive and Broughton Road (**EU 10**). Several hazardous dead ash trees lined the road, playgrounds,

Management Zone 3 - South Park East

Western Pennsylvania Conservancy



 Management Zones
 Ecological Units

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

and pavilions from the BMX track west to the Haunted House on One Hundred Acre Drive. Invasive species rarely found elsewhere in the park were noted here, including English ivy (*Hedera helix*) in **EU 9** and Japanese knotweed (*Fallopia japonica*) in **EU 11** and **EU 65**. The western portion of **EU 11** was also highly invaded by Japanese honeysuckle.

An existing meadow in **EU 10** was very beautiful and colorful in early spring and was surrounded by attractive pockets of eastern white pine (*Pinus strobus*) and aspen (*Populus spp.*) trees.



Field of Canada thistle that is intentionally retained in EU 16.

Priority Projects

1. Remove hazardous dead ash trees in high traffic areas along Brownsville Road at **EU 22** and north of the golf course in **EU 10**.
2. Address significant erosion issues at Brownsville Rd in **EU 43** and near Broughton Road at **EU 10**.
3. Realign drainage pathways near the skate park to prevent further erosion of lawn areas and to Linhart Drive.
4. Eradicate manageable patches of aggressive invasive species, including English ivy, Japanese knotweed, and Japanese honeysuckle in the units north of the golf course.
5. Restore the quality of the mature forest at **EU 65** to promote habitat for existing vulnerable plant species.

Potential Projects

1. Plant landscape trees along Brownsville Road at the open field of **EU 43** to ease traffic and provide a buffer between park users and the busy roadway.
2. Conduct a reforestation project and/or install a meadow on the hillside east of the kite flying area at **EU 43** between Sunny Slopes Road and Ridge Road.
3. Conduct a reforestation project and/or install a meadow in multiple open fields and roadside lawns at **EU 10** to reduce mowing and mitigate stormwater runoff.

4. Plant landscape trees with volunteer groups in open roadside lawns along East Park Drive and One Hundred Acre Drive to reduce mowing and to replace dead ash trees.
5. Remove the field of cultivated Canada thistle in **EU 16** and replace with native plant material.
6. Conduct a reforestation project and/or install a meadow on the hillside north of the fairgrounds at **EU 44** that is bisected by a paved access road immediately west and parallel to Brownsville Road.



Significant drainage and erosion issues exist in Management Zone 3 near developed areas.

2.10.4 MANAGEMENT ZONE 4: CORRIGAN DRIVE/CATFISH RUN

Geography

Management Zone 4 totals 273.13 acres and spans the entire north-south length of Corrigan Drive and Catfish Run within park property. It includes a 100ft buffer on either side of Catfish Run and also contains the fairgrounds and all developed parkscape immediately along Corrigan Drive.

Summary of Contents

- Ecological Units: 3, 4, 5, 6, 7, 15, 16, 18, 19, 45, 61, 67, 71, 72

The purpose of this elongated management zone is to define management efforts for the long-term conservation of the Catfish Run watershed which is primarily bordered by impermeable and highly trafficked features. Parking lots

Management Zone 4 - Catfish Run



and roadways have significantly reduced the size of permeable buffers along the stream. Areas with significant erosion issues were observed in the mature forest and floodplain areas that abut the large parking lots along the northern section of Corrigan Drive (**EU 71-72**). Roadside lawns and open fields in **EU 4** do little to ease stormwater runoff into the watershed. Further south, Catfish Run is directed underneath park features and flows through culverts for large lengths along Corrigan Drive and through the fairgrounds.

Priority Projects

1. Reduce the size of impermeable features along Catfish Run by eliminating unnecessary parking lot areas and/or increasing permeable parking through green parking solutions.
2. Increase the integrity of natural stream buffers in EU 4 by planting riparian tree species in the mowed strip between Corrigan Drive and Catfish Run.
3. Remove hazardous dead ash trees near the horse show arena at the southernmost part of the fairgrounds.

Potential Projects:

1. Seed field restoration habitat areas in **EU 4** with native seed mixes to increase habitat for wildlife and pollinator species.
2. Reforest field restoration areas closest to Corrigan Drive and Catfish Run with trees to reduce stormwater runoff into the watershed.



Large grassy areas and parking lots provide opportunities along Corrigan Drive for stormwater capture. This lot is below Lebanon and Mifflin shelters in EU 6, Management Zone 4.

Management Zone 5 - Vale of Cashmere

Western Pennsylvania Conservancy



2.10.5 MANAGEMENT ZONE 5: VALE OF CASHMERE

Geography

At only 95 acres, Management Zone 5 is the smallest zone in the park and surrounds the historical riparian stonework structure known as the Vale of Cashmere. This structure was first created by the Civilian Conservation Corps. This is the only management zone that does not touch any portion of the South Park property boundary.

Summary of Contents

- Ecological Units: 29, 61, 62, 66, 67

The majority of this management zone consists of an area of mature red oak-mixed hardwood forest that is bisected north to south by a tributary to Catfish Run and its associated Mid-Atlantic high terrace hardwood floodplain forest (**EU 29**). Although the mature forest patch (**EU 66-67**) is fragmented by roads and includes some landscaped or developed features, together they form one of the largest blocks of mature forest in the park. The floodplain forest between East Park Drive and One Hundred Acre Drive is one of the best examples of this type of community in the park, despite the fact that the herbaceous layer is less diverse than would be expected for a typical well-developed example of



Heavy wear and erosion on Vale of Cashmere paths in spring.

this community. Large patches of garlic mustard were found along the stream and the large swaths of the trails were prone to extreme erosion during wet time periods.

The upland forest east of East Park Drive is one of the most intact and diverse forest communities in the park. This area hosts many sensitive wildflower species, including red trillium (*Trillium erectum*), Solomon's seal (*Polygonatum pubescens*), false Solomon's seal (*Maianthemum racemosum*), woodland phlox (*Phlox divaricata*), stonecrop (*Sedum ternatum*), and early meadow-rue (*Thalictrum dioicum*). However, some of these species currently have very small populations, only present as scattered individuals in difficult-to-reach areas such as steep slopes along stream ravines. Manageable patches of Japanese honeysuckle are located just upslope from the floodplain.

The forested area to the west of One Hundred Acre Drive has a somewhat less diverse wildflower community and more problems with patches of invasive species such as privet shrubs (*Populus spp.*).

Priority Projects

1. Protect the integrity of the mature forest and invasive-free wildflower community at East Park Drive by monitoring for invasives and temporarily closing park trails as needed.
2. Reduce invasive species in the mature forest west of One Hundred Acre Drive, especially along the southern border with Management Zone 4. Large patches of several invasive plant species were found near the horseshoe curve in One Hundred Acre Drive, the southern part of **EU 67 and EU 61**.
3. Control invasive garlic mustard in the immediate area surrounding the Vale of Cashmere landmark.
4. Repair trails damaged by erosion and limit trail use during periods of wet weather.

Potential Projects

1. Install interpretive signage detailing the history of the Vale of Cashmere, including historical photos, and describing its current ecological diversity.
2. Reintroduce native wildflowers to the mature forest west of One Hundred Acre Drive (**EU 67**).



Allegheny County Parks and Western Pennsylvania Conservancy staff and volunteers plant landscape trees at Boyce Park.

SECTION III - OBJECTIVES, ISSUES AND OPPORTUNITIES:

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3.1 Objective: Maintain and improve ecological function and quality of mature forest patches.

The existing forest patches in South Park, most that were established at the same time the park was initially developed, are worth protecting and even improving for the ecological and natural value they provide to the rest of the park as well as surrounding communities and plant communities native to western Pennsylvania. Like many of the large parks in Allegheny County, South Park is surrounded by a highly fragmented and developed suburban landscape with a history of significant resource extraction. Efforts to maintain healthy forest patches will continue to provide myriad of benefits to the natural landscape and humans alike.

Issues:

- Invasive plants
 - o The most severe and widespread ecological issue facing South Park's existing mature forest stands and the native plant communities they host is infestation by invasive weeds. While several of the mature forest stands in the park have relatively moderate infestations in their core, the surrounding woodlands that



Mature forest floor in Management Zone 5 of South Park.

have a history of more intense uses (such as mining and agriculture) are heavily impacted by canopy-destroying vines – like oriental bittersweet and wild grapes – and invasive understory shrubs and herbs like multiflora rose and Japanese stiltgrass.

- Deer over-browse
 - o South Park's location, surrounded by suburban residential communities Bethel Park, South Park and Baldwin place it within a landscape where deer thrive. The more mature forest areas of South Park contain good habitat and food sources for deer. Unfortunately, many of these food sources are native plants that are decimated by pressure from an overabundance of deer. Over time, the mature forest areas of the park will lose much of the native plant species in the forest understory unless deer browsing pressure is contained. Referring to the Conservation Plant List in Section 2.4, for many native species, if they disappear from the landscape, it will be difficult to see them return.
- Balancing recreational use with conservation
 - o More intense recreational uses like mountain biking and horseback riding can severely damage sensitive botanical areas, especially when trails through such areas are not adequately designed and regulated. Recognizing that Allegheny Park trails are all considered



Deer fencing example. Photo courtesy of Ecological Society of America (esapubs.org).

multi-use special consideration should be made to limit some use to foot traffic on trails through sensitive botanical areas if at all possible.

