



RETURN ON ENVIRONMENT

The Economic Impact of Protected Open Space in Montgomery County, Pennsylvania

Montgomery County Planning Commission
March 2022



MONTGOMERY COUNTY

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Montgomery County



TABLE OF CONTENTS

Report Overview	6
Section 1: Introduction	11
Section 2: Home and Property Values.	17
CASE STUDY: Green Ribbon Preserve and Trail	20
Section 3: Economic Activity	23
CASE STUDY: Schuylkill River Trail in Pottstown	28
Section 4: Environmental Services.	31
CASE STUDY: Pennypack Ecological Restoration Trust Lands	38
Section 5: Direct Use Benefits	41
CASE STUDY: Norristown Farm Park	44
Section 6: Conclusions, Next Steps, and Success Stories	47
A Few Closing Words	49
SUCCESS STORY: The Path to Creating an Open Space Fund for Lower Frederick Township	50
SUCCESS STORY: Spring Mountain Conservation Area: A Win-Win-Win for All!	52
Glossary	54

LIST OF FIGURES

Report Overview

Figure RO.1: The Key Benefits of Protected Open Space 7

Section 1: Introduction

Figure 1.1: Montgomery County Protected Open Space and Percentage by Ownership Type 12

Figure 1.2: Montgomery County Open Space Acreage by Ownership Type. 13

Figure 1.3: The Four Key Areas of Impact Measurement 15

Section 2: Home and Property values

Figure 2.1: Montgomery County Open Space Property Value Impact. 18

Figure 2.2: Percent Premium from Proximity to Montgomery County Protected Open Space. 18

Figure 2.3: Percent Premium in House Value for Every 150 acres of Protected Open Space within 1/2 Mile 18

Figure 2.4: DVRPC Planning Areas in Montgomery County 19

Figure 2.5: Percent Premium of Protected Open Space by Planning Area 19

Figure 2.6: Added Market Value from Protected Open Space per House by Planning Area 19

Figure 2.7: Green Ribbon Preserve and Trail 20

Figure 2.8: Green Ribbon Preserve and Trail Property Value Impact for Homes within a 1/2 Mile. 21

Section 3: Economic Activity

Figure 3.1: Economic Impact Methodology 23

Figure 3.2: Annual Economic Impact Associated with Protected Farmland 24

Figure 3.3: Annual Employment Associated with Protected Farmland 24

Figure 3.4: Annual Salaries Associated with Protected Farmland 24

Figure 3.5: Annual Municipal Park Expenditures Estimate 25

Figure 3.6: Annual Economic Impact Associated with Open Space Park Maintenance and Management 25

Figure 3.7: Employment Associated with Open Space Park Maintenance and Management 26

Figure 3.8: Annual Salaries Associated with Open Space Park Maintenance and Management 26

Figure 3.9: Annual Economic Impact Associated with Open Space Related Tourism. 26

Figure 3.10: Annual Employment Associated with Open Space Related Tourism. 26

Figure 3.11: Annual Salaries Associated with Open Space Related Tourism. 27

Figure 3.12: Estimated Annual Pennsylvania Tax Revenue Related to Protected Open Space 27

Figure 3.13: Schuylkill River Trail in Pottstown. 28

Figure 3.14: Annual Economic Impact from Trail User Spending along the Schuylkill River Trail in Pottstown 29

Section 4: Environmental Services

Figure 4.1: Environmental Benefits of Protected Open Space in Montgomery County (\$M per Year) 32

Figure 4.2: Potential Annual Air Pollution Removal Benefits from Protected Open Space in Montgomery County . . . 33

Figure 4.3: Potential Amounts of Lifetime Carbon Storage and Annual Carbon Sequestration Benefits from Protected Open Space in Montgomery County. 34

Figure 4.4: Avoided Increase in Annual Pollutant Loading Due to Protected Open Space in Montgomery County 36

Figure 4.5: Avoided Increase in Stormwater Runoff Due to Protected Open Space in Montgomery County 36

Figure 4.6: Avoided Costs of Construction and Annual O&M to Manage 2-Year Storm Runoff Due to Protected Open Space in Montgomery County 37

Figure 4.7: Avoided Costs of Removal of Annual Stormwater Pollution Loads Due to Protected Open Space in Montgomery County 37

Figure 4.8: Pennypack Ecological Restoration Trust. 38

Figure 4.9: Annual Environmental Benefits Summary of Protected Open Space Associated with Pennypack Ecological Restoration Trust 39

Figure 4.10: Potential Annual Air Pollution Removal Benefits Associated with Pennypack Ecological Restoration Trust 39

Figure 4.11: Potential Amounts of Lifetime Carbon Storage and Annual Carbon Sequestration Benefits Associated with Pennypack Ecological Restoration Trust. 39

Section 5: Direct Use Benefits

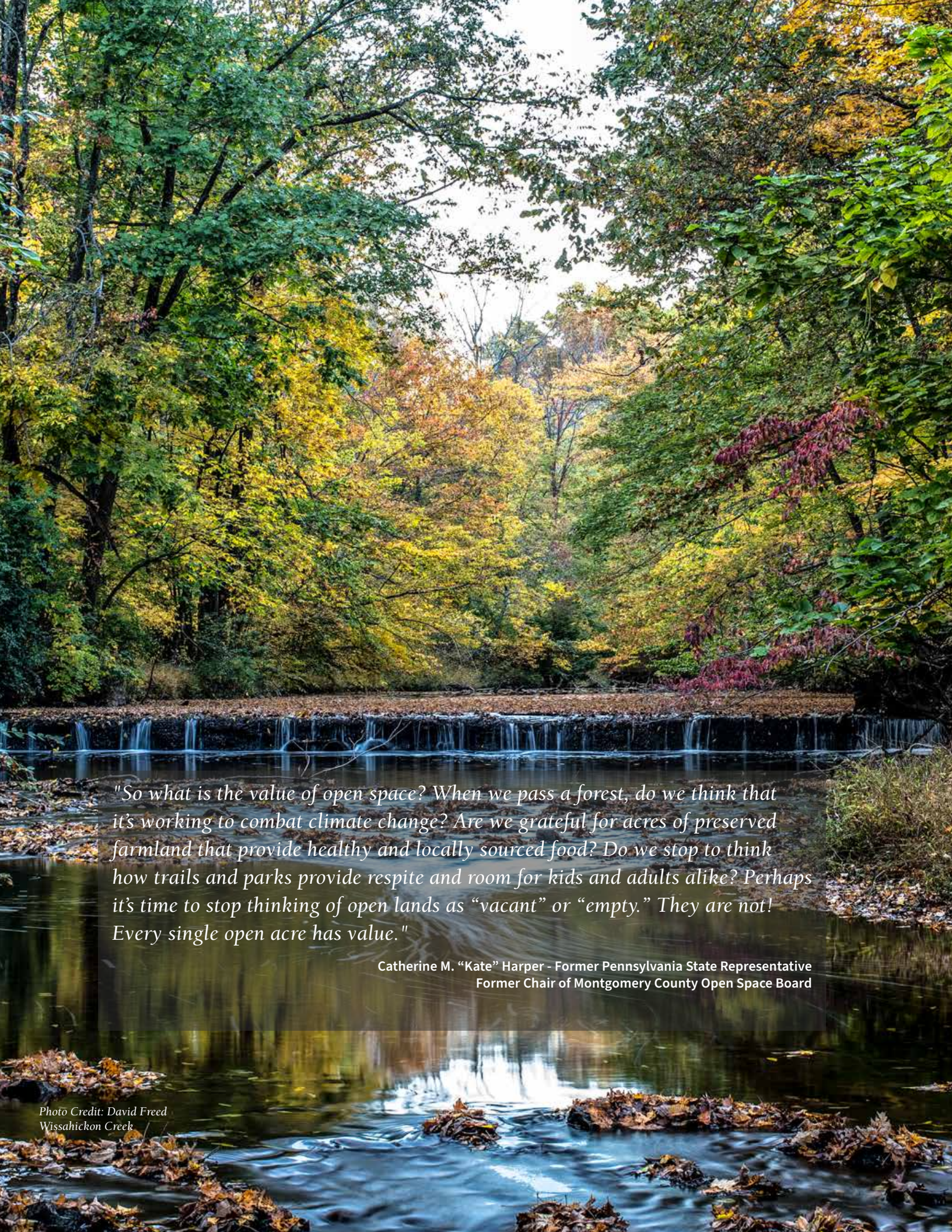
Figure 5.1: Annual Recreational Benefits from Montgomery County Protected Open Space 42

Figure 5.2: Annual Healthcare and Workplace Savings from Physical Activity on Montgomery County Protected Open Space (\$M). 43

Figure 5.3: Norristown Farm Park 44

Figure 5.4: Annual Recreational Benefits Associated with Total Households within a 1/2 Mile of Norristown Farm Park 45

Figure 5.5: Annual Healthcare and Workplace Savings Associated with Norristown Farm Park. 45



"So what is the value of open space? When we pass a forest, do we think that it's working to combat climate change? Are we grateful for acres of preserved farmland that provide healthy and locally sourced food? Do we stop to think how trails and parks provide respite and room for kids and adults alike? Perhaps it's time to stop thinking of open lands as "vacant" or "empty." They are not! Every single open acre has value."

Catherine M. "Kate" Harper - Former Pennsylvania State Representative
Former Chair of Montgomery County Open Space Board

MONTGOMERY COUNTY RETURN ON ENVIRONMENT REPORT OVERVIEW

This report demonstrates that protected open space adds significant value to Montgomery County's economy, with benefits for businesses, governments, and households.

Protected open spaces—public parks and trails, preserved farmland, and private conserved lands—provide proven and substantial economic, environmental, and public health benefits to surrounding communities. This value occurs in different ways – some are direct revenue streams to individuals or governments, some represent appreciation in asset values, others are the result of avoided costs.

Based on methodologies from a previous 2011 *Return on Environment* report completed by Greenspace Alliance and the Delaware Valley Regional Planning Commission (DVRPC)—that assessed the economic benefits of protected open space in the five-county region of Southeastern Pennsylvania—this current *Return on Environment Study* seeks to quantify the economic value of protected open space specific to Montgomery County. This economic analysis is critical to understanding the true value and impact of the policies and initiatives that support open space preservation.



Home and Property Values Impact Open Space Generates Premium for Home Values

The property value impact from protected open space is reflected in the home value premium that homeowners are willing to pay to live near protected open space. As a result, the existing protected open space in Montgomery County adds to the overall value of its housing stock. This increased wealth is captured through higher sales values of homes near protected open space and generates increased government revenues via greater property tax collections. This report analyzes more than 46,022 total acres of protected open space and approximately 142,925 single family home sales in Montgomery County

from 2000-2020 to estimate the effect of protected open space on residential property values and the attendant fiscal impacts. Results indicate that proximity to protected open space contributes a significant positive impact to residential property values.

➔ \$2.8 BILLION ADDED TO THE MARKET VALUE OF HOUSING STOCK

The value of homes in Montgomery County increases by more than \$11,300 if these homes are located up to a ½ mile from protected open space. In total, the 250,000 homes within a ½ mile of protected open space have an added value of \$2.8 billion in market value, due to their proximity to open space.

➔ \$48M IN ANNUAL PROPERTY TAX REVENUES

Protected open space also increases the amount of property taxes that local governments and school districts receive. These increased property tax revenues total \$48 million per year.



Economic Activity Impact Open Space and Farmland Generate Jobs and Attract People to Spend in the Region

Protected open space in Montgomery County generates economic impacts by creating management and maintenance expenditures and related jobs at public parks. The direct spending, which goes to labor income, is circulated back into an economy when those employees spend some of their earnings on various goods and services, creating a ripple effect in the economy.

Figure RO.1:
The Key Benefits of Protected Open Space



HOME AND PROPERTY VALUES

\$2.8B

added to the value of housing stock located within a ½ mile of protected open space

\$11,300

average increase in the value of homes located within a ½ mile of protected open space

\$48M

in annual additional property tax revenues generated from homes within a ½ mile of protected open space



ECONOMIC ACTIVITY

\$160M

annual economic impact associated with protected open space

1,555

jobs supported from open space-related upkeep, protected farmland, and open-space tourism

\$49M

in annual salaries



ENVIRONMENTAL SERVICES

\$31.6M

in annual savings through the provision of six environmental services

\$97.4M

in the lifetime cost savings of carbon storage in trees

\$10M

in avoided annual stormwater system maintenance

\$180M

in avoided annual stormwater pollutant removal costs



DIRECT USE BENEFITS

\$219M

in annual recreation benefits to residents

\$225M

in medical costs avoided annually

\$243M

in lost productivity costs avoided annually



Beyond management and maintenance, agricultural activities occurring on protected farmland also generate economic impact, and open space and farms attract tourists to visit the county, who, in turn, generate associated expenditures within the county.

➔ **\$160M IN TOTAL ANNUAL ECONOMIC IMPACT**

It is estimated that open space-related activities generate, in total, \$160 million in annual economic impact. Examples of these economic activities include spending from tourism associated with protected open space, spending for the purchase of goods made on preserved farmland, and government spending for the management and maintenance of public open space.

➔ **1,555 JOBS SUPPORTED FROM OPEN SPACE-RELATED UPKEEP, PROTECTED FARMLANDS, AND OPEN SPACE TOURISM**

Protected open space in Montgomery County contributes an estimated 1,555 direct and indirect jobs to the economy. Examples of these jobs include public maintenance workers, municipal, county, state, and federal park administrators, and rangers; farmers, distributors, and suppliers working on protected farmland; and guides and hospitality professionals catering to tourists who visit protected open space.

➔ **\$49M IN ANNUAL SALARIES**

Salaries paid to individuals working on or in positions related to protected open space in Montgomery County total \$49 million per year.

 **Environmental Services Benefits
Open Space Reduces Pollution
and Stormwater Risks**

Protected open space in Montgomery County provides environmental benefits for the communities it serves, including air pollution removal, the provision of a water supply, water quality improvement, flood mitigation, wildlife habitat conservation, and carbon sequestration and storage. Combined, these benefits create ecosystem functions that would require costly measures to replicate, if lost. The upkeep of protected open space

will ensure the value of these services, if the ecosystems are retained. If these ecosystems were removed, municipalities would incur additional costs to provide equivalent services.

➔ **\$31.6M ANNUALLY THROUGH THE PROVISION OF SIX ENVIRONMENTAL SERVICES**

The six environmental services include replenishment of the water supply, water quality improvement, flood mitigation, wildlife habitat conservation, air pollution removal, and carbon sequestration in trees on protected open space. This sum represents value gained and costs avoided by eliminating the need to sacrifice or artificially replace vital ecological services currently provided by protected open space within Montgomery County.

➔ **\$97.4 MILLION IN THE LIFETIME COST SAVINGS OF CARBON STORAGE IN TREES**

It is estimated that trees on Montgomery County’s protected open space store a tremendous amount of carbon, a benefit that would cost \$97.4 million to replicate.

➔ **\$74 MILLION IN AVOIDED TOTAL CAPITAL COSTS, \$10 MILLION IN AVOIDED ANNUAL STORMWATER SYSTEM MAINTENANCE AND OPERATIONS, AND \$180 MILLION IN AVOIDED ANNUAL STORMWATER POLLUTANT REMOVAL COSTS**

An increase in runoff and pollutant loads would require additional investment in infrastructure to manage the increased stormwater.