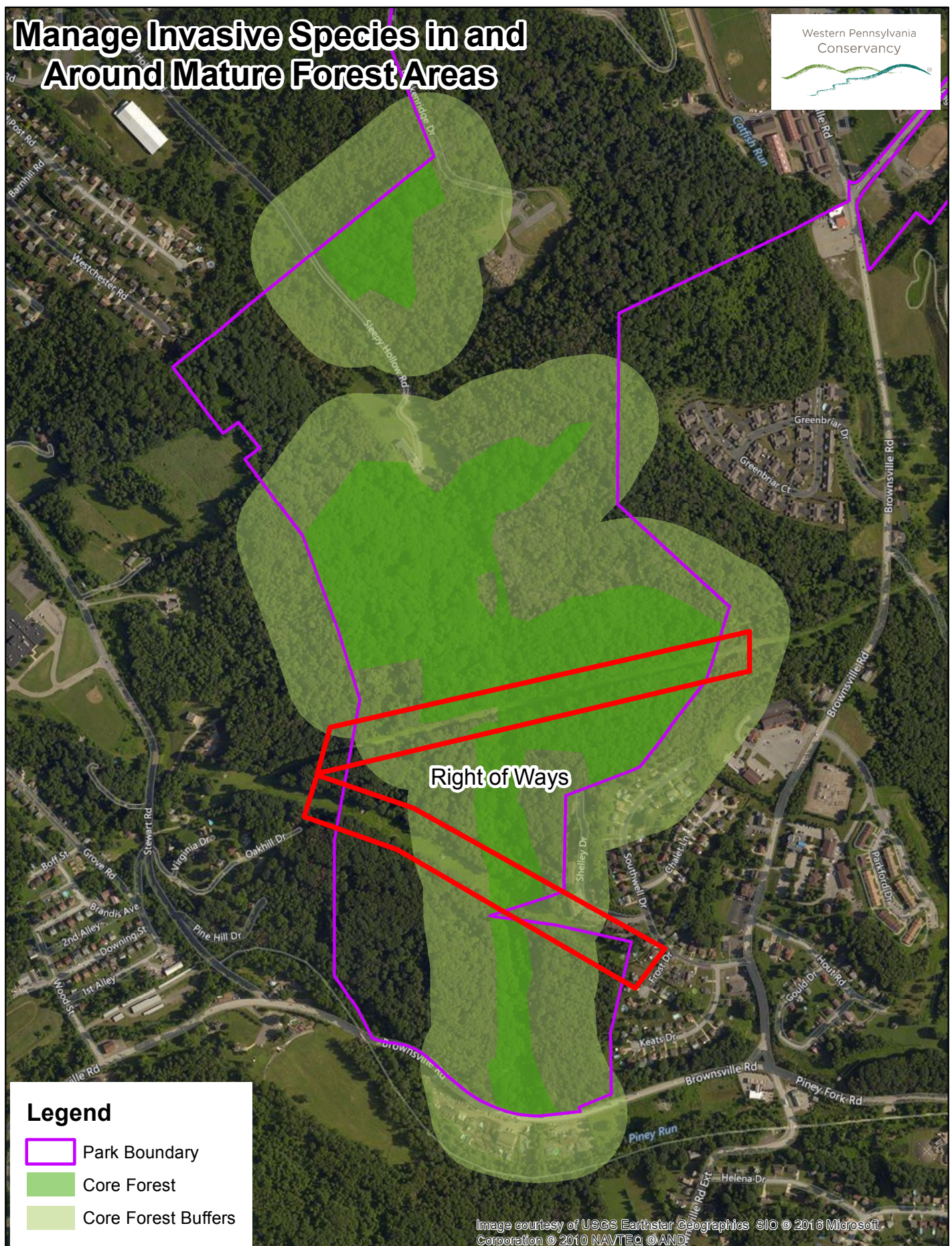
- Forest pests and pathogens
 - o The ecological assessment noted several forest pest and pathogen issues in South Park. The most visually and ecologically significant impact is the park-wide loss of ash trees as a component of the forest and recreational areas resulting from emerald ash borer infestation. While no serious pest or pathogen issues are heavily impacting the mature forests currently, it is important to be prepared for rapid response to any new forest pest or pathogen.



Power lines running through South Park.

- Right of Way Maintenance
 - o Power line right-of-ways, highlighted in the following map, cut swaths through mature forests in South Park and invite invasive species as well as an in-road for ATV activity from outside the park.

Manage Invasive Species in and Around Mature Forest Areas



Legend

- Park Boundary
- Core Forest
- Core Forest Buffers

Image courtesy of USGS Earthstar Geographics SIO © 2016 Microsoft Corporation © 2010 NAVTEQ © AND

- Public appreciation and support
 - Because of its close proximity to surrounding communities, public support for conservation of the more mature forest areas in South Park are crucial for bringing about ongoing support for conservation activities.

Opportunities:

- Prioritizing invasive plant management and removal within and surrounding mature forest patches to establish a core areas protected by buffers where ongoing invasive plant management is conducted. Also concentrating on vectors of entry for invasive plants (i.e. road and utility corridors). Because invasive plants will continue to be a reality, this will be an ongoing management concern that will require regular attention indefinitely.
- Continuing existing deer management program in the park and partnering with surrounding landowners and communities on deer management.
- Installing deer fencing around especially sensitive areas may be a good way to stop further loss of plant diversity in combination with existing deer management program.



Deer exclosure example. Photo courtesy of Cougar Rewilding Project (cougarrewilding.org)

- Engaging proactively with utility companies, regulators, and others on planning for new and existing utility corridors that minimize ecological impacts on mature forest patches.
- Retiring and closing problematic and/or redundant trails in mature forest patches.
- Prioritizing implementation of trail best management practices on existing trails through mature forest patches.
- Monitor and treat forest pests and pathogens when possible, particularly those that could create wide-scale impacts (oak wilt, Asian long-horned beetle, etc.) if not treated early or those that impact any rare or sensitive tree species.
- Installing interpretive signage about the natural history of the mature forest areas – such as requests not to pick flowers or other native vegetation and to refrain from damaging recreational activities – may help with public cooperation in conservation-oriented management.
- Increase outreach and education programming to the local community and to educational institutions about the history and mature forest areas of South Park.



Temporary signage at Boyce Park to help educate the public about important changes and the ecological benefits associated with meadows.

3.2 Objective: Enhancing the ecological value and visual appeal of currently mowed areas.

Reducing or eliminating mowing and establishing meadows or reforestation is a relatively simple and highly effective way to enhance the park landscape's ability to provide ecosystem services, and can have high visual appeal if done properly. Meadows provide year-long food resources and shelter for small mammals, and birds. Wildflowers also attract hummingbirds, butterflies, and other beneficial insects.

Meadows can serve a highly important ecosystem service by providing sources of food and breeding habitat for native pollinating insects, especially in a suburban setting where mowed lawns and ornamental landscaping can lack this function. Scientists across the globe are raising alarms about collapsing populations of native pollinator insects. While this is a global issue that will require global solutions, much can be done on the local level by restoring manicured, highly simplified suburban landscapes into more diverse native plant communities.

Perennial meadows are a useful and beautiful alternative to the mowed lawn. A landscape of perennial grasses and wildflowers provides a myriad of ecological benefits with very little maintenance required once established. After the plants



Protected meadow area in Schenley Park, Pittsburgh.

are established, watering is virtually unnecessary, and mowing requirements are reduced to once per year at most.

Besides benefits to wildlife, the root system within a meadow slows down and infiltrates stormwater much more effectively than mowed lawn, allowing it to seep into the ground rather than gush into storm drains as a pulse of runoff. And since they require no fertilizers or insecticides, meadows cut down on the amount of excess nutrients that pollute the ecosystem.

Perennial meadows can also be more visually rewarding. In stark contrast to a static lawn, meadows constantly change throughout the seasons. Blades of tall warm-season grasses catch the sunlight as they rhythmically dance in the breeze, while colorful wildflowers produce eye-pleasing colors and textures. This landscape amenity can reduce stress and serve as topic for community environmental learning.

In addition to the ecological, visual and education benefits to establishing meadows, significant cost savings and environmental benefits can be realized through reducing or eliminating mowing. Reducing mowing will lead to savings on mower maintenance and replacement costs, fuel costs, staff costs spent on mowing, fertilizer and chemical costs and more. Reducing mowing could also significantly reduce emissions and the overall carbon footprint of park management activities.

Issues and Challenges:

- Public perception of meadow areas
 - o Many citizens, park users, and even park staff may have negative perceptions of discontinuing regular mowing of areas that are traditionally mowed lawn. While some efforts have been well received, there have been several small controversies over some of the “field restoration” efforts across the county park system where mowing was discontinued in particular.
- Mowing ingrained in park workflow
 - o South Park contains over 76 acres of lawn that receives regular mowing during the growing season. Because of the volume of work involved in regular mowing of these areas, mowing is an ingrained and primary component of the seasonal flow of work within the park. Establishing meadows over time will gradually reduce the amount of staff time needed for mowing that could then be re-allocated to other maintenance activities.

Opportunities:

- Reducing frequency of mowing and re-seeding mowed areas with native meadow mix, especially emphasizing pollinator-friendly species and visual appeal.
- Expanding and amplifying educational and interpretive efforts by park rangers and naturalists regarding meadow habitat, especially as it relates to pollinators and other wildlife.
- Measure cost and carbon emissions savings realized from reduced mowing, share results widely.
- Maintain seasonal mowing and train park staff on herbicide treatment and other control strategies to prevent invasive plant infestations.



Old lot on the left (west) side of the bank of Catfish Run. A lawn and playground is on the east side of the run.

3.3 Objective: Reducing erosion, flooding and other downstream environmental impacts resulting from stormwater runoff within South Park.