Protected open space helps mitigate stormwater impacts by reducing the volume of runoff created by storm events and the associated pollutants that stormwater carries. This mitigation reduces the burden placed on community stormwater infrastructure to manage the volume of runoff and pollutant loads, thereby avoiding both capital and long-term community maintenance expenditures, as well as improving ecological habitat, recreational resources, and safeguarding sources of current and future public water supplies.

Protected open space avoids \$74 million of capital cost for stormwater infrastructure construction, plus an additional \$10 million needed annually to operate and maintain the additional infrastructure, thereby avoiding an additional yearly investment of \$180 million needed to remove the pollutant loads.



Direct Use Benefits Open Space Provides Free or Low-Cost Recreational Opportunities and Promotes Health

Protected open space in Montgomery County provides a multitude of free or low-cost recreational activities to residents. Many of these activities involve strenuous or moderate exercise, which contribute to physical well-being and defray health-care costs. In addition to physically active residents who derive benefits from protected open space, employers realize lower healthcare costs, see fewer workers compensation claims, and have lower rates of absenteeism and presenteeism (i.e., coming to work while sick or injured).

➤ \$219M IN ANNUAL RECREATION BENEFITS FOR RESIDENTS

Nearly \$219 million in benefits accrue annually to residents who participate in recreational activities on protected open space within Montgomery County. This value represents the additional amount of money that residents in the county would be willing to spend in the private market, to participate in the recreational activities, which they currently enjoy on protected open space.

➤ \$225M IN MEDICAL COSTS AVOIDED ANNUALLY

Physically active people typically enjoy a variety of health benefits, including lower incidence of cardiovascular disease, diabetes, depression, certain cancers, and obesity. It is estimated that the moderate and strenuous activities that take place on protected open space in the county account for \$225 million in avoided medical costs annually.

➤ \$243M IN LOST PRODUCTIVITY COSTS AVOIDED ANNUALLY

It is estimated that businesses in Montgomery County avoid \$243 million in lost productivity costs per year as a result of the physical activities their employees engage in on protected open space in the region. This total represents the amount saved due to less employee absenteeism and presenteeism for employees engaging in physical activity on protected open space in Montgomery County.

Conclusion

The benefits presented in this report provide information for elected leaders, policy makers, and the general public on the value of protected open space. Hopefully, this information will contribute to informed decision-making concerning both preservation and development in the county.

“Open space and recreational acquisitions or expansions are often questioned over the benefits they will provide over time. In response, the Return on Environment study provides us with real data to address such questions, and happily, the demonstrable benefits. As we work with communities across Montgomery County to enhance their open space offerings, these outcomes will be invaluable.”

Bruce D. Reed – Montgomery County
Open Space Board Chair



Photo Credit: Brian McNeill



“The past 30 years have proven Montgomery County’s extraordinary record of land preservation and trail development in close partnership with its municipalities and land preservation organizations. Thousands of acres of land have been preserved and hundreds of trail miles constructed. Together, these achievements have enhanced our quality of life and created a vibrant community and economy for residents and businesses alike.”

Paul Meyer – Former Morris Arboretum Director, Former Chair of the Montgomery County Open Space Board

SECTION 1: INTRODUCTION

Protected open spaces provide substantial economic, environmental, and health benefits to surrounding communities, but these benefits are often overlooked or undervalued in policy debates and investment decisions.

Montgomery County has changed dramatically since the 1950s due to its proximity to Philadelphia and the regional transportation system. Now, with over 850,000 residents, it is the third most populous county in Pennsylvania. In addition to its large population, Montgomery County currently serves as an important regional economic hub with a diverse array of jobs and popular shopping destinations.

The county offers a diverse natural and historic landscape with the roots of our nation running deeply throughout. Valley Forge National Historical Park is the county's most significant tourist destination and the site of the revolutionary army's winter encampment, which proved pivotal in the fight for independence. The county's scenic natural landscape is characterized by winding streams, rolling farmland, wooded hills, and over 42 miles of the Schuylkill River, which is designated as a National Scenic River

History of Montgomery County Open Space System

The current Montgomery County open space system, including its parks, natural areas, greenways, and trails began to form over 100 years ago. Prior to the turn of the 20th century, outdoor spaces which residents enjoyed for their leisure time were often picnic groves, amusement parks, swimming lakes, and horse racing tracks owned privately or by local churches and fire companies. Some of the first municipal parks were established through generous donations of property or were purchased by funds raised by local civic leaders. Important early examples of donated parks include

Norristown's Elmwood Park donated in 1909, Lorimer Park—the first county park—in 1936, and Ashbridge Park in Lower Merion Township in 1940. In the 1920s, important parks in Lansdale and Pottstown were established through successful local fundraising efforts and named in memory of fallen World War I soldiers.

In the 1960s, during a period of tremendous suburban growth in the county, many municipalities began establishing local parks to meet recreational demand. In 1964, the Commonwealth of Pennsylvania enacted important open space legislation known as Project 70 or the Land Acquisition and Borrowing Act. Through Project 70, the Commonwealth acquired the largest park in the county, 3,359-acre Evansburg Park. Montgomery County was also successful in obtaining Project 70 funding for key open space property acquisitions along important waterways throughout Montgomery County, including the Schuylkill River, Pennypack Creek, Wissahickon Creek, and Perkiomen Creek. Further efforts to preserve lands along these important waterways were undertaken through the formation of nonprofit watershed associations for the Wissahickon in 1957, the Pennypack and Perkiomen in 1964, and the Schuylkill in 1978.

The county's expansion of its park system continued through the second half of the 20th century, providing unique regional recreation spaces and historic sites for its residents. A modest grant program was established by the county in 1962, called the Open Space Grant in Aid Program, to provide important gap funding to municipalities for the acquisition of open space. In

INTRODUCTION

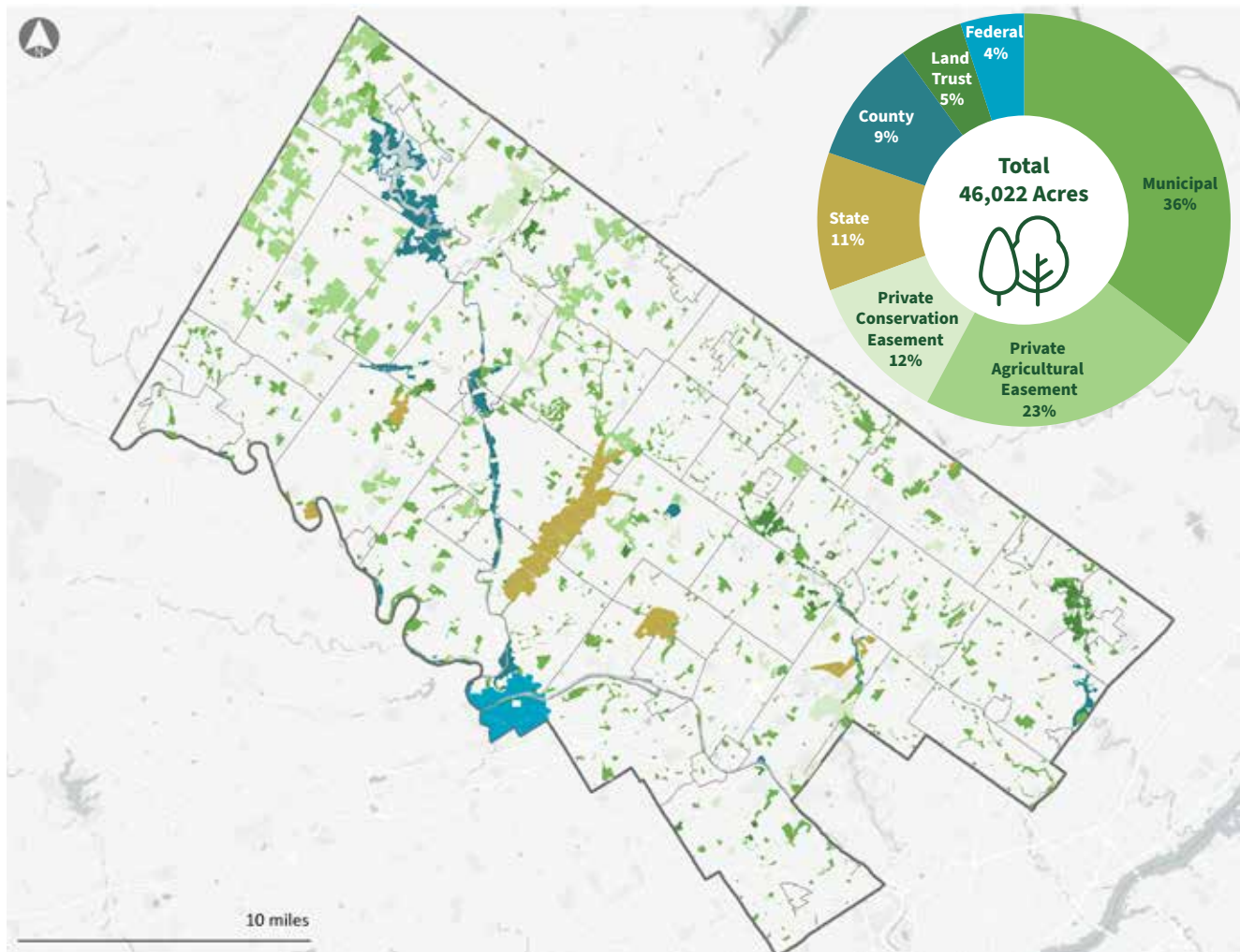
1979, Montgomery County officials cut the ribbon on a two-mile portion of the Schuylkill River Trail from Spring Mill to Shawmount in Philadelphia, making it one of the first suburban counties in the region to develop a multipurpose trail. Although the county, municipalities, and private organizations worked diligently to protect their open space in subsequent years, by 1993 it became evident that greater efforts needed to be undertaken to preserve open space since significant proportions of the county were being consumed by private development at an alarming rate. To address this important issue, the county established a robust blue-ribbon panel, which recommended a comprehensive \$100 million open space program to include funding for county acquisitions and trail development, municipal grants for open space plans and land acquisition, and grants to private conservation organizations. This 10-year open space program accomplished a great deal. In addition

to funding hundreds of important open space projects, this major investment established an important culture of open space protection among community leaders throughout the county. Working with the Montgomery County Planning Commission, many municipalities retooled their municipal codes to promote conservation development practices. As a result of this success, a second blue-ribbon panel recommended a \$150 million program called *Green Fields/Green Towns*, which was enthusiastically endorsed by voters in a 2003 referendum.

Farmland in Montgomery County

Agriculture represented a major part of the county's economy and source of employment for several centuries. Montgomery County contained farms producing various types of crops, livestock, dairy, nursery stock, and fruit, but beginning in the 1950s,

Figure 1.1:
Montgomery County Protected Open Space and Percentage by Ownership Type



Source: Montgomery County (2021), Econsult Solutions, Inc. (2021)

Photo Credit: Barb McMonagle



Worcester Township

significant amounts of farmland in the county were replaced by new housing developments, shopping centers, and business parks. The best agricultural soils stretching along the Pennsylvania Turnpike corridor were lost in the 1950s and 1960s due to the turnpike’s construction. In response to the rapid loss of farming throughout Pennsylvania, the Commonwealth enacted Act 319 in 1974 to reduce the impact of local suburban property taxes on farmers. Despite this new law, nearly all of the dairy farms located in the North Penn Area and Route 422 corridor in the western portion of the county were lost to residential subdivision. Conversion of farmland has continued, although the impact of the Pennsylvania Agricultural Conservation Easement Program approved in 1988 has been effective in maintaining core agricultural areas, particularly in the

Indian Valley near Souderton and in the western portion of the county, in Douglass and New Hanover Townships. Through this program, the county has been able to acquire easements which have permanently protected 10,226 acres of agricultural land to date. Despite the tremendous loss of farmland over the past 70 years, the county still has a strong and active farm community with younger farmers beginning to offer different types of agricultural products and through marketing directly to local consumers.

Perception of Open Space

Open space has become one of the most valued assets of the county. Residents have vocalized their support for the protection of land, development of parks and trails and preservation of farmland during many surveys and referendums. In 2003, nearly 78 percent of county voters approved a referendum authorizing the Montgomery County Board of Commissioners to incur up to \$150 million of debt (for the *Green Fields/ Green Towns* program described earlier) in order to continue preserving open space and farmland as well as developing trails. Since 2000, voters in nine of the county’s municipalities have approved substantial local open space expenditures as well. Surveys of residents, conducted for local planning efforts, repeatedly conclude that open space protection and trail development are among the most highly valued features of the county. In annual county elections, candidates tout their track record on open space achievements and their dedication to do more on its behalf.

Figure 1.2:
Montgomery County Open Space
Acreege by Ownership Type

Ownership Type	Acreege	Percent of Total
Municipal	16,357	36%
Private Agricultural Easement	10,402	23%
Private Conservation Easement	5,366	12%
State	4,996	11%
County	4,426	9%
Land Trust	2,274	5%
Federal	2,201	4%
Total	46,022	100%

Source: Econsult Solutions, Inc. (2021)

INTRODUCTION

Montgomery County residents have grown to expect great parks and trails and are generally aware of the importance of protected open space for the health of our natural environment. Polling has shown that many residents recognize that protected open space is vital to ensuring the protection of water resources and minimizing the impact of flooding. Overall, the county system of open space is viewed by the public as part of the essential infrastructure of their community similar to that of transportation and utilities.

Planning for Open Space in Montgomery County

Planning for the current Montgomery County open space system began with various plan elements developed for the county comprehensive plan adopted in 1979. One of the plan elements was devoted to the overall vision of a county-wide park system providing various recreation opportunities and containing key county historic sites. The other important plan element developed at that time focused on resource protection, describing a system to identify the most important properties to preserve based upon their intrinsic natural qualities. In 1996, after the approval of the county's \$100 million open space initiative, the county adopted *Creating a Greenway Legacy*, a plan to guide this substantial open space investment. In preparing this plan, the county worked with the Nature Conservancy to perform a *Natural Areas Inventory* to identify the most significant natural features. This *Natural Areas Inventory* was substantially expanded and updated in 2008. The key feature of the *Creating a Greenway Legacy* plan is the promotion of a "system" approach to open space preservation where local parks, county parks, trails, natural areas, and greenways are all linked together as integrated green infrastructure.

The county also prepared *Building a Greenway Legacy* in 2003 to identify how to work with 15 of the county's municipalities and the Schuylkill River Heritage Area to make the 42 miles of the Schuylkill River located in Montgomery County an attractive recreational open space and economic resource. The open space plan component prepared for the 2005 *Shaping Our Future* Montgomery County comprehensive plan further refined the proposed integrated open space system depicted in the 1996 *Creating a Greenway Legacy* plan. Also, due to grant funding offered by Montgomery County through the 1993 Open Space Program, each of the county's 62 municipalities developed detailed local open space plans focusing on their unique resource opportunities as well as the needs expressed by their residents. These

plans were key in identifying open space acquisition projects pursued through the county-funded open space grants. In the 2000s, every municipality prepared plan updates through the *Green Fields/Green Towns* program adopted in 2003. In these updates, each municipality was required to make a sobering appraisal of the potential build-out of their community under current zoning standards so that they could better adjust their local codes to fit their open space aspirations.