Issues:

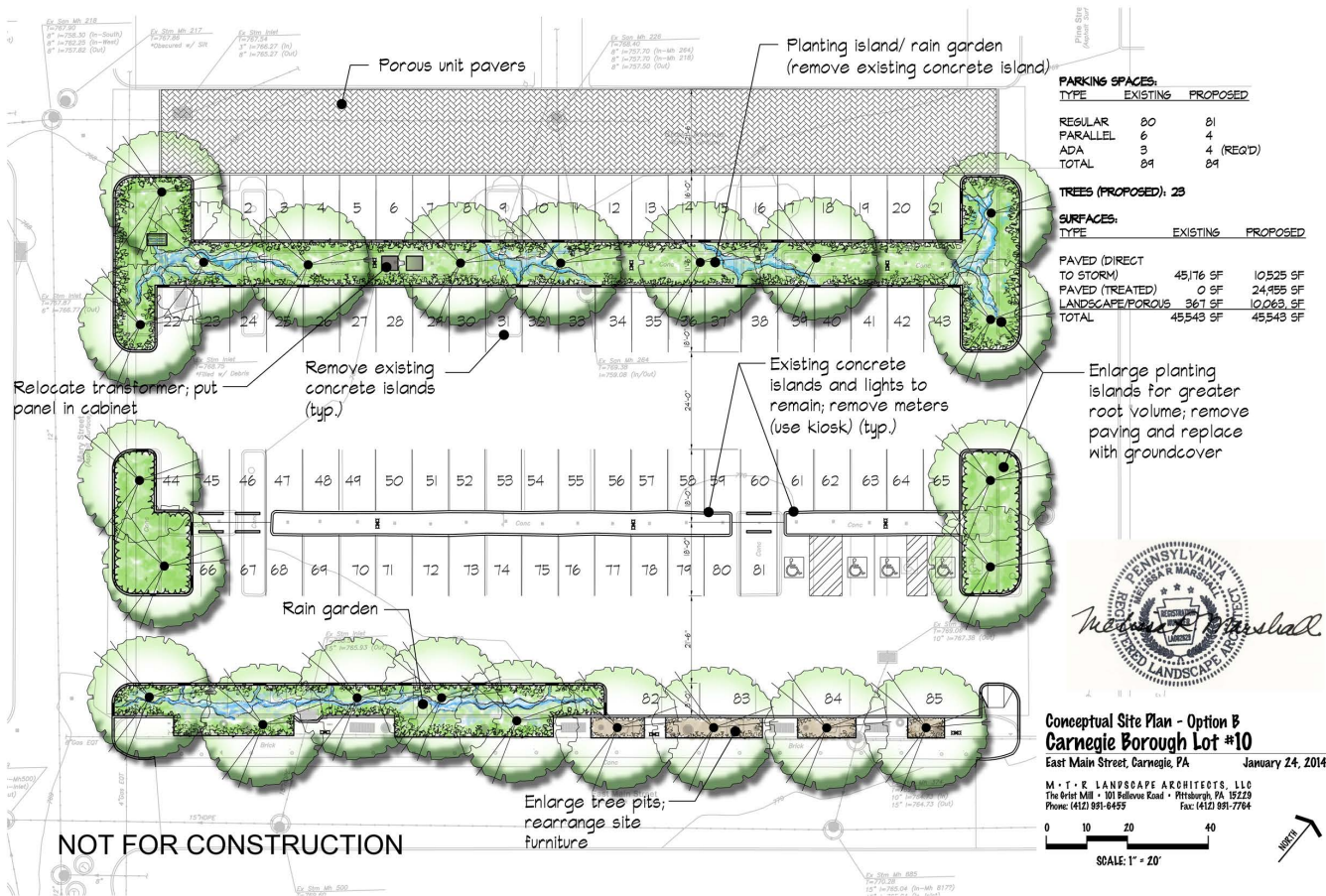
- High-energy runoff during rain events from impervious surfaces such as parking lots, sidewalks, roads, rooftops, ballfields, mowed areas (to a degree).
- Un-maintained or inadequately designed stormwater infrastructure (roads, ditches, culverts, storm drains, trails, etc.).

Opportunities:

- Convert paved areas to more permeable surfaces, right-size parking lots, add stormwater capture components to all buildings to capture rooftop runoff (green roofs, rain gardens, soakage trenches, etc.).
- Conduct a broad-scale tree planting program across the park to increase canopy cover and enhance stormwater mitigation potential.
- Upgrade drainage infrastructure along Corrigan Drive` to correct severe culvert erosion issues. Incorporate green infrastructure components to slow, store, and filter stormwater if feasible.



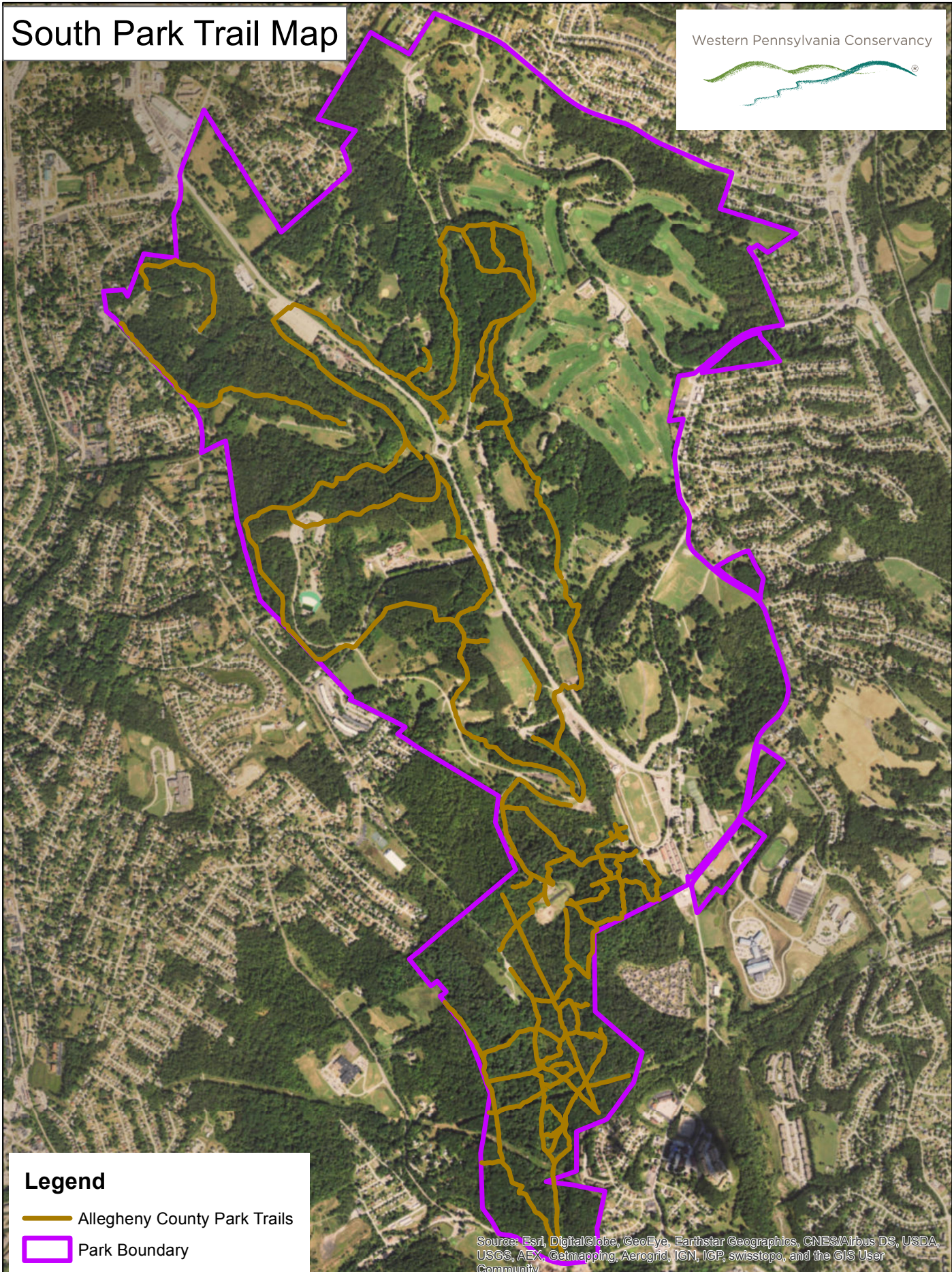
Bioswale and its signage along Hawthorne Road in Millvale, PA.



Rain gardens in renovated public parking lots in Carnegie, PA, installed in 2015 and 2016.

South Park Trail Map

Western Pennsylvania Conservancy



Legend

- Allegheny County Park Trails
- ▭ Park Boundary

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

3.4 Objective: Enhancing user access and experience in undeveloped areas of the park such as forests and meadows.

Issues:

- Lack of a central “trail head” where visitors can arrive and get information on trail use.
- Excessive number of informal trails causing confusion with formal trails.
- Design, redundancy and maintenance issues with formal trails.
- Illegal ATV usage throughout the park.
- Inadequate way-finding on formal trails.

Opportunities:

- Conduct a comprehensive evaluation and assessment of the trail system to identify needed improvements for the entire trail system and for individual trails.
- Establish one or more “trail head” areas that provide convenient access to the entire trail system and where visitors can obtain trail information, rules, maps, etc.
- Retire and close problematic, and/or redundant trails.
- Install interpretive signage.
- County Park staff and rangers identify, and County Police enforce illegal ATV use in South Park.
- Park staff work with active partners in South Park, collaborating to improve and maintain the trails in a comprehensive manner.



Many South Park trails suffer from erosion and deep ruts from heavy and illegal usage.

3.5 Objective: Game Preserve

The Game Preserve holds a small, permanent population of American Bison along with a few exotic bird species. There is also a man-made pond at the site with a population of wild waterfowl and non-native turtles. Visitors routinely feed the waterfowl which is considered problematic by the County Parks staff because of health (both human and animal) and the attraction of vermin. The Allegheny County Parks Department is therefore officially opposed to the feeding of any wild or feral animals within the parks system.

Adjacent to the Game Preserve is an area unofficially managed as a feral and abandoned “cat colony.” Anecdotal observation by park staff and rangers indicates that there is an understanding within the surrounding communities that unwanted domestic cats can be abandoned at the “colony” and will be cared for by an informal group of volunteers. WPC staff has observed shelters and evidence of feeding in the area. Extensive research indicates that both feral and outdoor domestic cats have significant negative impacts on native bird and small mammal populations through predation. An article published in 2013



Buffalo at the South Park Game Preserve in the southern portion of Management Zone 1 off of Sesqui Drive.

in the on-line journal Nature Communications (<http://www.nature.com/articles/ncomms2380>) suggests that free-ranging cats cause substantially greater wildlife mortality than previously thought and are likely the single greatest source of anthropogenic mortality for U.S. birds and mammals. There are also potential human health concerns regarding the spread of rabies and toxoplasmosis.

Specific programmatic recommendations regarding the Game Preserve or the cat colony are outside the scope of this report. The County Parks, Allegheny County Parks Foundation, and County Park Rangers could consider a public education and outreach effort focused on eliminating the feeding of wildlife and addressing concerns over the existing cat colony. The Audubon Society of Western Pennsylvania is also an excellent resource to assist with this challenge.



Cat encampment in South Park. Local residents have been providing feral cats with food and other amenities in the park for some time. This activity is detrimental to the natural ecology of South Park.

3.6 Objective: Golf Course

Specific programmatic or project recommendations for the South Park golf course are outside the scope of this report. The Audubon Society has a certification program for golf courses that promotes environmental sustainability through habitat enhancement and protection, proper use and/or reduction of pesticides, herbicides, and fertilizers, responsible water use, and other measures. Achieving this certification would be advantageous for improving wildlife habitat and protecting water resources in South Park.

3.7 Objective: Cascades, Vale of Cashmere, and other Historic Landscape Features

South Park has numerous landscape features throughout the park, designed by well-known landscape architects. Since the 1920s and '30s when the features were constructed, some have been lost to the lack of maintenance and the encroaching forests. Restoration of these features would require significant funding, planning, design, and construction—all beyond the scope of WPC's assessment project. The development of signage describing the features could be an affordable option to educate the public. Also, measures to stabilize these structure and prevent further deterioration should be explored.

3.8 Objective: Fairgrounds

The Fairgrounds are a highly developed area of the park including multiple buildings of various uses, parking areas, athletic facilities which have recently undergone improvements. Specific program or project recommendations for the Fairgrounds are outside the scope of this project. A master plan for this area was completed in recent years. With its proximity to Catfish Run, stormwater management improvements to the extensive paved areas and buildings would help contribute to improved conditions in the Catfish Run Watershed.



The old Allegheny County Fairgrounds at South Park.



WPC staff and Barrett Elementary students plant new trees in new tree pits meant to capture and retain stormwater in front of the school in Homestead.

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4.1 CAPITAL PROJECTS

A Capital Project is one that builds or improves park assets and infrastructure and has a lifetime of at least 10 years. For the most part, capital projects are relatively large in terms of cost (>\$10,000). Capital projects also require commitment from annual operating plans and budgets for regular maintenance to ensure the improvement lasts its entire projected lifetime or longer. These projects typically require at least some level of technical expertise such as engineering, landscape design, forestry, GIS and data management, and project management.

4.1.1 LANDSCAPE TREE PLANTINGS

“Landscape trees” refers to trees planted within “managed areas” of parks and open spaces and are associated with facilities and buildings as part of the landscape. By WPC’s community forestry standards, these trees are a minimum of two inch caliper (diameter of the trunk at the base of the tree) and typically stand 10 to 15 feet tall at the time of planting. The trees are balled and burlap (B&B) which means they are excavated at the nursery in such a way that they have a root ball that is then secured with natural burlap and a wire cage. These trees are typically used by WPC as park, trail, and street trees through their community forestry program because they can withstand contact with people that could damage smaller trees. Landscape trees have significant and measurable environmental, economic, and aesthetic benefits for the built environment including energy savings, stormwater control, wildlife habitat improvement, and increases in property values. The WPC community forester has recommended that up to 200 new landscape trees be planted in South Park.

Cost Estimates

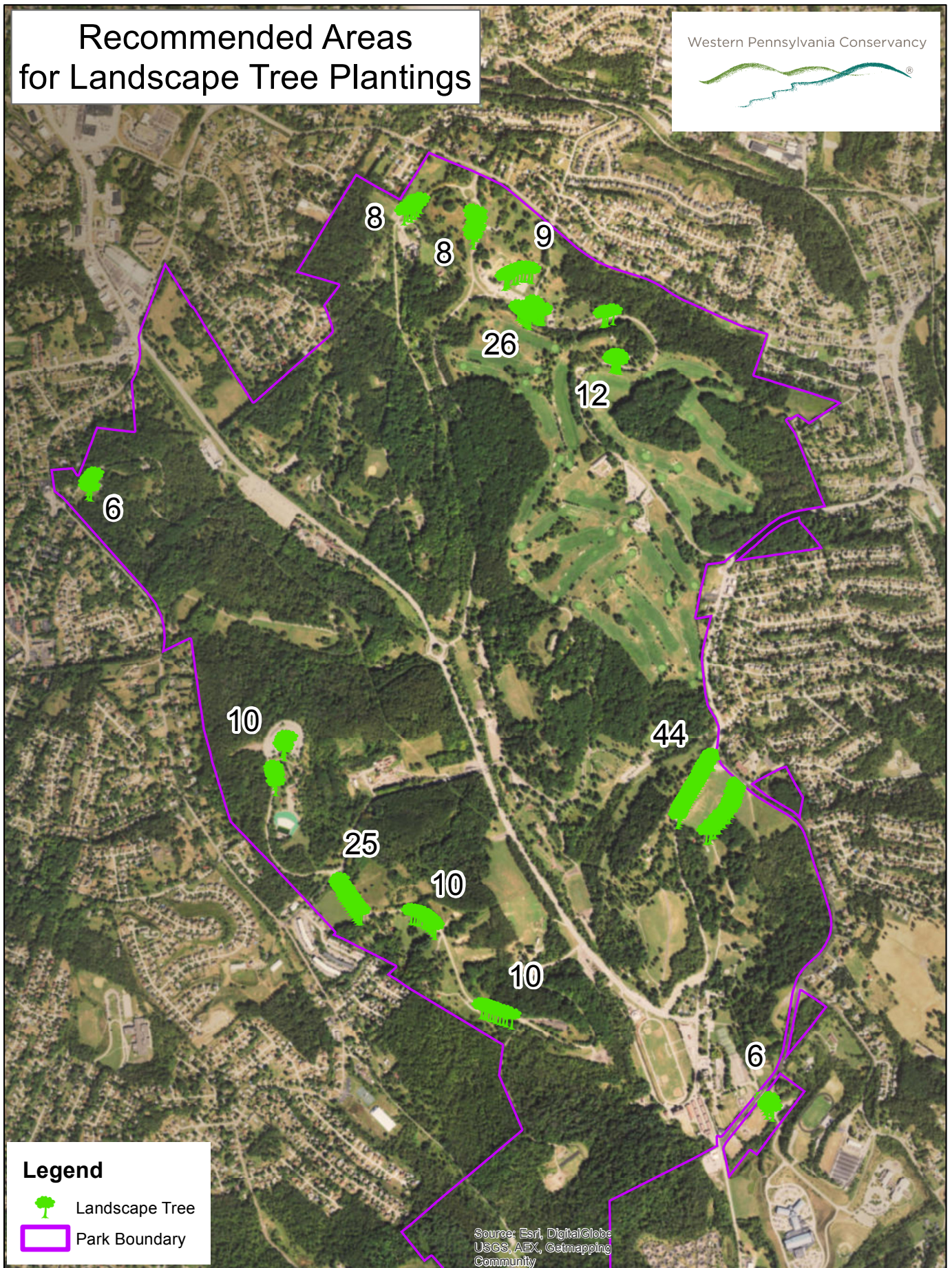
Project administration	\$100
Forestry Consultation	\$50/hr
Volunteer tree planting event coordination	\$50/hr
2” Caliper landscape trees	\$200 each
Mulch, stakes, tie, protection:	\$25 per tree
Open site preparation (excavation, backfill):	\$250 per tree

Methodology

Project staff begins the tree planting process by conducting planting site assessments. The project forester identifies optimal planting locations using community forestry specifications which include considerations for proximity

Recommended Areas for Landscape Tree Plantings

Western Pennsylvania Conservancy



to buildings, roads, and utilities, species diversity, and other site conditions such as light exposure and soil conditions. Tree plantings occur in the spring and in the fall while the tree is dormant but the ground is not frozen. Once the planting sites are assessed and the species have been selected, the project forester hand selects each specimen from a local nursery. All of WPC trees must come from within a 150-mile radius of the City of Pittsburgh.

Staff can then begin planning for the planting event by recruiting and training volunteers to help with the tree plantings. Experience has shown that this helps ensure the long-term health of the trees since volunteer-planted trees under staff supervision are planted in a superior fashion to contracted plantings using landscaping firms. Volunteer engagement also helps ensure that the community is invested in the project and better understands the value of the trees and how they should be maintained.

With all volunteer tree plantings in Allegheny County Parks, site preparation completed for each tree is normally conducted by park staff to achieve substantial cost savings.



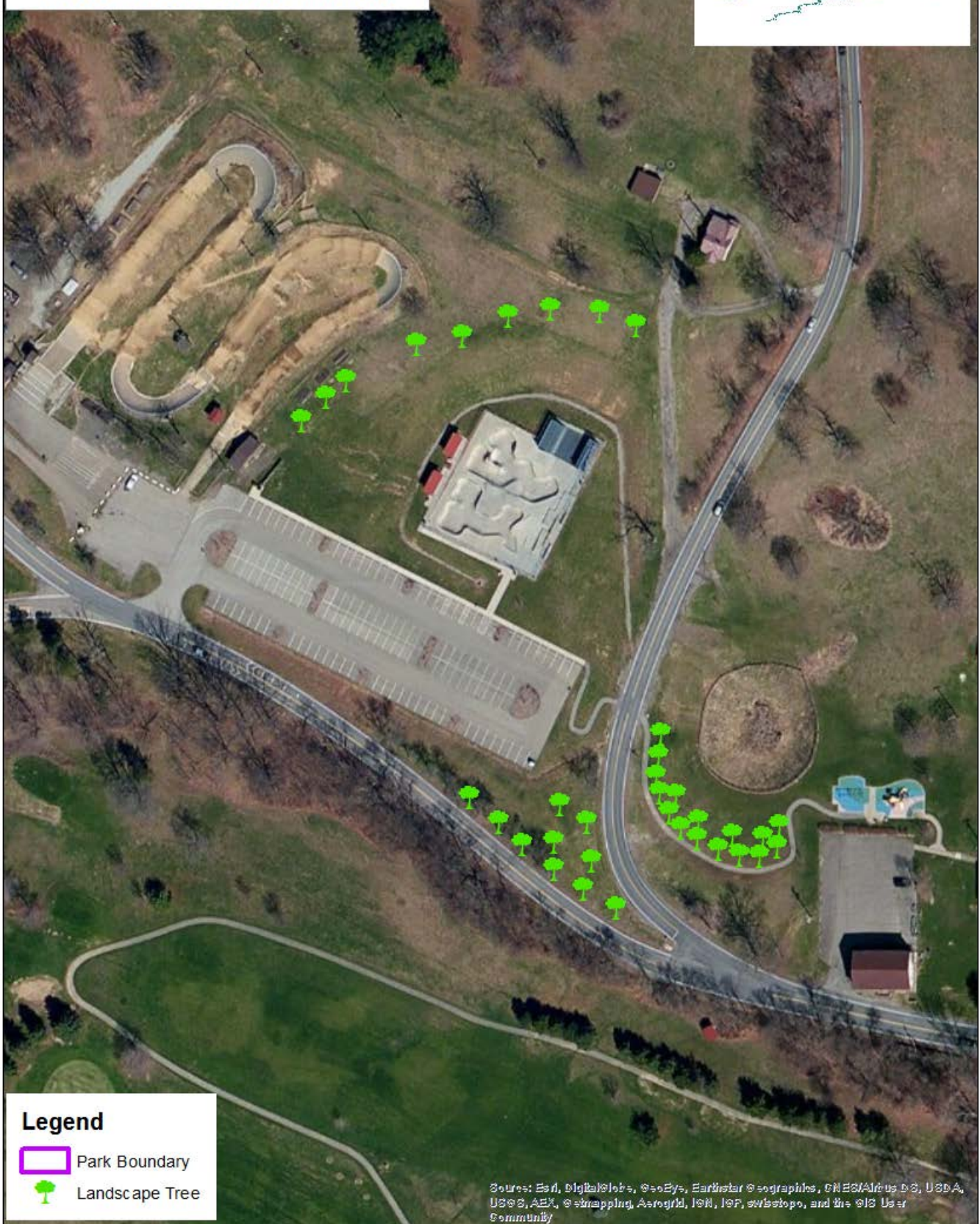
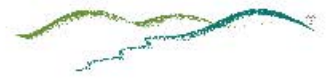
Tree planting at Harrison Hills Park, spring 2015.