The Montgomery County comprehensive plan adopted in 2015, *Montco 2040: A Shared Vision*, views the county open space system through the lenses of sustainability, healthy lifestyles, and future economic development. And finally, in 2015, the Montgomery County Open Space Board prepared *Trails, Parkland, and People* to outline key short-term open space system implementation priorities for a healthier Montgomery County. Priorities included specific acquisition and preservation properties, county multipurpose trail projects, and the promotion of healthy outdoor and recreation activities through the *Get Out and Go Montco* initiative.

Preservation Through Partnership

Every open space and trail success in the county is the result of a collaboration of various governmental and non-profit organizations. The county has remained a strong funding partner through grants to local municipalities for the past 60 years. These grants have encouraged municipalities to partner with neighboring municipalities to preserve shared open space resources or to develop multi-municipal trails. Montgomery County has also worked with Bucks and Chester Counties and the City of Philadelphia to extend large multi-municipal and regional trails. In fact, one of the key recommendations of the 2003 Open Space Program Green Ribbon Task Force was the formation of the Montgomery County Lands Trust (MCLT). This land trust was a vital county partner in working with municipalities and other conservation organizations in making the open space program such a success. MCLT successfully completed many conservation projects that the county and municipalities were not able to achieve alone. Currently, Montgomery County has a close working relationship with Natural Lands, since MCLT merged with them several years ago. Montgomery County also collaborates with many other key regional organizations such as the Delaware Valley Regional Planning Commission (DVRPC) and the Circuit Trails coalition (comprised of many entities including the Bicycle Coalition of Greater Philadelphia,

the Rails-to-Trails Conservancy, and the Pennsylvania Environmental Council) on trail development issues. The Commonwealth of Pennsylvania has also remained an important funding source and partner with the county over the years.

Defining Return on Environment

Based on the methodologies from the previous *Return on Environment* study completed in 2011 by the Greenspace Alliance and the Delaware Valley Regional Planning Commission that assessed the economic benefits of protected open space in the five-county region of Southeastern Pennsylvania, this *Return on Environment* study seeks to quantify the economic value of protected open space specifically for Montgomery County. This economic analysis is critical to understanding and communicating the true value of the policies and initiatives that support open space preservation.

This analysis estimates the economic benefits associated with protected open space in Montgomery County by measuring impact in four key areas (Figure 1.3).

Figure 1.3:
The Four Key Areas of Impact Measurement



Home and Property Values

The effect protected open space has on residential property values.



Economic Activity

Jobs and revenue created as a result of maintaining open space and the activity on and connected to open space.



Environmental Services

The environmental benefits provided by Montgomery County’s protected open space.



Direct Use Benefits

The recreation value and associated health benefits that accrue to users of publicly protected open spaces.

“Protecting and enhancing Pennsylvania’s natural resources and environmental quality is the core of PEC’s mission. To that end, we rely on dedicated partners in local government, and Montgomery County is a statewide leader in open space protection and has developed one of the most coherent and extensive park and trail networks in the Commonwealth. The development of the Return on Environment study further demonstrates how the county’s citizens and leadership embrace their role as stewards of our precious natural resources. Kudos to Montgomery County!”

Patrick Starr - Executive Vice President
Pennsylvania Environmental Council

Photo Credit: Barb McMonagle

Salford Township



“Preserving the Green Ribbon Preserve and Trail was a community effort to protect the health of our land and waterways for the benefit of the people and wildlife that live here. The economic impact of this preserved open space will only increase as development pressures continue to expand in our region over the coming decades. Simply put: investing in open space is a gift that will keep on giving for generations to come.”

Gail Farmer – Executive Director for Wissahickon Trails
Montgomery County Open Space Board Member

Green Ribbon Preserve

Photo Credit: Maddy Neff

SECTION 2: HOME AND PROPERTY VALUES

Introduction

The analysis presented in this section quantifies the impact of protected open space on home values in Montgomery County relative to the proximity and size of the protected open space and the environment in which the home and protected open space are located. The analysis estimates the percent and dollar premiums on house prices realized from proximity to protected open space and the increase in property tax revenues for the county, municipalities, and school districts resulting from the increased home values.

Homes in Montgomery County capture a measurable increase in value as a result of proximate protected open space. In addition to homes having an increase in value due to their proximity to open space, this section also discusses how the size of the protected open space and how development patterns can affect the value of homes.

Methodology

Hedonic regression analysis was used to isolate the differences in home sale price attributable to protected open space, holding all other housing features constant (see sidebar below). The analysis used more than 142,925, arms-length transactions, of single-family homes in Montgomery County from 2000 to 2020. Control variables were included to account for differences in housing characteristics as well as neighborhood characteristics. The analysis isolates the effect on home values of proximity

Hedonic Regression Analysis

The property value analysis presented in this section relies upon hedonic regression analysis, a standard technique used by economists to analyze demand and pricing for an item.

Hedonic regression analysis seeks to isolate the explanatory power of a single variable of interest (such as proximity to protected open space) by holding constant other relevant housing characteristics (such as square footage, number of bedrooms, year built, etc.). This technique is commonly applied to housing market transaction data to evaluate the value premium associated with various amenities.

to protected open space from the effect of other variables that influence home value. Specifically, the three primary variables that determine whether protected open space adds value to a home are: 1) the house's proximity to protected open space, 2) the size of the nearest protected open space, and 3) whether the total area of all protected open space up to a half mile is greater than 150 acres.

The analysis includes more than 1,690 protected open space parcels including a federal park, state parks, county parks, municipal parks, nonprofit lands, and preserved farms.

The Impact of Protected Open Space on Property Values

When a home is closer to protected open space, part of its value can be directly attributed to this proximity. Homes within a ½ mile of protected open space realize a 2.95 percent increase in total home value, equating to \$2.8 billion in total added home value throughout the county. For homes located within a ¼ mile of protected open space, this value share is 3.75 percent. For homes located between ¼ to ½ mile of protected open space, this value share is 0.13 percent.

Hypothetically, if all of the protected open space in Montgomery County were eliminated, the total market value of the housing stock would decrease by \$2.83 billion. For homes in the band between ¼ mile to ½ mile of protected open space, this relationship of open space proximity to home value represents an average market value increase of \$28 million. For homes within a ¼ mile of protected open space, the average market value increases by \$2.8 billion (Figure 2.1).

Protected open space also increases the amount of property taxes the owners of these homes pay to the county, municipalities, and school districts. County-wide, these additional property tax revenues amount to \$48 million dollars per year for all homes within a ½ mile of protected open space.¹

1 ESI estimates that if the properties were to be reassessed on a regular basis, then up to \$48 million in property tax collections could be attributed to the presence of protected open space based on the current relationship between market value and assessed value. Without regular reassessment, it is difficult to determine the total amount that it is attributable to current assessed value. If all the open space were to disappear, and then the county were to reassess, then the county would lose the value and subsequent tax dollars since the assessed values would fall.

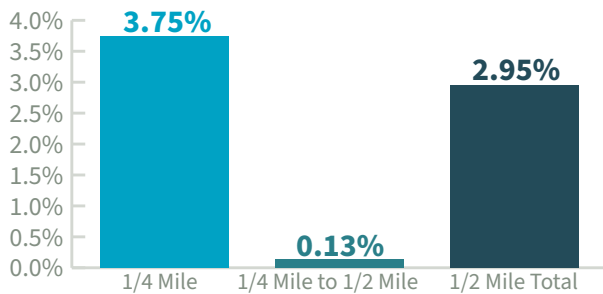
HOME AND PROPERTY VALUES

Figure 2.1:
Montgomery County Open Space Property Value Impact

	1/4 Mile Total	1/4 Mile to 1/2 Mile Total	1/2 Mile Total
Total Number of Houses within Distance Band	197,898	52,306	250,204
Total Property Value (Market Value, \$M)	\$74,758	\$21,234	\$95,993
Total \$ Value Attributable to Open Space Proximity (Market Value, \$M)	\$2,804	\$28	\$2,832
Total % Value Attributable to Open Space Proximity	3.75%	0.13%	2.95%
Total \$ Value/House (Market Value)	\$14,169	\$537	\$11,319
Total Tax Value (\$M)	\$47	\$0.5	\$48
Total Tax/House	\$240	\$9	\$192

Source: Econsult Solutions, Inc. (2021)

Figure 2.2:
Percent Premium from Proximity to Montgomery County Protected Open Space



Source: Econsult Solutions, Inc. (2021)

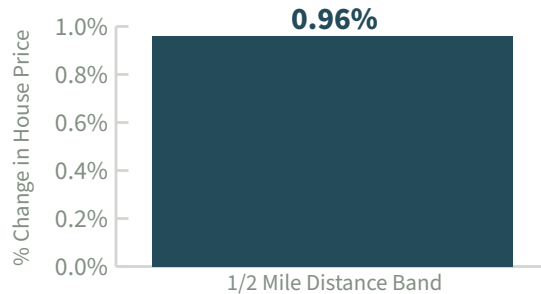
Impact of Size of Open Space

The amount that nearby protected open space will add to a home's value is largely dependent upon the aggregate amount of nearby open space. Figure 2.3 shows that if the total acreage of open space within 1/2 mile from a property is greater than 150 acres, the aggregate property value premium from all nearby open space is nearly an additional 1 percent of value.

Impact by Different Development Patterns

The Delaware Valley Regional Planning Commission categorizes the region's municipalities as belonging to one of four planning areas—*Core City* (of which there are none categorized for Montgomery County), *Developed Community*, *Growing Suburb*, and *Rural Area*.² Figure 2.4 illustrates these planning areas in Montgomery County.

Figure 2.3:
Percent Premium in House Value for Every 150 acres of Protected Open Space within 1/2 Mile

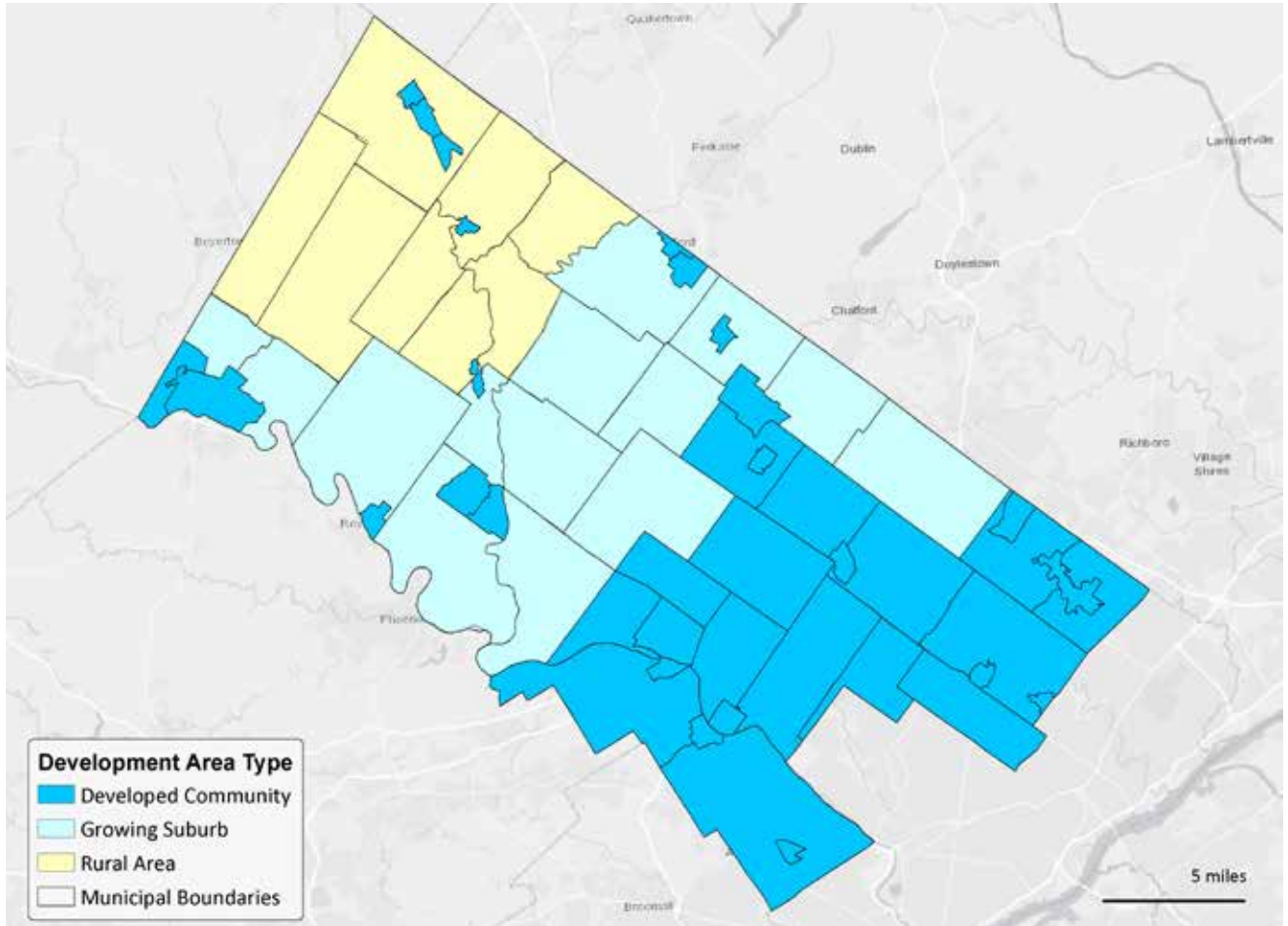


Source: Econsult Solutions, Inc. (2021)

This section analyzes the additional housing value generated by protected open space within the three categories of development with the county. The analysis reveals that a home's value is more impacted by proximity to protected open space in growing suburbs than in developed communities or rural areas (Figure 2.5). A single-family home in the growing suburban municipalities in Montgomery County has a 4.4 percent premium in value if it is within ¼ mile from open space, which equates to \$16,958 per house. Many people choose to live in these types of municipalities because of the access to abundant open space and natural areas, and this has become even more evident since the COVID-19 pandemic started and stay-at-home orders and social distancing made open space an even more desirable amenity for homeowners.

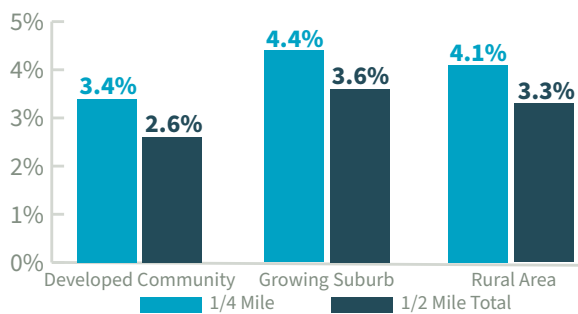
² Montgomery County does not have any regions defined as a "Core City" according to DVRPC's Planning Area designations.