Because of varying soil and sub-surface conditions in urban and even park environments, it is essential to have the planting sites prepared in advance of the volunteer planting event. Relying on volunteers to hand dig the tree planting sites leaves too much to chance. Planting site preparation in “open sites” (open green spaces in parks usually) includes excavating a hole 36” in diameter and 24” deep and backfilling to surface level with a specific grade of top soil.



Maintenance is essential for the successful establishment of these trees. The Conservancy will provide Allegheny County Parks’ staff with a maintenance plan for the trees which will include guidelines on watering, weeding, mulching, and protecting the trees over the first three years. We will also provide guidance on training pruning that should occur between years 3 and 5. Tree care can also provide a good opportunity for volunteer engagement.

Landscape Tree Planting: BMX and Skate Parks

Western Pennsylvania Conservancy



Legend

-  Park Boundary
-  Landscape Tree

Sources: Esri, DigitalGlobe, GeoEye, Earthstar , CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community

Timeline

WPC recommends planting up to 200 landscape trees in South Park, splitting the work between the spring and fall 2017 and spring 2018 planting seasons. Staff would work with Allegheny County Parks, including Park Rangers, and ACPF staff to plan and execute the plantings and would lead all technical forestry work and plan all logistics for volunteer tree plantings.

One specific site where landscaping trees can provide immediate benefits are near the the northern portion of South Park in Management Zone 3 around the BMX and Skate Park courses off of East Park Drive. Suggested planting map is found on the next page; cost estimates are below based on 35 trees.

Landscape tree planting (35)	
Project Administration	\$100
Forestry Consultation	\$250, \$50/hr at 5 hours
Volunteer tree planting event coordination	\$250, \$50/hr at 5 hours
2" Caliper trees	\$7,000, \$200 per tree for 35 trees
Mulch, stakes, tie, protection	\$875, \$25 per tree for 35 trees
Open site preparation	\$8,750, \$250 per tree for 35 trees
Total Cost	\$17,225





Large areas of lawn, suffering from erosion issues, could receive many landscape trees near the BMX course and Skate Park in South Park.

Opportunities for Environmental Restoration Projects

Western Pennsylvania Conservancy



Legend

-  Park Boundary
-  Mowed Areas

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

4.1.2 ESTABLISH MEADOWS

This assessment located 76 acres of regularly mowed lawn in South Park , most of which are suitable for establishing meadows of native grasses and wildflowers that will have high ecological value, will be visually appealing and will require minimal maintenance relative to maintaining a mowed lawn.

It is recommended that a demonstration project area be selected and converted from lawn to meadow as soon as possible. If successful, it will provide an ideal outreach and education opportunity that will be important for building support for more wide-scale establishment of meadows on mowed areas.

Once a site is selected, several site preparation steps should be taken to ensure the area can be enjoyed by the public and that vigorous establishment of native meadow plants occurs and is sustained.

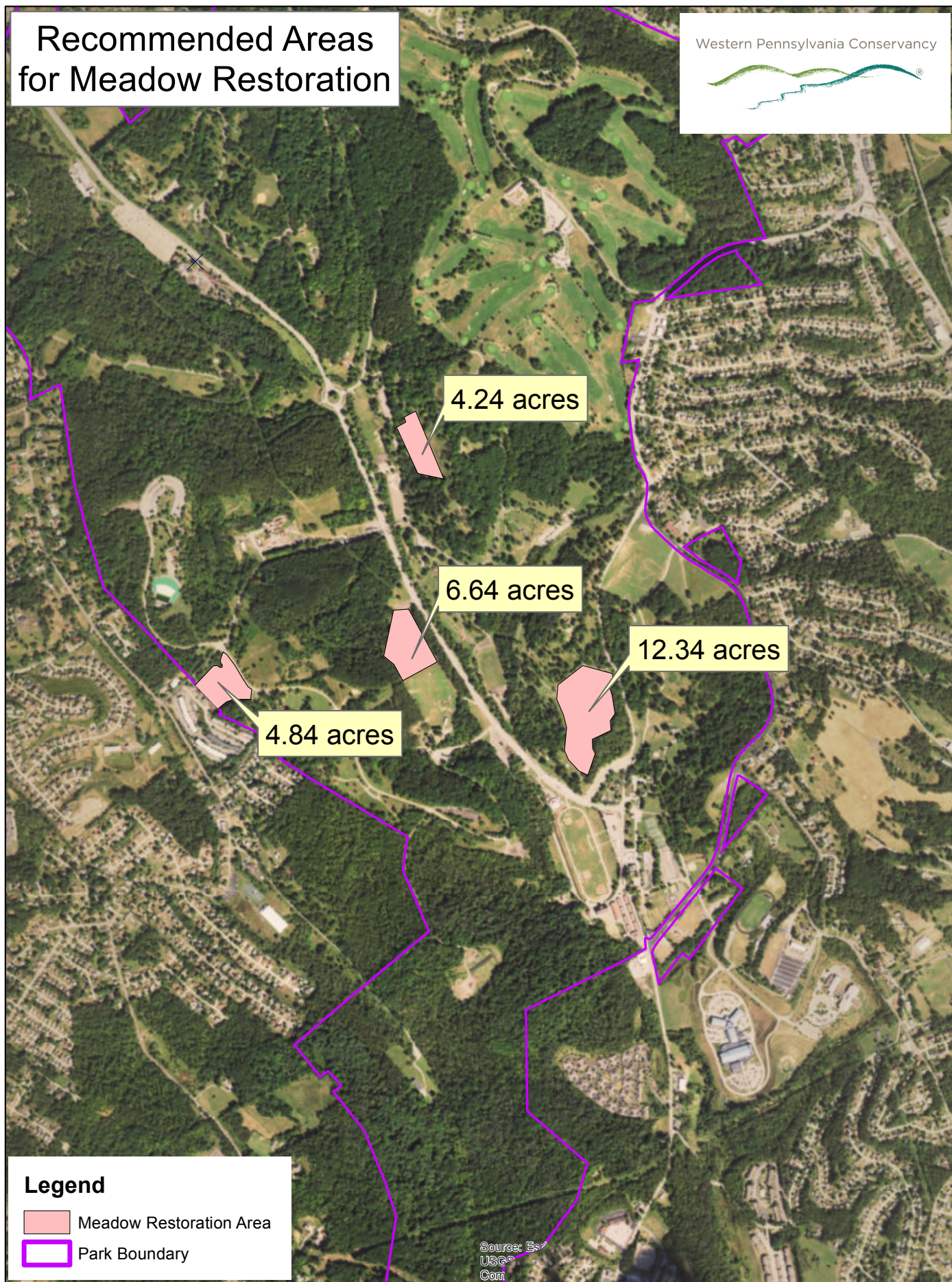
Following the protocol that the County is using at the demonstration meadow at Boyce Park, site preparation and seeding will be conducted by Allegheny County Park staff using a newly acquired Truax no-till native seed drill.





Prairie native plantings example. Photo courtesy of Native Connections (nativeconnections.net)

Recommended Areas for Meadow Restoration

Western Pennsylvania Conservancy



Legend

-  Meadow Restoration Area
-  Park Boundary

Source: Esri
USGS
Com

Equipment needed for meadow establishment projects include the following:



Tractor or ATV mounted herbicide sprayer



Disc tiller on trailer



Cultipacker



Grain drill

A demonstration project can begin during 2017. The steps in establishing a meadow on the selected site include the following:

1. Summer/Fall 2017: Mark off areas where mowed lawn will be retained (i.e. trails, picnic groves, etc.)
2. Fall 2017: Spray grass area to be re-seeded with a systemic herbicide. Repeat again in early spring if total kill not achieved
3. Spring 2018: No-till drill meadow with seed mix

If work is not conducted by park staff, the estimated total cost for hiring custom equipment operators to establish meadows is approximately \$1,000 per acre broken down as follows:

Herbicide Treatment:	\$20-35 per acre
Grain Drill:	\$27-\$35 per acre
Meadow Seed Mixes:	\$20-\$45 per pound
Seeding Rate:	10-20 pounds per acre

Recommended Areas for Forest Restoration



Western Pennsylvania Conservancy



2.14 acres

3.52 acres

Legend

-  Forest Restoration Area
-  Park Boundary

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4.1.3 RESTORE FORESTS

“Restoration trees” are trees that are used to reforest areas that have been affected by invasive plant species, diseases, or pests. These trees are considerably smaller than landscape trees because they are typically planted in locations such as hillsides and stream embankments where transporting a very large, heavy tree would be extremely difficult. Restoration trees range in size from 12” bare root seedlings to moderately sized plants grown in containers. In any case, they can be easily handled by one person. WPC recommends two potential sites for reforestation as indicated on the previous page.