Figure 2.4:
DVRPC Planning Areas in Montgomery County



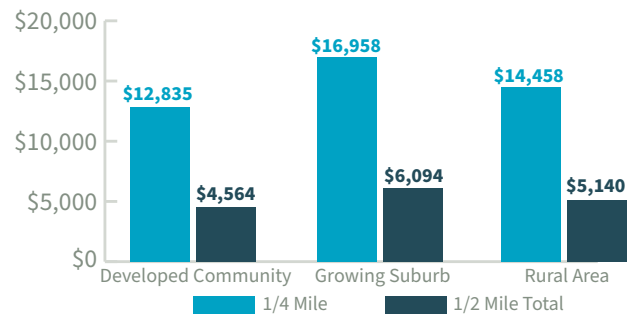
Source: DVRPC (2021); Econsult Solutions, Inc. (2021)

Figure 2.5:
Percent Premium of Protected Open Space by Planning Area



Source: Econsult Solutions, Inc. (2021)

Figure 2.6:
Added Market Value from Protected Open Space per House by Planning Area



Source: Econsult Solutions, Inc. (2021)

CASE STUDY: Green Ribbon Preserve and Trail

Location: The Green Ribbon Preserve and Trail follow the Wissahickon Creek in Montgomery County through the Townships of Upper Gwynedd, Lower Gwynedd, Whitpain, Upper Dublin, Whitmarsh, and Springfield, and the Boroughs of Ambler and North Wales.

Total Acreage: The preserve has 65 parcels, totaling 578 acres of protected land, and a 12.6-mile public trail. Acreage is comprised of land owned by Wissahickon Trails (formerly known as the Wissahickon Valley Watershed Association), the Commonwealth of Pennsylvania, Montgomery County, Lower Gwynedd, Upper Gwynedd, Whitpain Townships, and private trail easements.

Land Managers: Wissahickon Trails, a 501c3 non-profit conservation organization, manages 10 miles of the trail and the Montgomery County Division of Parks, Trails, and Historic Sites manages 2.6 miles of the trail that runs through Fort Washington State Park.

Introduction

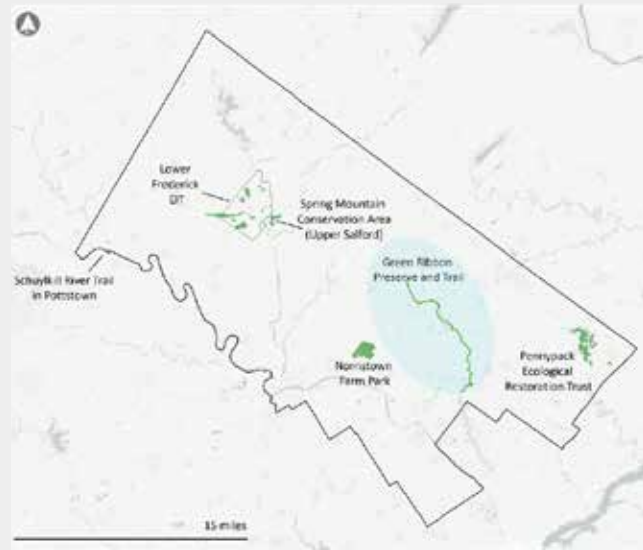
The 12.6-mile Green Ribbon Trail is a natural trail in a suburban area that follows the Wissahickon Creek as it flows through diverse landscapes comprised of wetlands, woodlands, and meadows. It is located in the traditional and ancestral territory of the Lenni Lenape people.

Stretching between Parkside Place in Upper Gwynedd Township and Stenton Avenue in Whitmarsh Township, the preserve and trail follow the Wissahickon Creek the entire length. The Green Ribbon Preserve protects the water quality of the Wissahickon Creek and provides habitat for wildlife. The trail is open to the public year-round.

Along the trail, visitors encounter historic sites that offer a glimpse of life in the Wissahickon Valley many years ago, such as the Evans-Mumbower Mill, a fully operational gristmill built in 1745. Trail users will also find Wissahickon Trails' headquarters, located in the iconic Four Mills Barn, designed by Philadelphia architect Horace Trumbauer in the 1890s.

Wissahickon Trails conserved the first section of the Green Ribbon Preserve in 1962, and has worked with individuals and community organizations since then

Figure 2.7: Hundreds of acres to create the preserve we know as the Green Ribbon Preserve and Trail



Source: Montgomery County (2021), Econsult Solutions, Inc. (2021)



Photo Credit: Laura Tantino

Home and Property Values

The Green Ribbon Preserve has a significant, positive impact on property values. There are 2,646 houses located within 1/2 mile of the Green Ribbon Preserve, and it is estimated that 13.5 percent of the property value of homes within a 1/2 mile of the trail is attributable to the proximity of the trail and preserved open space. This is higher than the county average of 2.95 percent. In other words, if the Green Ribbon Preserve and Trail were removed, the total assessment value of these homes would decrease by \$87 million or \$33,184 per house. This equates to an additional \$2.83 million in total annual property taxes (or approximately \$1,072 per property) generated for the municipalities and school districts. Additionally, the Wissahickon Creek and public trails located within the Green Ribbon Preserve are increasingly being used to market the area’s real estate for its proximity to natural, green spaces.

The increased home and property value related to the Green Ribbon Preserve and Trail is undeniable.

**Figure 2.8:
Green Ribbon Preserve and Trail Property Value Impact for Homes within a 1/2 Mile**

	1/2 Mile Total
Total Number of Houses within 1/2 Mile	2,646
Total Assessment Value	\$648,558,470
Total \$ Value of Open Space (Assessed Value)	\$87,804,610
Total % Value of Open Space	13.5%
Total \$ Value/Housing Unit (Market Value)	\$33,184
Total Tax Value	\$2,836,518
Total Tax/Housing Unit	\$1,072

Source: Econsult Solutions, Inc. (2021), Montgomery County (2021)



Photo Credit: Mark Vasoli

Green Ribbon Preserve and Trail

“The Schuylkill River Trail is an incredibly valuable asset in our region, connecting communities and providing a place for our residents to recreate, enjoy the outdoors and escape from the stresses of life. Not only that, the trail carries visitors to Pottstown all year long, especially in the warmer months of the year when it hosts our amazing running and walking clubs and a diversity of other users and activities.”

Elaine Schaefer - Executive Director for Schuylkill River Greenways
Vice Chair of Delaware County Council



SECTION 3: ECONOMIC ACTIVITY

Introduction

This section presents estimates of the annual economic and fiscal impacts within three categories:

1. Total sales by agricultural commodity type in Montgomery County (data obtained from the 2017 Agricultural Census).
2. Management and maintenance expenditures at public parks (federal, state, county, municipal, and non-profit).
3. Expenditures associated with protected open space tourism.

Economic impact is measured in terms of expenditures, employment, earnings, and tax revenues.

Methodology

The impact of direct expenditures associated with protected open space does not end with direct spending but is recirculated and multiplied through the economy in two ways:

- First, a portion of that direct spending which goes to the purchase of goods and services gets circulated back into the economy when those goods and services are purchased from local vendors. This is the “indirect effect,” and reflects the fact that local purchases of goods and services support local vendors, who in turn require additional purchasing with their own set of vendors.
- Second, a portion of that direct spending which goes to labor income gets circulated back into the economy when those employees spend some of their earnings on various goods and services. This is the “induced effect,” and reflects the fact that some of those goods and services will be purchased from local vendors, further stimulating the local economy.

By determining linkages across industries, input-output models estimate both the magnitude and composition of spillover impacts to all industries associated with a dollar spent in any one industry. Thus, the total economic impact is the sum of the direct investment plus the indirect and induced effects generated by direct expenditures associated with protected open space.³

Figure 3.1:
Economic Impact Methodology



Source: Econsult Solutions, Inc. (2021)

³ ESI uses IMPLAN modeling software to estimate indirect and induced impact, and sums them with the direct activity to produce total economic impacts. For more information on the IMPLAN modeling process, visit IMPLAN.com.

ECONOMIC ACTIVITY

Economic Impact of Spending from Agricultural Activity on Privately Owned Protected Open Space

This economic impact analysis considers direct, indirect, and induced economic activity. Direct economic activity—such as the sale of crops grown on protected farmland—takes place on protected open space itself. Indirect economic activity arises from all intermediate rounds of production in the supply of goods and services. For example, economic activity on private farmland supports various contractors, who have to make their own purchases of materials from suppliers, who thereby indirectly benefit from economic activity on protected open space. Induced economic activity, on the other hand, measures the impact of the spending of wages generated by the direct activities as well as by the indirect activities of supplying firms. For example, workers on protected farmland will spend their earnings on various items, such as food, clothing, and housing.

In order to estimate the economic impact of agricultural activity on protected open space, three data points were used:

1. Total sales by agricultural commodity type in Montgomery County (data obtained from the 2017 Agricultural Census).
2. Total acres of protected farmland in Montgomery County. County GIS data shows preserved farmland occupies approximately 10,400 acres.
3. Proportion of agricultural commodities produced by revenue per acre in Montgomery County. ESI calculates estimated revenues by using the proportion of agricultural commodities by revenue per acre of protected farmland.

Annual Expenditures

Direct expenditures for protected farmland include expenses for goods and services farms incur to produce their farm products, and indirect and induced expenditures occur off of the farm as a result of the farm’s spending on goods and services as well as wages for its employees. The total economic impact associated with agricultural activities on protected farmland in Montgomery County is \$8 million annually (Figure 3.2).

Annual Employment

Agriculture associated with protected farmland is estimated to support 195 jobs directly and indirectly in the county. The total estimate comprises direct employment related to agricultural activity on protected farmland as well as a number of indirect and induced jobs related to agricultural activity on protected farmland (Figure 3.3).

Annual Salaries

Salaries paid to workers in jobs related to the agricultural activity that takes place on protected farmland total approximately \$2 million per year (Figure 3.4).

**Figure 3.2:
Annual Economic Impact Associated with Protected Farmland**

Direct Output	\$6M
Indirect & Induced Output	\$2M
Total Output	\$8M

Source: IMPLAN (2020), USDA Agricultural Census (2017), Econsult Solutions, Inc. (2021)

**Figure 3.3:
Annual Employment Associated with Protected Farmland**

Direct Employment	180
Indirect & Induced Employment	15
Total Employment	195

Source: IMPLAN (2020), USDA Agricultural Census (2017), Econsult Solutions, Inc. (2021)

**Figure 3.4:
Annual Salaries Associated with Protected Farmland**

Direct Salaries	\$1M
Indirect & Induced Salaries	\$1M
Total Salaries	\$2M

Source: IMPLAN (2020), USDA Agricultural Census (2017), Econsult Solutions, Inc. (2021)

Economic Impact of Spending on Park Maintenance and Management

Public parks make up about 56 percent of the protected open space in Montgomery County.⁴ Economic activity on this land results from management and maintenance expenditures of the federal, state, county, and municipal-owned parks. Using calculated expenditures for federal, state, county, and municipal parks, a combined expenditure number was derived that applied to all public park acres in Montgomery County.

- Federal Park Expenditures:** The total expenditure for Valley Forge National Historic Park was obtained from the FY2021 Budget Justification from the Department of the Interior’s National Park Service.
- State Park Expenditures:** The average expenditures per acre were estimated using the state park budget from the FY2021 Governor’s Detailed Budget. The state park budget is applied to the acreage associated with state-owned open space.
- County Park Expenditures:** The Montgomery County Division of Parks, Trails, and Historic Sites budget was obtained from the FY2021 Montgomery County budget.
- Municipal Park Expenditures:** For municipal-managed parks, ESI obtained the parks and recreation budgets for the top 16 municipalities with the greatest acreage of municipal-owned open space in Montgomery County. This yields an estimated average expenditure per acre, which was applied to the remaining municipalities in Montgomery County (see Figure 3.5).

- Land Trust/Nonprofit Lands Expenditures:** Data were provided by Natural Lands, a non-profit organization that preserves open space in eastern Pennsylvania and southern New Jersey.

Annual Expenditures

Direct public expenditures on public parks and preserved nonprofit lands—money spent for the management and maintenance of these spaces—account for an estimated \$62 million. This economic activity supports an additional \$50 million in indirect and induced expenditures, which results in a total economic impact of \$112 million (Figure 3.6).

Figure 3.6:
Annual Economic Impact Associated with Open Space Park Maintenance and Management

Direct Output (\$M)	\$62
Indirect and Induced Output (\$M)	\$50
Total Output (\$M)	\$112

Source: IMPLAN (2020), Montgomery County (2021), Various Municipality Budgets (2021), Econsult Solutions, Inc. (2021)

Figure 3.5:
Annual Municipal Park Expenditures Estimate

	Municipal-Owned Open Space Acreage*	Budget Expenditures	Expenditure per Acre
Top 16 Municipalities†	10,756 acres	\$32M	\$2,997
Remaining Municipalities	6,595 acres	\$20M	
Total Estimated Expenditures Related to Maintenance and Management		\$55M	

* Note that this is the acreage for municipal-owned open space only. This does not include open space owned by other entities, such as state or the county.

† The top 16 municipalities are: Lower Salford, Upper Providence, Horsham, Lower Merion, Upper Hanover, Montgomery, Upper Dublin, Lower Providence, Upper Merion, Whitmarsh, Abington, Upper Salford, Limerick, Worcester, Whitpain, and Cheltenham.

Source: Montgomery County (2021), Various Municipality Budgets (2021)

4 This includes federal, state, county, and municipal-owned open space.

ECONOMIC ACTIVITY

Annual Employment

The management and maintenance of parks and non-profit lands directly and indirectly support 940 jobs in Montgomery County. This estimate includes jobs that take place directly on or because of public parks, including park rangers, groundskeepers, and public administrators. It also includes indirect and induced employment associated with public parks, examples of which include jobs selling and repairing equipment used for park maintenance and jobs arising from private concessions run on public parkland (Figure 3.7).

Figure 3.7:
Employment Associated with Open Space Park Maintenance and Management

Direct Employment	690
Indirect and Induced Employment	250
Total Employment	940

Source: IMPLAN (2020), Montgomery County (2021), Various Municipality Budgets (2021), Econsult Solutions, Inc. (2021)

Annual Salaries

Earnings for workers with jobs directly and indirectly related to the management and maintenance of local public parks and non-profit lands account for an estimated \$33 million per year (Figure 3.8).

Figure 3.8:
Annual Salaries Associated with Open Space Park Maintenance and Management

Direct Salaries (\$M)	\$20
Indirect and Induced Salaries (\$M)	\$14
Total Salaries (\$M)	\$33

Source: IMPLAN (2020), Montgomery County (2021), Various Municipality Budgets (2021), Econsult Solutions, Inc. (2021)

Economic Impact of Spending from Parks Related Tourism Activity

To calculate the economic impacts of tourism-spending attributable to protected open space in Montgomery County, data from the 2019 Economic Impact of Travel and Tourism in Pennsylvania were used. Traveler spending associated with recreation in Montgomery County was used to determine direct economic impacts through a conservative calculation estimating that two percent of tourism activity was attributable to protected open space. However, not all spending with protected open space is for recreation only; for example, a tourist visiting a Montgomery County park may go to a restaurant nearby and the server from that restaurant will spend money in the local economy, accounting for indirect and induced impacts. Using the 2019 Travel and Tourism data for associated spending and a conservative two percent estimate, the direct, indirect, and induced economic impacts of protected open space were identified.⁵

Annual Expenditures

Tourist activity associated with protected open space in the form of travel spending generates approximately \$39 million in total economic impact (Figure 3.9).

Annual Employment

Open space related tourism directly and indirectly supports 420 jobs in Montgomery County. These jobs include employment directly related to tourism on protected open space, such as jobs in lodging, retail, and restaurants (Figure 3.10).