Cost Estimate

Site Preparation and Layout:	\$500-\$700 per acre
Trees:	\$900 per acre (\$1.50 each @ 600 per acre)
Tubes, staking, netting and other materials:	\$3,000 per acre (at \$5.00 per tube and stake)
Total Establishment Cost/Acre:	\$3,500-\$3,700 per acre (plus training, tools and labor)



Preparation for reforestation planting at WPC's Bennett Branch Forest property.

Methodology

Several opportunities for forest restoration projects in South Park were identified during this assessment. The locations are within currently mowed lawn areas that have no other identifiable recreational use.

The goal of restoration tree plantings is to reforest an area that has lost trees to previous land uses, forest pests and

diseases, resource extraction, or where invasive plant species are actively being removed or controlled. In any of these approaches, the strategy is to plant a suite of native trees that will over time out-compete invasive species and restore the native tree canopy. The benefits are much the same as landscape tree plantings, but with more focus on restoring forest habitat. The shade provided by a restored canopy helps prevent the growth of invasive plant species that typically prefer growth in canopy gaps.



Volunteers plant native restoration trees at the Pittsburgh Botanic Garden on an unseasonably cold spring day.



Volunteers plant native restoration trees at Bennett Branch Forest.

Once the area for restoration has been identified, the forester and arborist will assign a suite of native tree species appropriate to the location. In areas where resource extraction has occurred, WPC recommends implementing the

Appalachian Regional Reforestation Initiative (ARRI) restoration approach which includes a specific type of land preparation for planting small bare root seedlings. This involves hiring a bulldozer operator to use a ripper to break up hard, compacted topsoil, to expose the native seed bank (if any exists) and to expose mineral soils, which is the preferred growing medium for restoration trees. The protocol recommends 600 trees per acre. These small trees are protected with tree tubes that prevent damage from wildlife but also act as small greenhouses and promote growth. They also help in monitoring tree health since you can more easily find the tubes than the small trees. Ongoing maintenance, including watering is not part of this protocol. A more detailed description of the ARRI approach is included in the Resources package attached to this assessment.

WPC has undertaken this type of planting protocol on one of its own properties and also a TreeVitalize planting at the Pittsburgh Botanic Gardens. WPC will monitor the success of both of these projects over time to inform future forest restoration projects. With restoration tree plantings in areas where invasive species are being removed or controlled or where there has been tree loss to disease or pests, utilize container trees that are larger than the aforementioned bare root seedlings. Using larger material is best when the strategy is to out-compete invasive plant species. These trees require fencing for protection from wildlife and should be maintained to ensure establishment. Maintenance should include watering, weeding, maintaining the fencing, and controlling invasive plants.





Hundreds of native restoration trees planted by volunteers to repopulate a formally strip-mined area at the Pittsburgh Botanical Gardens.

Forest Restoration: Corrigan Drive and Catfish Run Riparian Buffer

Western Pennsylvania Conservancy



Legend

-  Park Boundary
-  Forest Restoration Area

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, Aero, @satellite, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Corrigan Drive and Catfish Run Riparian Buffer

The map on page 94 presents the opportunity for reforestation of one of the currently mowed area number 9 (from the map on page 90). This 2.14 acre stretch of land would provide an attractive buffer between the housing just to the west, reduce the need to mow and provide greater stormwater capture.

Estimates for reforesting this entire site at the northern entrance of South Park are as follows, based on the previous estimates:

Site Preparation and Layout:	\$1,400, 2 acres at \$700 per acre
Trees:	\$1,800, \$900 per acre
Tubes, staking, netting and other materials:	\$6,000, \$3,000 per acre
Total Establishment Cost along Corrigan Drive and Catfish Run:	\$9,200

As an alternative for this site, it might be appropriate not to reforest the entire 2.14 acres. Instead, plant trees in a 30 foot swath along Catfish Run, 1800 feet long and avoid planting in the 30 foot strip along Corrigan Drive. The alternate cost estimates would be reduced by half at about \$4,600. Given the volume of trees needed for at least an acre, the costs will likely be less than \$1.50 per tree, reducing the costs for such a planting even more.

Tennis Courts Reforestation

Another suggested location for reforestation is the old tennis courts between Catfish Run and the Oliver Miller Homestead, near the Corrigan Drive and Stone Manse Drive intersection in the middle of South Park. This location comprising of 3.52 acres, has long been unused and could provide many environmental and aesthetic benefits at an important juncture. Site preparation below assumes that full removal of previous tennis court material has been completed.

Site Preparation and Layout:	\$2,450, 3.5 acres at \$700 per acre
Trees:	\$3,150, \$900 per acre
Tubes, staking, netting and other materials:	\$10,500, \$3,000 per acre
Total Establishment Cost for Tennis Courts reforestation:	\$16,100

Forest Restoration: Old Tennis Courts along Catfish Run



Legend

- Park Boundary
- Forest Restoration Area

Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, @strapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

4.1.4 INSTALL DEER EXCLOSURE FENCING

Installing deer exclosure fencing is a highly effective and relatively simple way to implement and protect sensitive botanical areas from browsing deer. South Park already has at least one small deer fencing demo site that is very close to a trail and includes some signage. It was effective because it presented a very noticeable difference in understory vegetation compared to the vegetation outside the fencing. Location is right next to the Ice Rink parking lot on the opposite side of Catfish Run. Using mostly hand tools, County Park staff could begin to install more exclosure fencing as soon as funding is available and sensitive areas are located.

It is recommended that a demonstration area be selected and fencing installed in Spring/Summer once sensitive areas for spring ephemeral wildflowers are located and prioritized.

Interpretive signage should be a component of any new deer exclosure project. The fence may appear unfamiliar and obtrusive to many park users, but signs explaining the reason for the fence (to prevent deer from eating native plants) and directing users to hiker-access gates or openings. For estimated costs to install interpretive signage, see the following recommendation.



Deer exclosure in South Park near the Ice Rink parking lot on the opposite side of Catfish Run, in South Park with interpretive signage. Inset: closeup of interpretive signage.

The steps to installing additional deer exclosures include:

1. Survey to prioritize and map areas for fencing and estimate length of fencing needed. WPC staff could be available upon request to assist with identification of the most sensitive botanical areas for a minimal fee.
2. (Optional) Engage a project manager to provide design advice, staff training and project oversight.
3. Develop costs estimates for procuring tools and materials and providing project oversight and instruction to park staff at the initial fence installation.
4. Procure materials and tools and begin staff training and installation of the exclosure area.

The estimated total cost to install deer exclosure fencing is approximately \$5.00-\$5.50 per foot based on installing an 8 foot woven wire fence with 12 foot galvanized steel posts. Fence can and should be designed to allow hiking access without additional costs. A good local example of a deer exclosure fence that allows hiking access is along Trillium Trail in Fox Chapel. Gates for equipment (bicycle) access should also be installed, and are \$150-\$400 each depending on size. The estimated cost for project oversight and instruction to park staff at the initial demonstration project installation is approximately \$2,000-\$2,500.

8 foot woven wire fence and posts:	\$5.00-5.50 per foot
Gates:	\$150-\$400 per gate
Project oversight and instruction:	\$2,000-\$2,500
Totals (for 1,000 feet of fence):	\$7,300-\$8,800



Deer fencing exclosure at Pierce Cedar Creek Institute in Barry County, Michigan.

4.1.5 INSTALL/UPDATE INTERPRETIVE SIGNAGE

Interpretive signage accompanying any new projects or park management change is a high priority because of the importance of having public understanding and support, and in some cases to provide environmental education.

Signs range in price depending on size and materials but range from \$300 or less for small signs used along trails to \$3,000 or more for larger kiosks that are good for posting maps and public notices, such as at trail heads.

One immediate interpretive signage opportunity where funds are already secured is in conjunction with the Audubon Society of Western Pennsylvania's initiative to install chimney swift towers across the county park system.



Audubon is working with ACPF and the County Parks on the project and will complete installation of 100 swift towers across the park system in 2017. Many of the towers include kiosks with interpretive panels, two of which pertain to the chimney swifts leaving two panels available for additional interpretive signage.

All signage installations should be coordinated with a park-wide interpretive plan; however, there may be occasional immediate need for signage before completion of a full plan.

Chimney swift habitat tower with interpretive signage installed in 2016. Photo courtesy of Allegheny County Parks Foundation.

4.1.6 GREEN INFRASTRUCTURE

Green infrastructure is increasingly recognized in our region as an affordable and effective strategy for managing stormwater runoff while improving water quality. Green infrastructure such as bioswales capture stormwater runoff from parking lots and roads and facilitates the infiltration and filtration of runoff through engineered structures that usually include hardscaping and plants.

Methodology

WPC has identified several potential locations for bioswales in South Park, with a focus on the Ice Rink parking lots. This large asphalt covered area slopes from Corrigan Drive down to within 30-50 feet of Catfish Run. Initial investigation by WPC staff shows a potential for removing as much as 70,000 square feet of asphalt and replacing with green infrastructure including bioswales and tree trenches. It is important to establish a wider buffer of at least 100 feet along Catfish Run to allow room for an adequate vegetated riparian buffer. This could include installing a large bioswale along the bottom of the parking lot that will capture, slow, and filter stormwater before it enters Catfish Run. In addition, a strip of tree trenches could be installed where there is currently a strip of asphalt between Corrigan Drive and the parking lot. This would create an attractive tree-lined corridor along Corrigan Drive, breaking up the asphalt expanse, in addition to providing shading and capacity for significant stormwater capture.

The process to install bioswales would begin with engineering analyses of the sites to calculate the drainage areas and stormwater capture goals. Implementation can be credited toward Municipal Separate Storm Sewer (MS4) program requirements. (Refer to the Department of Environmental Protection MS4 manual for more information <http://www.dep.pa.gov/Business/Water/CleanWater/StormwaterMgmt/Stormwater/Pages>). South Park and Bethel Park could possibly receive credit for green infrastructure installations.