Figure 3.9:
Annual Economic Impact Associated with Open Space Related Tourism

Direct Output (\$M)	\$23
Indirect and Induced Output (\$M)	\$16
Total Output (\$M)	\$39

Source: IMPLAN (2020), VisitPA (2020), Econsult Solutions, Inc. (2021)

Figure 3.10:
Annual Employment Associated with Open Space Related Tourism

Direct Employment	330
Indirect and Induced Employment	90
Total Employment	420

Source: IMPLAN (2020), VisitPA (2020), Econsult Solutions, Inc. (2021)

⁵ VisitPA, "Economic Impact of Tourism in Pennsylvania," 2019 https://www.visitpa.com/sites/default/files/pdfs/Economic%20Impact%20of%20Tourism%20in%20PA%202019_FINAL-min.pdf.

Annual Salaries

Employees in the tourism industry earn approximately \$14 million annually as a result of the tourist draw of protected open spaces in Montgomery County (Figure 3.11).

**Figure 3.11:
Annual Salaries Associated with
Open Space Related Tourism**

Direct Salaries	\$9M
Indirect and Induced Salaries	\$5M
Total Salaries	\$14M

Source: IMPLAN (2020), VisitPA (2020), Econsult Solutions, Inc. (2021)

**Tax Revenues Generated by
Protected Open Space**

The economic activity discussed above generates tax revenues via income, sales, and business taxes. All economic activity associated with protected open space in Montgomery County generates an estimated \$2.5 million annually in state taxes (Figure 3.12).



**Figure 3.12:
Estimated Annual Pennsylvania Tax Revenue Related to Protected Open Space**

Tax Type	Protected Farmland	Open Space Maintenance and Management	Open Space Related Tourism	Total
Income Tax	\$37,000	\$670,000	\$277,000	\$984,000
Sales Tax	\$58,000	\$801,000	\$302,000	\$1,161,000
Business Tax	\$19,000	\$255,000	\$96,000	\$370,000
Total State Tax Revenues	\$114,000	\$1,726,000	\$675,000	\$2,515,000

Source: IMPLAN (2020), PA Comprehensive Annual Financial Report (2019), Econsult Solutions, Inc. (2021)

CASE STUDY: Schuylkill River Trail in Pottstown

Location: The Schuylkill River Trail (SRT) stretches alongside the Schuylkill River between Philadelphia and Frackville, Pennsylvania. This case study focuses on an approximately three-mile-long portion in Pottstown Borough.

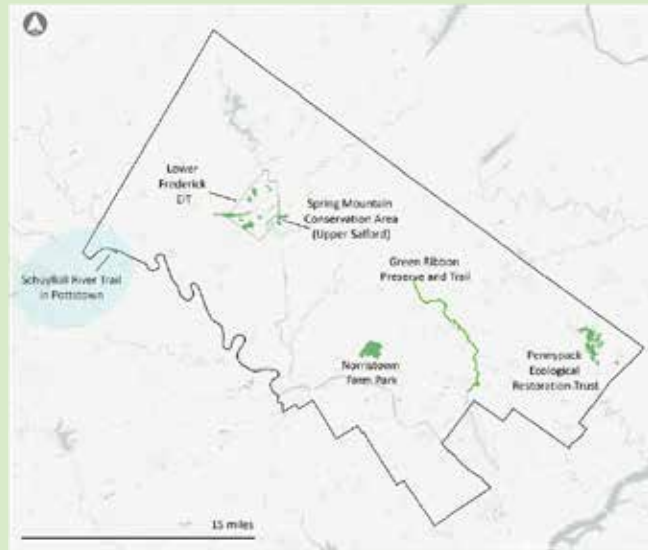
Land Managers: Schuylkill River Greenways, Pottstown Borough, and the Montgomery County Division of Parks, Trails, and Historic Sites.

Introduction

The Schuylkill River Trail is a long-distance multiuse trail extending from downtown Philadelphia to Frackville, PA in Schuylkill County. When completed, this trail will extend over 120 miles; currently 80 miles are complete and open. The SRT is one of the most popular and well-known urban trails in the northeastern United States. In 2015 it was recognized by USA Today as the country’s “Best Urban Trail”. More recently in 2021, the SRT earned recognition as one of the top three River Trail Walks in the nation. The SRT travels through the historically rich five-county region of Southeastern Pennsylvania and offers a diversity of experiences with both paved and crushed stone surfaces that wind through rural, agricultural, suburban, urban, and industrial landscapes. Along its path, trail users can see evidence of several centuries of industrial development, canal navigation, railroad history and iron, steel, and other historic industry.

Over a million cyclists, runners, walkers, and strollers enjoy the SRT each year and that number continues to rise as our world has rediscovered the joy of outdoor recreation during the COVID-19 pandemic. While the heaviest use of the trail is in and around Philadelphia, the SRT in Montgomery County is a point of pride and a popular destination for residents and visitors alike with more than 70,000 users a year frequenting the Pottstown section of the trail alone. Importantly, the four-mile section of the trail that is the missing link between Parker Ford and Pottstown is nearing completion. This critical gap will be closed in 2023, and the SRT will then be uninterrupted between Philadelphia and Reading. This new and vital connectivity will increase the usage of the Pottstown section of the SRT exponentially, bringing even more benefit to the surrounding Pottstown community.

Figure 3.13:
Schuylkill River Trail in Pottstown



Source: Montgomery County (2021), Econsult Solutions, Inc. (2021)

Economic Activity

Like many well-developed long-distance trails across the nation, the SRT has an enormous positive economic impact on all of the communities through which it runs. Entire industrial towns have been revitalized around the trail, with restaurants, breweries, and new residences popping up around it and boasting of its proximity. In the Pottstown area, the SRT has created an extended trail community with a dedicated following of regular users as well as a steady inflow of visitors from near and far. These users have a meaningful economic footprint on the area, supporting a new river and trail outfitter, a robust local bike shop, and several new brew pubs in Pottstown within walking distance of the trail. In addition, as soon as the weather breaks in the spring, each weekend brings a different running or walking event, with races drawing visitors from all over the region. Riverfront Park in Pottstown serves as a constant host to trail events, trail visitors, and community festivals.



Photo Credit: Schuylkill River Greenways

Each year, visitors using a given trail generate spending from purchases that may not otherwise happen in the trail’s host communities. Visitors spend on “soft goods” such as food, drinks, and snacks and on “hard goods” such as their equipment. Data provided by Schuylkill River Greenways shows that there are approximately 70,000 counts per year on its trail counters along Grosstown Road. Based on a variety of industry studies, including the 2009 Schuylkill River Trail User survey, ESI estimated the distribution of users that were infrequent trail users and regular users in order to estimate spending habits, broken into the following categories: soft goods (refreshments and snacks) and hard goods (exercise clothing, accessories, and bikes). Then the typical spending of various types of trail users was estimated. A conservative approach was used and only the retail margin of the visitor spending total was used to calculate the county’s economic impact, because retail goods are generally sourced from outside the region. It is estimated that users along the Schuylkill River Trail in Pottstown spend \$3.5 million on soft and hard goods and \$4.8 million is spent on management and maintenance, generating a total economic impact of \$8.3 million in Montgomery County, supporting 90 jobs with \$3 million in employee compensation.

This short stretch of a long-distance trail provides reverberating economic impacts in the local vicinity and county.

Figure 3.14:
Annual Economic Impact from Trail User Spending along the Schuylkill River Trail in Pottstown

Impact Type	Montgomery County
Direct Output (\$M)	\$4.8
Indirect and Induced Output (\$M)	\$3.5
Total Output (\$M)	\$8.3
Employment Supported	90
Employee Compensation (\$M)	\$3.0

Source: Econsult Solutions, Inc. (2021)
Schuylkill River Greenways (2021), IMPLAN (2019)

Photo Credit: Schuylkill River Greenways



Schuylkill River Trail in Pottstown



Lower Frederick Township

Photo Credit: Phil Smith

SECTION 4:

ENVIRONMENTAL SERVICES

Introduction

Protected open space in Montgomery County provides tangible environmental benefits for the communities it serves.

This section draws upon established research to evaluate the economic benefits of several types of ecosystem services provided by the county's open space network, including air pollution removal, the provision of water supply, water quality improvement, flood mitigation, wildlife habitat conservation, and carbon sequestration and storage. Combined, these benefits create ecosystem functions that would require costly measures to replicate if lost. The upkeep of the protected open space will ensure the value of the services if the ecosystems are retained. If these ecosystems were removed, municipalities and others would incur additional costs to recoup their value.

Methodology

ESI calculated the land cover variation for the protected open space in Montgomery County and applied the values associated with each of the ecosystem services to produce the total value of the environmental impact of protected open space. Dollar values approximating the economic value of each of these services are based on peer-reviewed estimates of value on a per-acre basis. These total value estimates represent the costs avoided by not having to artificially replicate the ecosystem services currently provided by the protected open space.

First, acreage of ecosystems within the protected open space was determined using the land cover imagery from the *Multi-Resolution Land Characteristics (MRLC) 2019 National Land Use Land Cover* file.

The acreage of each ecosystem type is used to calculate environmental services benefits using values from a 2006 study conducted by Costanza, which estimated the average value of various ecosystem services. The estimated benefits were derived by determining the acreage type for the ecosystem services and multiplying the acreage by the ecosystem service benefit. Each ecosystem provides different ecosystem services and has associated value per acre, determined by the Costanza study, and applied to protected open space in Montgomery County.⁶

The i-Tree model developed by the U.S. Forest Service is used to estimate the air pollution removal and carbon sequestration and storage benefits of protected open space in Montgomery County. The resulting values for air pollution benefits reflect the amount society would have to pay in areas such as healthcare if trees did not remove these pollutants. The model uses National Land Cover Datasets (NLCD) to first estimate the amount of tree canopy and then uses pollution removal rates to estimate the total amount of pollutant removal that results from this canopy coverage. It also estimates the lifetime amount of carbon stored within trees and how much carbon is sequestered by trees on an annual basis. The i-Tree model has the advantage of allowing for the adjustment of the per-acre pollution removal values.⁷

6 Costanza, Wilson, Tory, Voinov, Liu, and D'Agostino (2006), *The Value of New Jersey's Ecosystem Services and Natural Capital*. New Jersey Department of Environmental Protection, Division of Science, Research, and Technology.

7 i-Tree, USDA Forest Service, <https://www.itreetools.org/>.

ENVIRONMENTAL SERVICES IMPACT

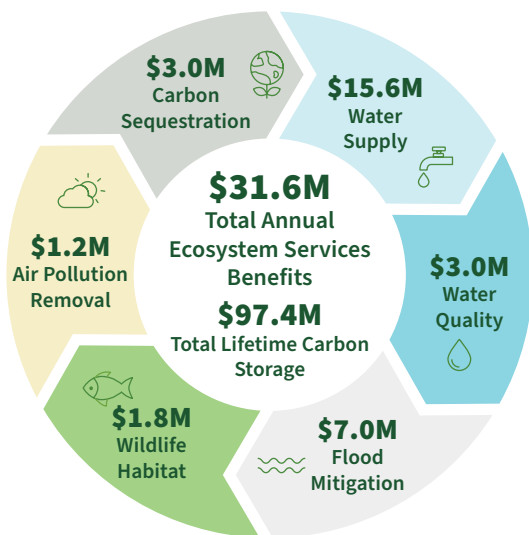
Ecosystem Services Impact

As noted, ecosystem services include benefits such as air pollution removal, replenishing water supply, water quality improvement, preservation of wildlife habitat, and carbon sequestration and storage. It should be emphasized that some types of landscapes are more valuable than others for a particular type of benefit: air pollution removal and carbon sequestration are primarily a function of tree cover, and wetlands and riparian forests are major drivers of water supply, water quality, and flood mitigation benefits.

The ecosystem services provided by the approximately 46,000 acres of protected open space generate significant economic benefits, including the nearly 16,400 acres of tree cover in the county.

In sum, the ecosystem services and environmental benefits are \$31.6 million annually from a variety of sources (Figure 4.1) and \$97.4 million in the lifetime cost savings of carbon storage from tree coverage.

Figure 4.1:
Environmental Benefits of Protected Open Space in Montgomery County (\$M per Year)



Source: Costanza (2006), Multi-Resolution Land Characteristics Land Cover (2016), Montgomery County (2021), Econsult Solutions, Inc. (2021)

The following subsections provide additional detail on the calculations of these ecosystem services, how they were calculated, and their total cost-savings impact in Montgomery County.

Water Supply

The soil of undeveloped land stores water, which replenishes streams, reservoirs, and aquifers. This natural system provides the continuous recharge of groundwater and streams. Forests and wetlands are particularly productive land cover for water supply. In other words, the larger the area of land cover, the greater the benefits derived. Were this ecosystem to fail, water would have to be imported from elsewhere or local water would need to be more extensively treated, both of which are costly alternatives. Protected open space in Montgomery County generates \$15.6 million in annual cost savings from natural water supply services.

Water Quality

Forests and wetlands provide a natural protective buffer between human activities and water supplies. This service is driven largely by the proportion of forest, wetland, and riparian buffer located within the protected open space. Riparian buffers filter and reduce several types of waste, including pathogens, excess nutrients, metals, and sediments from entering the water supply. Without riparian buffers, residents would be forced to pay for alternative groundwater filtration or water treatment methods. In sum, these buffers generate approximately \$3 million annually in water quality benefits from their ability to naturally maintain water quality in Montgomery County.

Flood Mitigation

Many natural landscapes serve as a buffer protecting people and properties from destructive natural events. The absorptive capacity of protected open space helps to mitigate the risk of flooding during storm events by trapping and containing stormwater. If the county were to be deprived of this natural service, residents and local governments would be forced to undertake costly measures to protect the built environment from further damage as a result of flooding, e.g., constructing dams or reservoirs. In sum, buffers from protected open space in Montgomery County generate approximately \$7 million annually from natural flood mitigation services.

Wildlife Habitat

Protected open space serves as habitat for a diversity of plants and animals. Intact forests and wetlands harbor species that people value for both aesthetic and ecological purposes. Values for this ecosystem service estimate the amount of money that people would be willing to pay to preserve wildlife. It is important to note that the value associated with wildlife habitat is of a different nature than the values associated with the other ecosystem services included in this section, i.e., it does not represent an avoided cost. To ensure a conservative valuation of the benefit derived from the preservation of wildlife habitat on protected open space, the estimates in this section are based on minimum willingness-to-pay values from the research literature.⁸ In sum, the wildlife habitats located within Montgomery County’s protected open space have an estimated annual value of \$1.8 million.

Air Pollution Removal

Poor air quality is common in many urban and suburban areas and can lead to a variety of human health problems, including asthma and other respiratory ailments. The pollutants that affect air quality can also damage buildings and plants, give rise to smog, and contribute to climate change. Trees mitigate significant amounts of air pollution through botanic respiration processes that remove pollutants from the air. This naturally occurring air pollution removal process contributes to environmental quality and health.

Figure 4.2:
Potential Annual Air Pollution Removal Benefits from Protected Open Space in Montgomery County

Pollutant	Tons	Cost Savings (\$)
O ₃	348	\$769,500
PM10	86	\$435,800
NO ₂	114	\$32,300
CO	6	\$6,400
SO ₂	18	\$1,900
	572	\$1,245,900

Source: i-Tree (2021), Multi-Resolution Land Characteristics Land Cover (2016), Montgomery County (2021), Econsult Solutions, Inc. (2021)



Photo Credit: Margaret Rohde

Protected open space in Montgomery County provides approximately 16,400 acres of tree canopy. Using this total tree canopy acreage and established estimates of the per-ton benefits of removing various airborne pollutants, it is estimated that trees on protected open space in Montgomery County annually provide \$1.2 million in air pollution removal services.