Other necessary measures would include assessing the integrity of the existing storm systems to see if upgrades are required and to conduct infiltration tests that indicate the infiltration potential of the soils and substrate. Once these technical components are complete, design of the facility can begin. Design features can vary based on site conditions, desired stormwater capture goals, and aesthetics. The design will indicate where the runoff will enter the bioswale and what materials will be used in construction. Materials typically include a combination of rock, soil, and plants and usually feature constructed components such as concrete weirs.

Cost estimates

Joel Perkovich of Allegheny County Parks was able to procure cost estimates and create a conceptual design for this significant capital project that would address the VIP and Ice Rink parking lot. The estimates below include the excavation and restoration of 34,000 square feet of the parking lot.

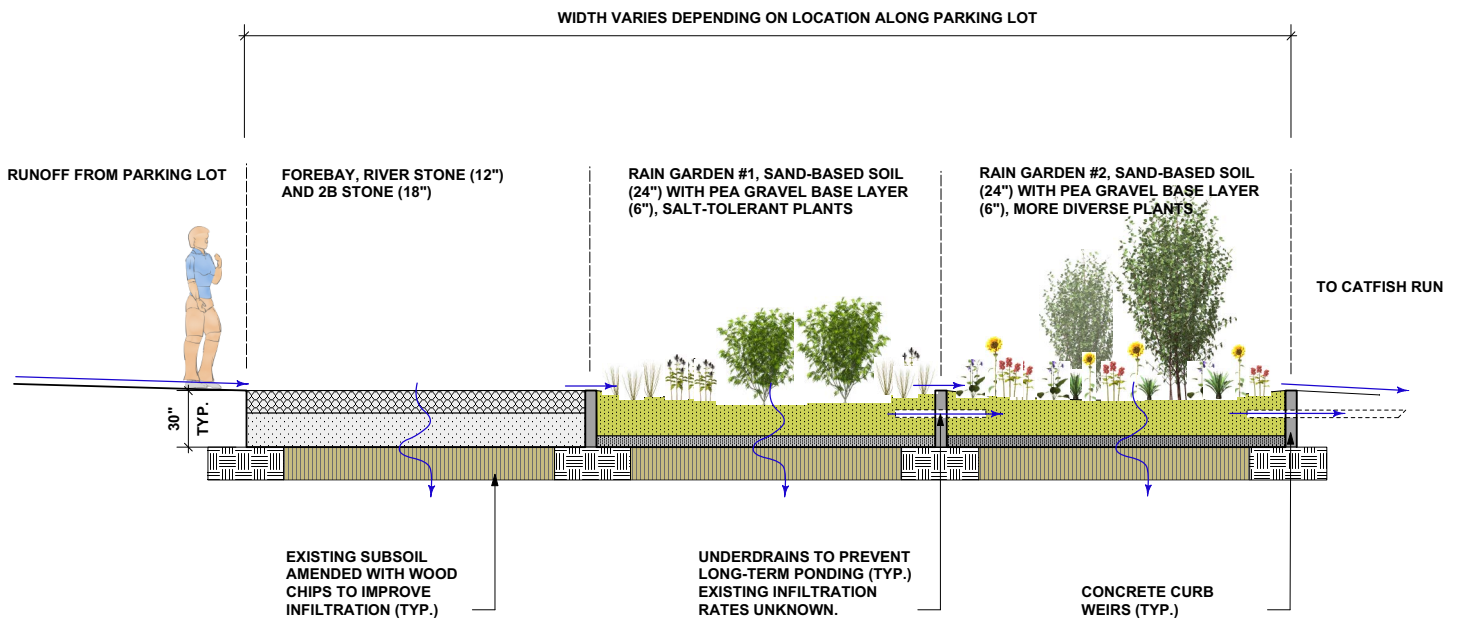
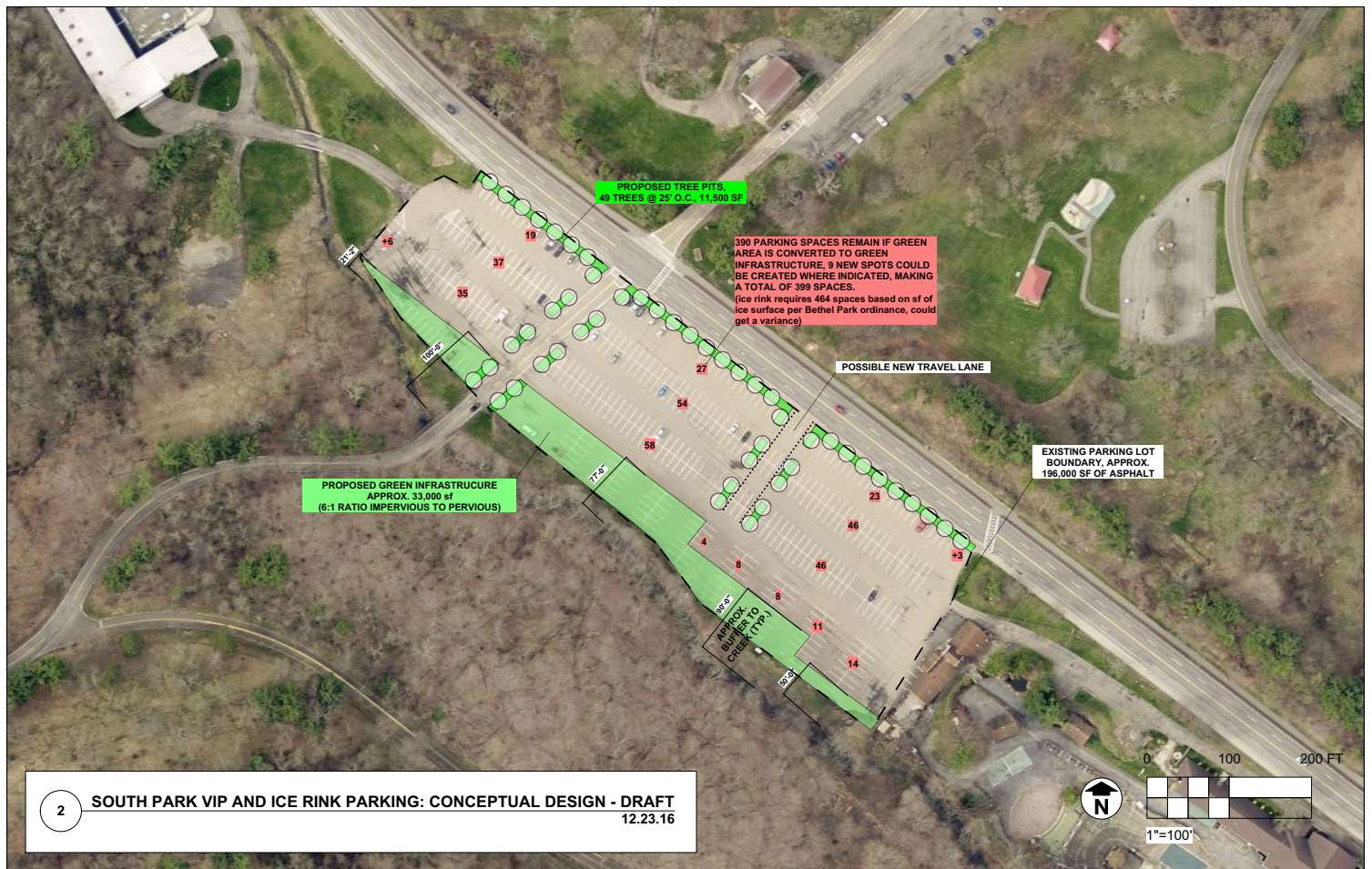




VIP and Ice Rink parking lot off of Corrigan Drive, Management Zone 4

Labor:	
Excavation Labor costs, 40 days	\$79,677
Excavation Equipment Costs, 40 days	\$199,231
Restoration Labor costs, 40 days	\$34,206
Restoration Equipment Costs, 40 days	\$80,803
Estimated Totals not including materials (for 34,000 sf bioswale parking lot project):	\$393,917

Bioswale materials (1.7 tons/cubic yard):	
2B gravel, 575 yards, \$37.63/ton	\$36,783
3-5" river stone, 375 yards, \$32/ton	\$20,400
pea gravel, 375 yards, \$33.75/ton	\$21,516
Compost/sand/soil mix, 1,500 yards, approximately 1,800 tons, \$34.81/ton	\$62,658
Estimated Totals for materials (for 34,000 sf bioswale parking lot project):	\$141,357
Estimated Combined Totals for labor and materials:	\$535,274



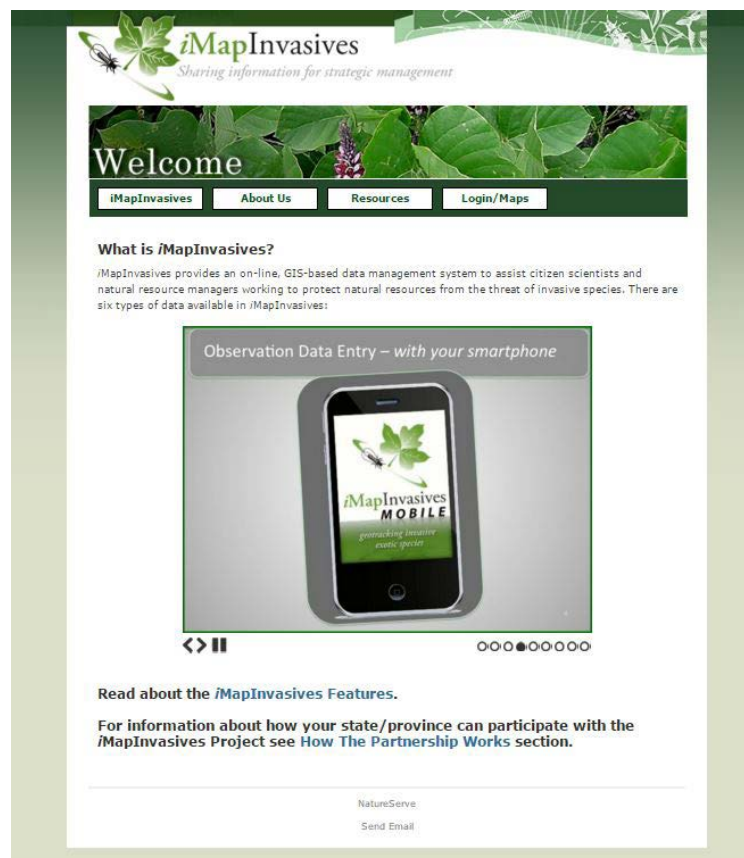
**3 SOUTH PARK VIP AND ICE RINK PARKING: CONCEPTUAL PLAN FOR GREEN INFRASTRUCTURE
12.23.16**

4.2 MANAGEMENT/PLANNING

4.2.1 PARK STAFF TRAINING

Invasive Species Management

- i. Training Topics
 1. Plant identification and management strategies.
 2. Mechanical treatment methods.
 3. Chemical/herbicide treatment methods.
 4. Keeping records of infestations and management activities (iMap Invasives).



a. <http://www.imapinvasives.org/>

- ii. Training could be provided over several days during the spring and summer to coincide with seasons when weed management is needed.
- iii. Penn State Wildland Weed Management Program, WPC staff, and others could be available to provide training.