This analysis includes benefits derived from the removal of five different pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM10), and sulfur dioxide (SO₂). Figure 4.2 shows the value generated for the removal of each pollutant.

Carbon Sequestration and Storage

Trees mitigate the impacts of climate change by sequestering and storing atmospheric carbon from carbon dioxide. Carbon storage is an estimate of the total amount of carbon stored in the existing biomass of trees, both above and below ground. In other words, if the carbon currently stored in trees on protected open space were released into the air, it would cause damages (e.g., agricultural productivity, human health, and property damages) that would require a significant cost to mitigate. It is important to note that the estimate of the value of stored carbon is not annual. The storage of carbon in a tree represents a one-time benefit—the carbon is kept out of the atmosphere until the tree dies and/or decomposes.

⁸ Costanza, Wilson, Tory, Voinov, Liu, and D’Agostino (2006), *The Value of New Jersey’s Ecosystem Services and Natural Capital*. New Jersey Department of Environmental Protection, Division of Science, Research, and Technology.




Photo Credit: Jamie Stewart

The social cost of carbon, which is the value of carbon sequestration and storage, is \$171 per ton.⁹ Using this social cost of carbon, it is estimated that trees within the protected open space in Montgomery County store 570,950 tons of carbon, equating to \$97.3 million within existing biomass. In other words, if carbon currently stored in trees within the protected open space were released into the air, it would cause climate change damages that would cost \$97.3 million to mitigate.

As a tree grows, it pulls carbon from the air. New growth on trees is responsible for carbon sequestration, which is measured on an annual basis. This estimate controls for the yearly release of stored carbon through the death and decay of trees. Like the carbon storage estimate, this estimate measures the monetary damages associated with each ton of carbon that is sequestered. Because this carbon is taken out of the air by trees within the protected open space, these damages are avoided,

Figure 4.3:
Potential Amounts of Lifetime Carbon Storage and Annual Carbon Sequestration Benefits from Protected Open Space in Montgomery County

	Cost Savings
 Carbon Storage 570,950 tons x \$171/ton =	\$97,632,450
Carbon Sequestration 17,840 tons x \$171/ton =	\$3,050,640

Source: i-Tree (2021), Multi-Resolution Land Characteristics Land Cover (2016), Montgomery County (2021), Econsult Solutions, Inc. (2021)

⁹ I-Tree, USDA Forest Service, <https://www.itreetools.org/>.

representing savings for communities across the county. Every year, new growth on the trees within the protected open space sequesters \$3 million in carbon.

Figure 4.3 shows estimates of the tons of carbon stored by trees for their lifetime and carbon annually sequestered within the protected open space, along with the benefits derived from the storage and sequestration of carbon by these trees.

Stormwater Management

Protected open space helps mitigate stormwater impacts by reducing the volume of runoff created by storm events and the associated pollutants that stormwater carries. This mitigation reduces the burden placed on communities and their stormwater infrastructure to manage the volume of runoff and pollutant loads, thereby avoiding both capital and long-term maintenance expenditures, as well as improving ecological habitat, recreational resources, and sources of current and future public water supplies. The analyses in this section estimate the value of these ecosystem functions and avoided stormwater impacts.

For the purposes of this study, the Delaware Valley Regional Planning Commission hired Stroud Water Research Center to examine the potential water quantity and quality benefits of open space preservation in Montgomery County.

Methodology

Potential water quantity and quality benefits of protected open space in Montgomery County was assessed using two different models under two different land-use scenarios, namely:

- The Site Storm Model (SSM), implemented in Python (programming language);¹⁰
- The Watershed Multi-Year Model (WMYM), implemented within the Model My Watershed® web application¹¹.

Both models provide estimates of infiltration, runoff, and evapo-transpiration, as well as nitrogen, phosphorus, and sediment loads derived from landscapes as precipitation moves through a watershed. However, the SSM estimates these loads from a single 24-hour storm event defined by the user (in this case a 3.2-inch rain event; approximately a two-year return interval storm) and the WMYM predicts average annual loadings derived from historic daily precipitation and temperature data that is automatically utilized in the modeling routine.

For the SSM, two different land-use scenarios were used:

- Land cover conditions as reported by the National Land Cover Database (NLCD) for 2016 ("2016 Land Use");
- Assumed land cover conditions if the level of development within the open spaces matched that of un-preserved portions of the county ("No Preservation").

For the WMYM an additional scenario was included:

- 2016 NLCD conditions with both urban and agricultural best management practices (BMPs) applied on preserved lands ("2016 Land Use with BMPs").

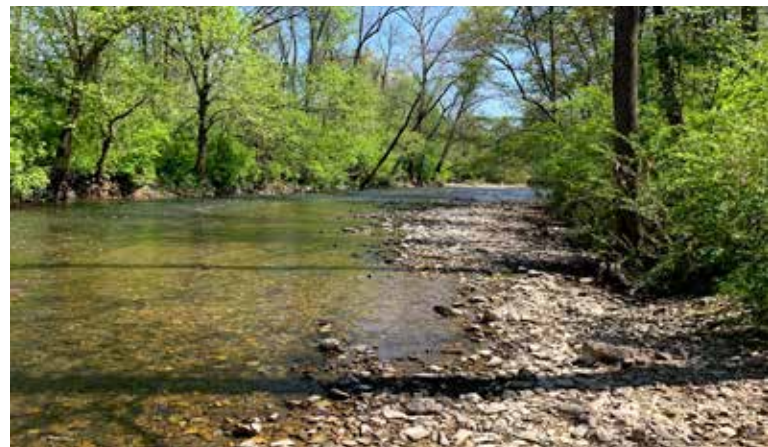
Before any models were applied, a Geographic Information System (GIS; ArcGIS Desktop version 10.6.1; ESRI, Redlands, CA) software was used to overlay the 2016 NLCD data within the boundaries of the preserved open spaces in Montgomery County. This overlay was used to calculate the total area of each land use category within the preserved open spaces and within the county as a whole. The associated NLCD categories

of "developed" (open, low, medium, and high intensity developed categories), agriculture (row crop and hay/pasture), and forest (deciduous, coniferous, and mixed) land cover values.

The "No-Preservation" scenario assumes that without open space preservation, the land use distribution within the applicable parcels would match that of the areas of the county without separate protections. Specifically, forest, row crop, and pasture categories were replaced with the various developed land cover types. To generate this scenario, the percent of potentially developable land that is developed was calculated for the county excluding the preserved open spaces. The resulting land use distribution was then multiplied by the total amount of developable land in the preserved open spaces to derive new land use areas without preservation.

Stormwater Runoff and Pollution Mitigation

Undeveloped and protected open space generates much less stormwater volume than developed lands and allows much less rainfall to reach streams as stormwater runoff, which helps to mitigate erosion and flooding. On average, parcels of undeveloped and protected open space have more tree canopy and vegetation and less impervious cover than unprotected lands. This additional vegetative and pervious cover enables these protected acres to better absorb rainfall for transpiration, evaporation, and infiltration into the ground, collectively leaving much less rainfall as stormwater runoff. The vegetative cover also has few sources of pollutants, resulting in relatively small volumes of pollutant loads carried to streams via stormwater runoff. These stormwater mitigation services result in much less overland flow of storm runoff, much smaller pollutant loads, and much less erosive energy than is generated by developed lands.



10 WikiWatershed Site Storm Model
<https://github.com/WikiWatershed/tr-55>.

11 Model My Watershed, <https://modelmywatershed.org/>.

ENVIRONMENTAL SERVICES IMPACT

Stormwater runoff from unprotected lands contains pollutants, such as excess nitrogen (N), phosphorus (P), and sediment (among others), which degrade water quality for humans for drinking and recreational uses, as well as degrading habitat for aquatic species. These pollutants are predominantly generated by human activities associated with developed and agricultural lands.

By generating less runoff and sources of pollutants, protected open space generates less nitrogen, phosphorus, and sediment than would be generated from these lands if they were unprotected from development. The modeling effort for watersheds in Montgomery County demonstrated that if all of the county's protected open space in the watershed were developed at the same extent and density as nearby unprotected (developed) lands, and there were no protection requirements for implementation of conservation plans on the protected agricultural lands, the pollutant loadings of nitrogen, phosphorus and sediment would increase significantly, as shown in Figure 4.4. These additional pollutant loadings would require additional stormwater treatment infrastructure to be installed and maintained to reduce the pollutant loads to levels that would not impair the receiving streams.

In terms of runoff volumes, if all the county's protected open space were developed at the same extent and density as nearby unprotected (developed) lands, along with no protection requirements for conservation plan implementation on protected agricultural lands, the annual volume of surface runoff would increase by 1.7 billion gallons per year. This is an increase in runoff of 4.7 percent.

If protected open space within the watershed were developed to the extent and density typical of nearby unprotected (developed) lands, each two-year storm would generate an additional 283 million gallons of stormwater runoff, an increase of 2.4 percent, representing the volume of water that is not absorbed by transpiration, evaporation, or groundwater recharge and alternatively runs off the property, contributing to erosion and flooding (Figure 4.5).

Figure 4.4:
**Avoided Increase in Annual Pollutant Loading
 Due to Protected Open Space in Montgomery County**

Pollutant	Total Increase in Annual Pollutant Loading (lbs/year)	Total Increase in Annual Pollutant Loading per Acre of Protected Open Space (lbs/year per acre)
Total Nitrogen	61,100	1
Total Phosphorus	28,800	1
Sediment	116,347,100	2,530

Source: Stroud Water Resource Center (2021)

Figure 4.5:
**Avoided Increase in Stormwater Runoff
 Due to Protected Open Space in Montgomery County**

Storm Level Runoff	Total Avoided Stormwater Volume	Percent Increase in Stormwater Volume: Protected Open Space vs. Unprotected Lands
Average Annual	1.7B gal./yr	4.7%
2-Year Storm Event (3.2"/24 hrs)	283M gal./event	2.4%

Source: Stroud Water Resource Center (2021)

Economic Benefits of Stormwater Mitigation

An increase in runoff and pollutant loads would require additional investment in infrastructure to manage the increased stormwater. Estimates of capital costs and accompanying annual operation and maintenance costs for the construction of the additional infrastructure required to manage the increased runoff of two-year storm events, as well as annual cost for removal of stormwater pollutant loadings, were developed based on existing research publications.^{12, 13, 14} The results indicate that protected open space avoids \$74 million of capital cost for stormwater infrastructure construction, plus an additional annual investment of \$10 million to operate and maintain this additional infrastructure (Figure 4.6) and an additional annual investment of \$180 million needed to remove pollutant loadings (Figure 4.7). Therefore, protected open space, on

average, avoids \$1,600 per acre of stormwater infrastructure construction costs, \$200 per acre of annual operation and maintenance costs (Figure 4.6), and \$3,900 per acre of annual pollutant load reduction costs (Figure 4.7), with the latter two costs often being the responsibility of municipalities.

Figure 4.6:
Avoided Costs of Construction and Annual O&M to Manage 2-Year Storm Runoff Due to Protected Open Space in Montgomery County

Avoided Capital Costs for Construction of Infrastructure for 2-Year Storm Runoff	Avoided Annual Costs for Operation & Maintenance of Infrastructure for 2-Year Storm Runoff
\$0.26/gallon runoff	\$0.03/gallon runoff
\$74M total capital cost	\$10M/year O&M cost
\$1,600/ acre of protected open space	\$200 per year per acre of protected open space

Source: Econsult Solutions, Inc. (2021)

Figure 4.7:
Avoided Costs of Removal of Annual Stormwater Pollution Loads Due to Protected Open Space in Montgomery County

Pollutant	Total Avoided Annual Pollutant Load (lb/year)	Total Avoided Annual Pollution Reduction Cost (\$/yr)	Average Annual Avoided Cost per Year per Acre of Protected Space (\$)
Total Nitrogen	61,100	\$277,700	\$10
Total Phosphorus	28,800	\$9.6M	\$210
Sediment	116.4M	\$169.3M	\$3,680
Totals		\$179.2M	\$3,900

Source: Econsult Solutions, Inc. (2021)

12 U.S. Environmental Protection Agency “Preliminary Data Summary of Urban Storm Water Best Management Practices”, August 1999 (EPA-821-R-99-012), Table 6-1. https://www.epa.gov/sites/production/files/2015-11/documents/urban-stormwaterbmps_preliminary-study_1999.pdf
 13 Houle, James J., R.M. Roseen, T.P. Ballesterio, T.A. Puls, and S. Sherrard, Jr. “Comparison of Maintenance Cost, Labor Demands, and System Performance for LID and Conventional Stormwater Management”, Journal of Environmental Engineering, ASCE, July 2013, Table 2. https://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/Houle_JEE_July-2013.pdf
 14 U.S. Environmental Protection Agency “Economic Analysis of the Final Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations”, December 2002 (EPA-821-R-03-002), Appendix E Cost-Effectiveness Analysis. https://www3.epa.gov/npdes/pubs/cafo_econ_analysis_appa.pdf

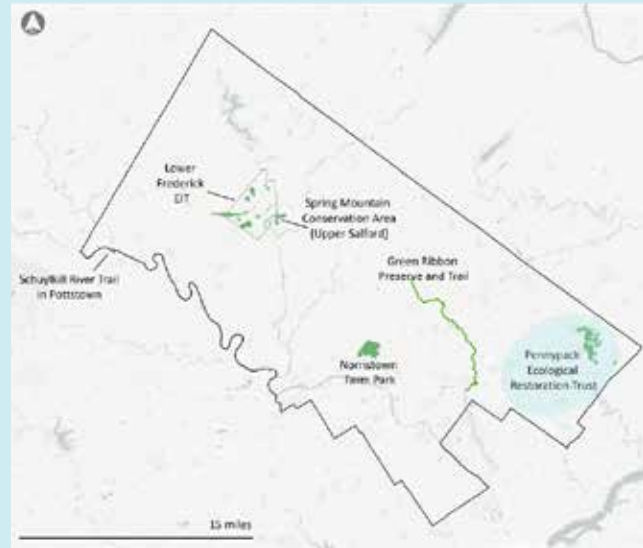
CASE STUDY: Pennypack Ecological Restoration Trust Lands

Location: The Pennypack Ecological Restoration Trust (“Pennypack Trust” or “Trust”) is comprised of 862 acres within three municipalities in northeastern Montgomery County: Upper and Lower Moreland Townships and Bryn Athyn Borough. The Pennypack Trust is also home to the county-maintained Pennypack Trail, which begins in Rockledge Borough and will ultimately connect with Bucks County’s Newtown Rail Trail.

Total Acreage: The Pennypack Trust owns 716 acres in fee and is the conservation easement holder of 146 acres of contiguous land for a total of 862 protected acres.

Land Managers: The Pennypack Trust and its nature preserve are largely self-funded and managed exclusively by its own staff and contractors. The Montgomery County Division of Parks, Trails, and Historic Sites patrols and maintains the Pennypack Trail.

Figure 4.8:
Pennypack Ecological Restoration Trust



Source: Montgomery County (2021), Econsult Solutions, Inc. (2021)

Introduction

The Pennypack Trust is both a nature preserve and a regional land trust. It only acquires land in the watershed of the Pennypack Creek and will protect only those properties that are directly connected to lands it owns. As such, the Trust manages a nature preserve that is home to a creek, its floodplains, and the forests and grasslands that provide vital habitat for a variety of plants, over 205 species of migratory birds, and an array of mammals.