- iv. Training Topics:
 - 5. Plant ID.
 - 6. Documentation and management tracking using iMap Invasives.
 - 7. Mechanical treatment methods.
 - 8. Chemical/herbicide treatment methods.
- v. Cost of training is approximately \$1,800-\$2,200 per day.

Tree Planting and Care (Tree Tender Training)

WPC has been working with the non-profit Tree Pittsburgh since 2008 through the TreeVitalize Pittsburgh project. An important component of the success of that project has been the training of volunteers through Tree Pittsburgh's "Tree Tender" program. Tree Pittsburgh has trained over 1,400 Tree Tenders in Allegheny County through an eight hour workshop that covers everything from the benefits of trees to communities to the planting and care of trees over the long term. In the Boyce Ecological Assessment and Action Plan (2016), WPC recommended that the Allegheny County Parks Maintenance staff undergo Tree Tender Training. The County Parks Director agreed that this was a high priority, and the PNC Foundation provided a grant to ACPF to cover the cost of two training sessions. The first was held in April 2016, and a second training session to complete the "Tree Tender" certification will be held in early 2017. Trained Parks staff will help to care for and enhance the longevity of newly planted trees.



Volunteers and staff plant and protect restoration trees during a planting along a river trail in Pittsburgh's South Side.

4.2.2 REDUCE MOWING, PRIORITIZE ECOLOGICAL MANAGEMENT AND MAINTENANCE OF CAPITAL PROJECTS

As discussed in the previous section, making reductions to the acreage and frequency of mowing in South Park will result in significant ecological, visual, education and cost savings benefits.

As staff time availability increases with reduced mowing obligations, staff capacity should be re-allocated more heavily toward ongoing maintenance and management of the capital projects mentioned above.

- Invasive Weed Management
 - o As described in previous sections of this report, managing invasive weed infestations impacting mature forest areas of South Park is a priority management concern, and will continue to be into the future. Investments in tools and staff training are priority recommendations also mentioned in this section.
- Trail System Maintenance
- Green Infrastructure Maintenance
- Meadows and Reforested Areas Maintenance

4.2.3 PROCURE TOOLS AND EQUIPMENT

For invasive weed management, trail maintenance, meadow management, tree planting, fence building and maintenance. Procuring an adequate supply of the tools listed below will cost approximately \$20,000 total, although the tools could be acquired as needed over the course of several months/years.

Hand Tools:

Hedge shears:	\$20-\$75 each (depending on size)
Hand pruners:	\$15-\$45 each
Loppers:	\$20-\$80 each (depending on size)
Bow saws:	\$15-\$30 each
Long reach pruners:	\$75-\$150 each
Picks mattock:	\$15-\$40 each

Specialty Tools:

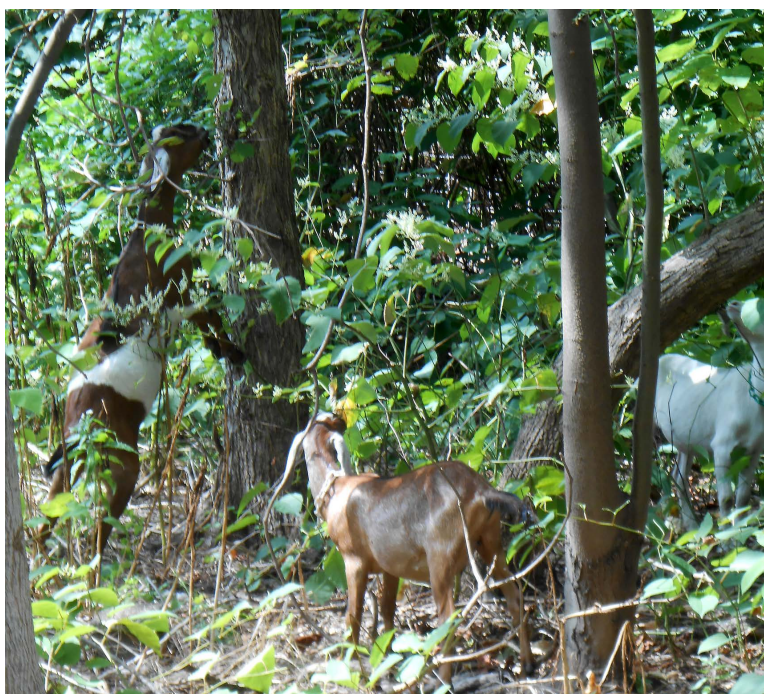
Tree and root puller (Pullerbear):	\$200
Root Talon:	\$70
Root Buster:	\$45
Tree planting dibble bar:	\$35-\$45 each

Power Tools:

Professional-grade chain saws:	\$350-\$600 each (depending on size and brand)
Professional-grade Pole saws:	\$400-\$700 each (depending on size)
Walk-behind brush cutter:	\$1,500 - \$3,000
Brush hog tractor attachment:	\$2,000 - \$4,000
Tree hole auger:	
Attachment for tractor with 3-point hitch:	\$450-\$1,000
Hand-held:	\$200-\$400

Goat herd:

- Use of goat herds to graze on invasive weeds has emerged locally as a potentially high impact, low cost strategy to be used in combination with other treatment methods, either chemical or mechanical. For example, spraying a systemic herbicide (i.e. triclopyr or glyphosate) immediately following grazing by goats can create good conditions for herbicide absorb into the plants' vascular system, increasing the chances of a total kill of the unwanted vegetation.



Steel City Grazers goat herd eats invasive plants along Bates Street in the Oakland neighborhood of Pittsburgh, Sept. 2015.

- There is one location non-profit organization that uses goats as a way to manage invasive and unwanted plant species - Allegheny GoatScape - that used to be business as Steel City Grazers. WPC engaged Steel City Grazers on one project to control a small patch of Japanese knotweed and other invasives in the City of Pittsburgh that proved to be highly effective. The fee for that project was based on a \$500 base fee plus \$100 per day for a 10-goat herd with an expectation that it could take two to three weeks per acre to be cleared. Those fees included transportation of the goats, temporary electric fencing to contain the goats to the area being managed, a donkey whose role was to protect the goats from predators such as coyotes and feral dogs and daily care of the animals.
- Interest was also raised by County Park staff and others during the meetings conducted in conjunction with this project about the possibility of acquiring a permanent goat herd (or herds) to manage invasive weeds across the County Parks system. Because of recent notoriety, demand is quite high for privately owned goat herds. Acquiring a goat herd would help to ensure goats are always available for weed management.
- Goats themselves are relatively inexpensive to buy (sometimes even free). However, they do require good fencing, food and shelter during winter and inclement weather, transportation to and from weed management projects, protection from predators, and a knowledgeable caretaker.



Before



After

Steel City Grazers

Western Pennsylvania Conservancy, Oakland, Pittsburgh, PA, September 2015

Japanese Knotweed, Porcelainberry, Pilewort, Other

4.2.4 DEVELOP A SUSTAINABLE TRAIL MANAGEMENT PLAN

In conjunction with training Parks staff on trail management and maintenance, developing a sustainable trail management plan that provides a comprehensive vision and management framework for all trails in South Park is a top priority. Such a plan should include broad stakeholder and public input, as well as engagement of trail design, construction and maintenance professionals.

The scope of the plan should include the following:

- Survey and evaluation of current and future trail usage.
- A comprehensive assessment and evaluation of the existing trail system by trail consultants.
- Identifying most appropriate trails for each permitted use.
- Identifying locations for development of new trailheads.
- A plan for interpretive signage and other outreach and educational assets.
- Prioritizing trails/trail sections will be the focus of future maintenance efforts and developing detailed work logs.
- Garner broad stakeholder and public input.
- Training and project oversight for County Parks staff on trail construction and maintenance BMPs.
- Identifying trails to close/eliminate due to redundancy, illegal vehicle use or other problems.
- Plan for accessibility in compliance with the ADA.

A more detailed budget estimate should be developed based on soliciting proposals from outside consultants, but the total cost to develop the plan is likely to cost anywhere from \$25,000 to \$120,000 depending on the contractor. The planning process would likely take at least two years to complete. For fundraising purposes, developing the Sustainable Trail Management Plan could be packaged with other recommended initiatives to develop an interpretive plan for South Park and to train County Parks' staff on trail management and maintenance.

Based on discussions held in conjunction with this project, it was also mentioned that the plan could be done in conjunction with a broader County Parks system wide trail planning effort that leverages the skill and expertise of the Allegheny County Park Rangers and Trail Pittsburgh, an organization that conducts extensive volunteer activities to protect and enhance trails for all park user groups.

THE POWER OF GREEN

South Park is in a great position to use the power of green to enhance its immediate present and support its future. With the engagement and leadership of the Allegheny County Parks Foundation and the Allegheny County Parks, it has many of the elements that are necessary for successful greening projects. Strategic greening has the potential to be a rallying point for community improvement that can involve citizens from school children to seniors, from business owners to cultural institutions, from novices to skilled members of the community. The power of green is found in the multifaceted benefits and the profoundly satisfying experience of improving the living landscape of the community. South Park has the elements in place to harness this power for all its constituents, employees and its landscape.