More than 90 percent of developable area in eastern Montgomery County is already built-out. Were it not for the Pennypack Trust, most of its 862 protected acres would have already been developed as suburban neighborhoods, institutions, and commercial retail. The residential development that has occurred since the 1950s has irreversible consequences, and from a habitat perspective, the lands under the stewardship of this small land trust are deeply fragmented and lack sufficient space to foster truly robust and resilient native plant communities. Human intervention through restoration efforts is needed to overcome these obstacles. However, the power of this modest preserve to protect a water supply, habitat, and retain precious soils is remarkable.

Environmental Services Impact

At its core, the Pennypack Trust protects a living stream, but it is really the trees that perform the essential tasks of protecting this valuable water resource. Trees stabilize soils which absorb water and mitigate flooding. According to the Stroud Water Research Center, the Trust’s forests avert three million cubic feet of water



Photo Credit: Iryna Bortnytska

“There is no question that 40,000 visitors per year to the Pennypack Trust know that it’s a special place. The Trust is contributing to the quality of life for the residents of three municipalities and many more visitors who travel here from afar. In the end, we’re protecting a mosaic of precious natural resources that, if lost, could never be recovered.”

Leigh Altadonna, Board Education Chair
Pennypack Ecological Restoration Trust

from a typical two-year storm through infiltration and evapo-transpiration. Additionally, simply being a nature preserve rather than a residential development averts an additional three million cubic feet of stormwater runoff from entering the creek each year. Forest cover also anchors soil and prevents almost 50 tons of sediment from entering the creek annually. Trees shade and cool water to maintain a crucial temperature range for the biome of other organisms that purify water and are critical to the food web. The Pennypack Trust's role in maintaining this essential natural infrastructure is valued at \$1,164,950 *per year*. To protect this natural infrastructure, forests, particularly those facing the intense pressure posed by white-tailed deer, need to be replenished by hand. To that end, the Pennypack Trust cares for the trees by keeping 600 acres of forest clear of invasive plants and planting approximately 1,000 new trees every year.

The beauty of nature is that healthy natural environments are not single-function or single-purpose systems. Those very same trees that provide the physical framework for maintaining clean water are also sequestering carbon from the atmosphere. While the Trust's trees serve to temporarily sequester carbon, their carbon storage service is valued at \$2,509,250 in their lifetime.

What is the value of a walk in the woods, a morning soaked in birdsong, or a day fishing on the creek? Once again, it's the trees that are responsible for a quality hike, a beautiful landscape, a connected community, and an enduring sense of place. The Pennypack Trust buttresses property values, aids in local employee retention, and helps keep families active and healthy. And like so many other small conservation organizations and their respective natural areas, it's done with a modest staff: the Pennypack Trust has nine full-time staff and a small group of dedicated volunteers.

Figure 4.10:
Potential Annual Air Pollution Removal Benefits Associated with Pennypack Ecological Restoration Trust

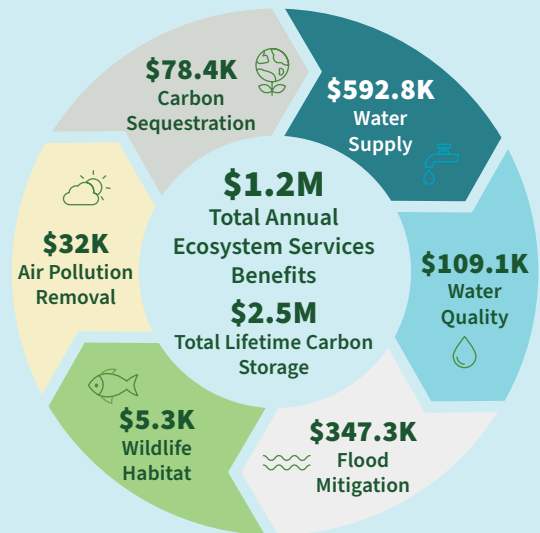
Pollutant	Pounds	Cost Savings (\$)
O ₃	17,957	\$19,800
PM10	4,424	\$11,200
NO ₂	5,866	\$800
CO	308	\$200
SO ₂	933	\$50
Total	29,488	\$32,050

Source: i-Tree (2021), Multi-Resolution Land Characteristics Land Cover (2016), Montgomery County (2021), Econsult Solutions, Inc. (2021)

It is important to note that the Pennypack Trust is a self-funded, privately owned and operated organization. Its \$1 million operating budget is gathered from membership revenues and carefully managed grants and endowments at no annual cost to the county. The Trust has ambitions to continue purchasing new properties, restoring their ecosystem functions, and offering them for public enjoyment.



The environmental services provided by the Trust's lands are astoundingly powerful and would be difficult to replicate if lost.

Figure 4.9:
Annual Environmental Benefits Summary of Protected Open Space Associated with Pennypack Ecological Restoration Trust



Source: Costanza (2006), Multi-Resolution Land Characteristics Land Cover (2016), Montgomery County (2021), Econsult Solutions, Inc. (2021)

Figure 4.11:
Potential Amounts of Lifetime Carbon Storage and Annual Carbon Sequestration Benefits Associated with Pennypack Ecological Restoration Trust

	Cost Savings
 Carbon Storage 14,713 tons x \$171/ton =	\$2.5M
 Carbon Sequestration 460 tons x \$171/ton =	\$78.4K

Source: i-Tree (2021), Multi-Resolution Land Characteristics Land Cover (2016), Montgomery County (2021), Econsult Solutions, Inc. (2021)



“This report was developed at a time when the COVID-19 pandemic catalyzed people in Montgomery County and around the region to visit preserved open spaces at unprecedented levels for exercise and peace of mind. This phenomenon was proof of what Return on Environment unmistakably demonstrates: nature is essential to the county’s economic vitality, health, and quality of life and conservation is an investment that yields tremendous, lasting returns.”

Oliver Bass - President of Natural Lands

SECTION 5: DIRECT USE BENEFITS

Introduction

Protected open space in Montgomery County provides a multitude of free and low-cost recreational activities to residents. Many of these activities consist of strenuous to moderate exercise, which contribute to physical well-being and defray healthcare costs. However, those who are physically active are not the only ones who derive benefits from protected open space; employers whose employees are healthier have lower healthcare costs, see fewer workers' compensation claims, and have lower rates of absenteeism and presenteeism (i.e., coming to work while sick or injured).

This section estimates the economic value that residents capture from the use of protected open space, analyzing both the value users would be willing to pay to participate in recreational activities on protected open space as well as the economic value of avoided healthcare costs as a result of users' participation in strenuous and moderate exercise.

Methodology

Recreational Benefit

The value of recreational protected open space in Montgomery County is estimated by using a *willingness to pay method* (see sidebar). This estimation seeks to quantify the amount an average consumer would be willing to pay for a service (using protected open space in Montgomery County for recreation) if the service were not publicly available. The analysis uses 2019 survey data from the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) to estimate the

average number of outdoor recreation visits by a typical Pennsylvania household each year.¹⁵ More comprehensive survey data tracked by PA DCNR in 2014 is then used to estimate the portion of these visits that occur on protected open space.¹⁶ The resulting estimate is applied to the number of households in Montgomery County to determine the total number of times residents participate in outdoor activities on protected open space.¹⁷ This estimate is then applied to the average monetary amount people reported being willing to pay to participate in a typical open space visit, producing an estimate of the economic value of protected open space in Montgomery County.¹⁸

It is important to note that the total values presented in this section estimate the value that residents derive from recreational activity in Montgomery County's public parks and open spaces. If all of these spaces were to be developed, it is likely that residents would go elsewhere to recreate and may pay for recreational amenities or decrease their level of participation in recreational activities. This replaces some of the value they currently derive from recreational activity in public parks.

Willingness to Pay

The estimates in this section are based on research evaluating the average consumer's willingness to pay for a service or activity. These willingness-to-pay values are not based on actual transactions—they estimate the amount of money the average consumer would be willing to pay for a service or activity if it were not provided by protected open space. As such, the values in this section should not be understood as income, but as a benefit enjoyed as a result of the free or low-cost recreational opportunities provided by protected open space.

15 Center for Survey Research at Penn State Harrisburg (2019), *Lion Poll Report of Results Submitted to: Pennsylvania Department of Conservation and Natural Resources*.

16 Pennsylvania Department of Conservation and Natural Resources and Penn State (2014), *A Resident Survey—Results*.

17 The number of Montgomery County households is drawn from the U.S. Census Bureau's American Community Survey (ACS) 2019 Estimates

18 The monetary value associated with a typical open space visit is developed through a series of steps. Estimates of a visitor's willingness to pay to participate in a range of outdoor recreation activities are drawn from the US Department of Agriculture (2017), *Recreation Economic Values for Estimating Outdoor Recreation Economic Benefits* and the US Army Corps of Engineers (2021), *Unit Day Values for Recreation for Fiscal Year 2021*. Detailed usage data from the PA DCNR (2014) tracking participation in different types of outdoor recreation activities is matched to the corresponding median willingness to pay values reported in the literature. To develop an estimate for a typical PA household on a typical visit, the weighted average willingness to pay is calculated (weighted by the relative share of outdoor recreation visits that involve that activity).

DIRECT USE BENEFITS

Health Benefit

Recent research has established the link between physical inactivity and demand for healthcare and has demonstrated that there is a positive relationship between the number of recreational opportunities available to an individual and the frequency of their participation in physical activity. This section seeks to quantify those benefits derived from engaging in physical activity in Montgomery County's protected open spaces.

First, the number of working age adults in Montgomery County was drawn from the U.S. Census Bureau's American Community Survey 2019 estimates. This number was then adjusted proportionally based on 2014 survey data from the PA DCNR to estimate the share of working age people in Montgomery County who meet physical activity guidelines by exercising at parks or on trails in the county.¹⁹ Physically active, in this case, is defined as engaging in moderate to strenuous exercise at least two times per week.

Next, the benefits were divided into the following five categories of cost savings:

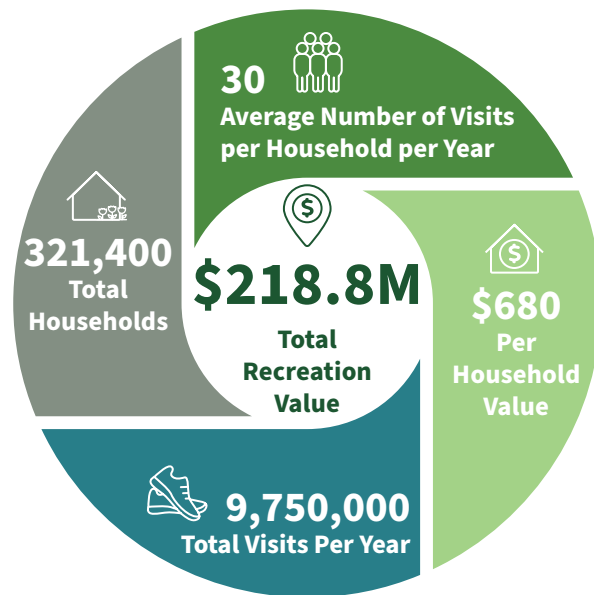
- Direct medical savings: Costs saved on the treatment of illness or medical conditions caused or exacerbated by physical inactivity.
- Indirect medical savings: Costs saved on adverse health conditions and poor quality of life resulting from physical inactivity.
- Direct workers' compensation savings: The amount employers save in compensation costs due to physically active employees having fewer accidents at work.
- Indirect workers' compensation savings: The amount employers save in reduced administrative costs due to their physically active employees submitting fewer compensation claims.
- Lost productivity savings: The amount saved due to less employee absenteeism and presenteeism

Economic Value of Recreational Activity

An estimated \$218.8 million in benefits accrue annually to residents who participate in recreational activities on protected open space in Montgomery County. This value represents the additional amount of money that residents would be willing to spend to participate in the recreational activities they currently enjoy for no personal cost on protected open space.

The \$218.8 million annual value of recreational activity on protected open space is equivalent to \$680 per household, per year (Figure 5.1). This value represents how much the average household would be willing to pay (in excess of what it costs them now) to participate in the recreational activities they now enjoy for free on protected open space. In other words, the average household saves \$680 every year by being able to recreate on protected open space in the county.

Figure 5.1:
Annual Recreational Benefits from
Montgomery County Protected Open Space



Sources: Econsult Solutions (2021), ACS 2019 1-Year Estimates, PA DCNR (2014, 2019), USDA (2017), U.S. Army Corps of Engineers (2021)

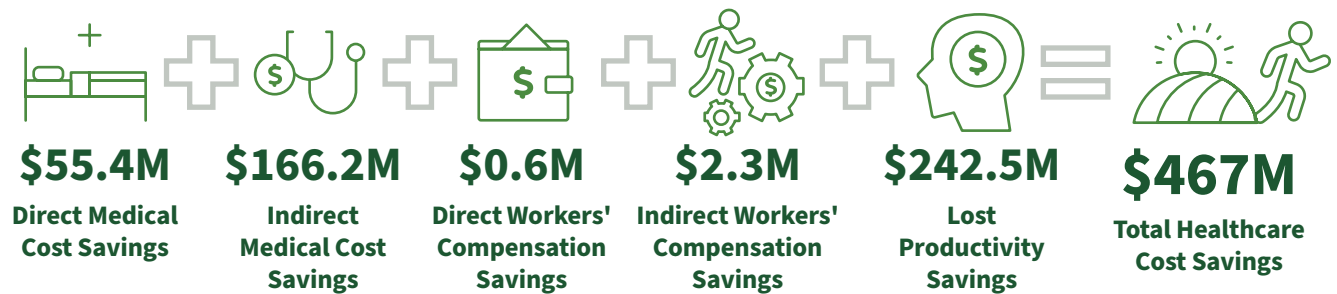
¹⁹ Pennsylvania Department of Conservation and Natural Resources and Penn State (2014), *A Resident Survey – Results*.

Healthcare and Workplace Cost Savings

Research has shown that physically active people typically enjoy a variety of health benefits, including lower incidence of cardiovascular disease, diabetes, depression, certain cancers, and obesity. This section estimates the health related cost savings resulting from the physical activity of residents on Montgomery County’s protected open space. In total, this physical activity results in avoided costs totaling \$466.9 million per year (Figure 5.2). This figure includes avoided medical costs, workers’ compensation costs, and costs related to lost productivity (see Figure 5.2). These impacts, in turn, translate to lower insurance costs and improved productivity.

Individuals who engage in strenuous exercise two or more times a week are considered to be physically active. According to survey data from PA DCNR, approximately 35 percent of Pennsylvanians participate in exercise outdoors two more times a week and approximately 41 percent of moderate to strenuous outdoor exercise takes place on protected open space such as parks and trails.²⁰ According to 2019 estimates from the U.S. Census Bureau’s American Community Survey, there are approximately 481,830 working age (20 to 64 years old) residents in Montgomery County. These statistics are used as the basis for estimating the number of county residents who meet physical activity guidelines on open space and the associated medical costs, workers’ compensation costs, and lost productivity costs that are avoided as a result.

Figure 5.2:
Annual Healthcare and Workplace Savings from Physical Activity on Montgomery County Protected Open Space (\$M)



Source: Econsult Solutions (2021), PA DCNR (2014); ACS 2019 1-Year Estimates, Graefe et al. (2009), Carlson et al. (2014), Chenoweth & Bortz (2005); Econsult Solutions (2021).



Cross County Trail



Photo Credit: Michael Stokes

20 Share who participate in exercise outdoors two or more times a week based on ESI analysis of: Pennsylvania Department of Conservation and Natural Resources and Penn State (2014), *A Resident Survey – Results*. Share of moderate to strenuous exercise by Pennsylvanians that occurs on open space such as parks or trails based on ESI analysis of raw survey data from Graefe et al. (2009), *Outdoor Recreation in Pennsylvania Resident Survey*.

CASE STUDY: Norristown Farm Park

Location: This large park is located in the Municipality of Norristown and East Norriton Township.

Total Acreage: The park covers 690 acres and has over eight miles of trails.

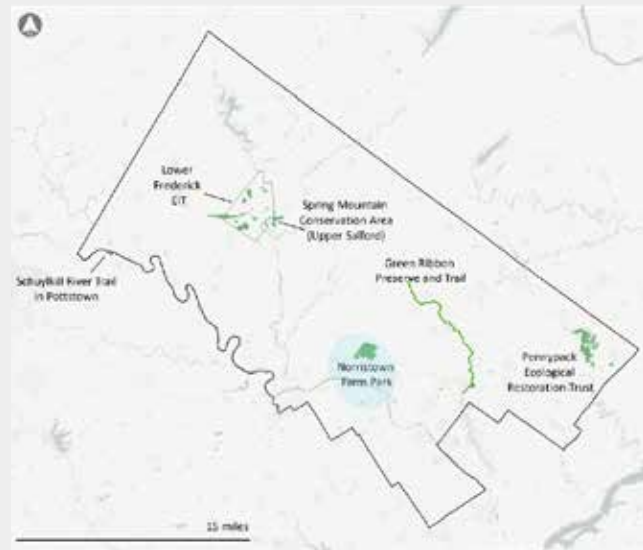
Land Managers: The Montgomery County Division of Parks, Trails, and Historic Sites and the Commonwealth of Pennsylvania.

Introduction

The Norristown Farm Park is owned by the Commonwealth of Pennsylvania and is operated and maintained by the Montgomery County Division of Parks, Trails, and Historic Sites. This unique relationship blends recreational opportunities and agricultural activities. The park is surrounded by a large and diverse population in Norristown and East Norriton.

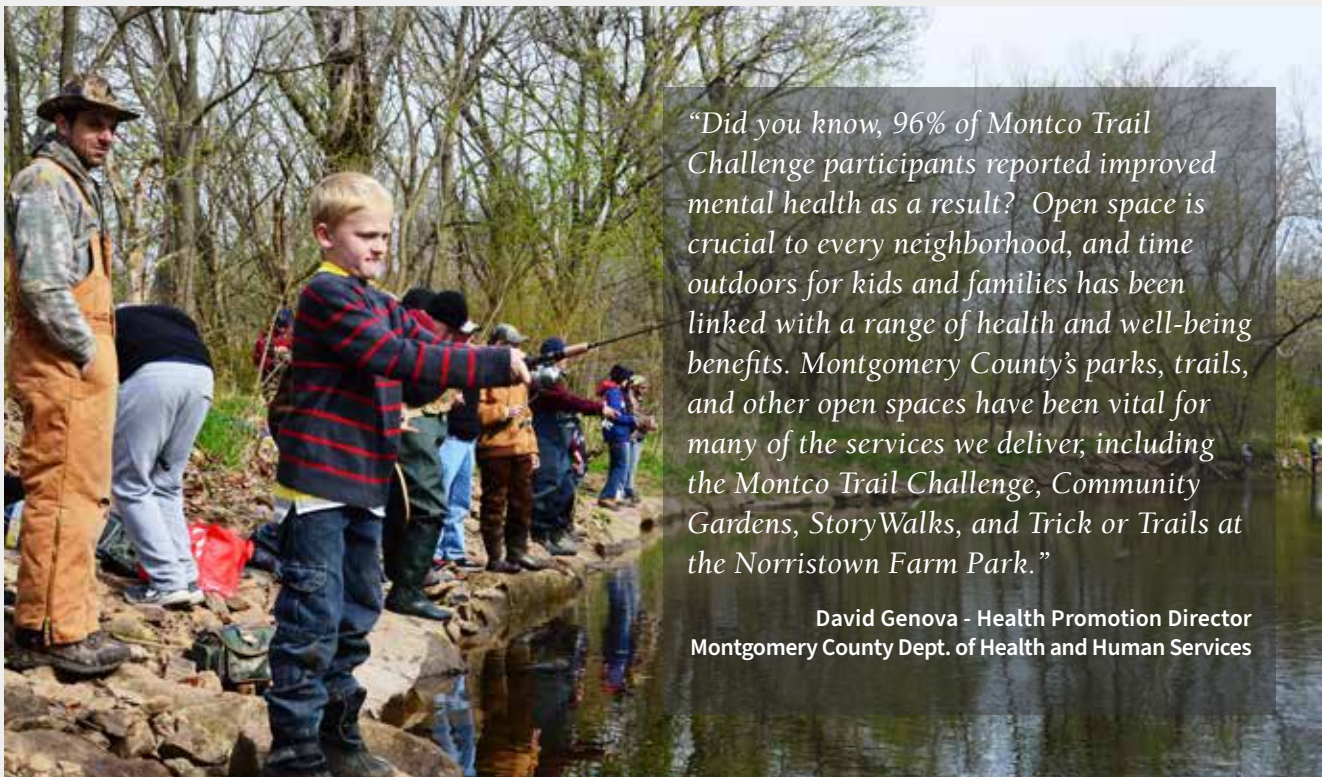
The park has been in continuous use as a working farm since colonial times. It was once part of a much larger tract of land owned by William Penn; a portion of which was later sold by his son to Isaac Norris, and much later in 1876, the Commonwealth purchased approximately 1,000 acres upon which it built the Norristown State Hospital. This land was used by the Commonwealth for both agricultural and therapeutic purposes with patients working on the farm growing crops and raising animals

Figure 5.3:
Norristown Farm Park



Source: Montgomery County (2021), Econsult Solutions, Inc. (2021)

as part of their treatment program. Additionally, the hospital farm served to train aspiring farm managers, and later served as an Alternative Service Program for conscientious objectors. In 1992, Montgomery County leased 690 acres from PA DCNR and created the Norristown Farm Park. The county maintains and operates the park as a passive recreation facility in partnership with DCNR, and today, some 400 acres are actively farmed by a tenant farmer, allowing visitors



“Did you know, 96% of Montco Trail Challenge participants reported improved mental health as a result? Open space is crucial to every neighborhood, and time outdoors for kids and families has been linked with a range of health and well-being benefits. Montgomery County’s parks, trails, and other open spaces have been vital for many of the services we deliver, including the Montco Trail Challenge, Community Gardens, StoryWalks, and Trick or Trails at the Norristown Farm Park.”

David Genova - Health Promotion Director
Montgomery County Dept. of Health and Human Services

Photo Credit: Michael Stokes

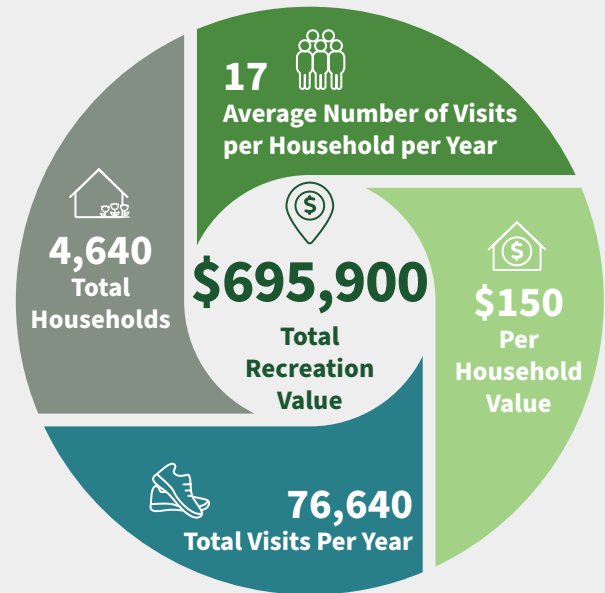
to observe a working farm in the midst of a suburban environment. The park has a variety of buildings and open fields representing a diverse history of farming, manufacturing, and institutions. The buildings date from the mid-18th century through the early 20th century and at various times were a part of mills, a tannery, farms, and the state hospital. The oldest historic structure, the Shannon Mansion located near the entrance to the park, dates back to 1764. The park is also home to a wide range of plant and animal species and provides for a multitude of recreation opportunities.

Recreation and Health Benefits

Popular visitor activities in the park include walking, running, hiking, dog walking, bicycling, rollerblading, picnicking, birdwatching, fishing, photography, cross country skiing, snowshoeing, and sledding. The park has nearly eight miles of paved trails and several miles of marked nature trails. The paved trails are primarily used for walking and bicycling, and the nature trails are restricted to foot traffic. The internal park roads are closed to vehicular traffic with the exception of park vehicles and farm equipment. There are also several small picnic shelters scattered about the park, which include restrooms, charcoal grills, volleyball nets, and horseshoe pits. A cooperative trout nursery, managed by the Stony Creek Anglers, operates in the park and provides fish for two stocked trout streams - Stony and Kepner Creeks that meander through the park on their way to the Schuylkill River. Due to the park's diverse habitat, over 170 species of birds have been recorded here. Volunteers monitor and maintain a number of song bird nesting boxes scattered throughout the park. Data collected by volunteers is reported to Nest Watch and is used to track the diversity of species, nesting success rates, and population trends. The park's naturalist offers a wide range of environmental education classes and activities throughout the year.

In total, the estimated annual recreational value generated from the Norristown Farm Park is \$695,900. In other words, this value represents how much

Figure 5.4:
Annual Recreational Benefits Associated with Total Households within a 1/2 Mile of Norristown Farm Park



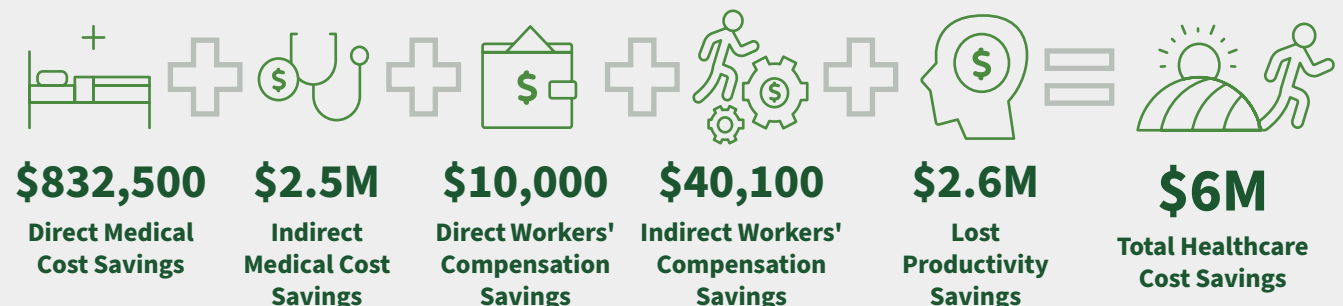
Sources: Econsult Solutions (2021), ACS 2019 1-Year Estimates, PA DCNR (2014, 2019), USDA (2017), U.S. Army Corps of Engineers (2021)

households are willing to pay to participate in recreational activities at the Norristown Farm Park.


The average local household saves \$150 every year by being able to recreate at the Norristown Farm Park (Figure 5.4). The proximity of Norristown Farm Park to a large population also generates healthcare and workplace cost savings on an annual basis. In total, this physical activity undertaken by visitors results in avoided costs totaling \$6 million per year (Figure 5.5). These impacts, in turn, translate to lower insurance costs and improved productivity.

These benefits generated from just one county park are tremendous and powerfully demonstrate the park's economic value.

Figure 5.5:
Annual Healthcare and Workplace Savings Associated with Norristown Farm Park



Source: Econsult Solutions (2021), PA DCNR (2014); ACS 2019 5-Year Estimates, Graefe et al. (2009), Carlson et al. (2014), Chenoweth & Bortz (2005); Econsult Solutions (2021).

A large, gnarled tree root grows horizontally across a mossy rock face. The root is thick and textured, with several smaller roots branching off. The rock is dark and covered in green moss. The background shows more of the rock and some green foliage.

“With a thirty-year legacy of investing in and permanently protecting open land, Montgomery County leaders have provided their constituents with conservation benefits that never get used up and never go away. As a result, green, healthy, and connected communities stretch across the county. What a powerful legacy Montgomery County leaders afford today’s citizens and bequeath generations to come.”

Dulcie F. Flaharty - Montgomery County Planning Commission Board Vice Chair
Former Montgomery County Lands Trust Executive Director
Former Montgomery County Open Space Board Member

SECTION 6:

CONCLUSIONS, NEXT STEPS, AND SUCCESS STORIES

This study provides a lot of big numbers and emphatic, undeniable proof that protected open space is economically valuable—there is definitely a “wow factor” that comes along with the results of this strenuous data analysis work. Now the questions are: Where do we go from here? How do we use these data and communicate them to important constituencies to effect change? What are the key takeaways? What does the study miss? Other thoughts for the future? The Advisory Committee grappled with these questions at their last meeting in December 2021. The points below capture much of their discussion.

Key Takeaways and Thoughts for the Future

Changing weather patterns associated with climate change will put even greater demands on the environment to provide ecosystem services.

As we experience more frequent and severe storm events, protected open space helps to avoid costs not only for infrastructure that would replicate ecosystem services (as the study results indicate) but also helps to avoid other costs such as the need for flood insurance for even more properties. In short, the value of the environmental benefits provided through protected open space will only inflate exponentially with time if current climate change trends continue.

Municipalities can play a powerful role by coupling their open space preservation efforts with other programs.

While there are many federal, state, and county programs and efforts oriented towards open space preservation, municipal governments have a significant opportunity and influential ability to work directly with their communities to preserve open space. Efforts such as instituting dedicated open space funding at the local level can be leveraged for even greater conservation gains when matched with federal, state, county, and philanthropic funds. Nine of the county’s 62 municipalities already have locally-funded open space programs in place. The story on page 50, about Lower

Frederick Township’s recently instituted open space fund is one such example that can serve to motivate other municipalities to pursue similar measures.

Dispelling the myth that more development unequivocally equals fewer taxes.

Many taxpayers believe that encouraging and allowing for more development will help keep taxes and costs low in their communities. This is often not the case since development creates a bigger tax burden due to the need to pay for increased services (e.g., libraries, fire and police services, schools) and infrastructure (e.g., sewer, stormwater management). Often, preserving open space rather than developing land into some other use can ultimately save communities money. The Montgomery County Lands Trust published a report titled *Saving Land Saves Money* in 2002, enumerating the economic benefits of land preservation—and although the numbers may have changed in the years since, the simple message of the report’s title remains true. This concept was also covered in "Chapter 6—Community Cost Savings" of Chester County’s recent 2019 *Return on Environment* study. In this chapter, the study shows through Cost of Community Services (COCS) studies for eleven Chester County municipalities that preserved farmland and other protected open space can help residents avoid significantly higher taxes than if the land were developed into residential use.

Creative partnerships and solutions can do wonders.

Besides the astounding figures and dollar signs jumping off the pages of this study, there are many notable preservation stories that can serve as inspiring examples of how to achieve greater open space preservation success. One of these stories centers on the county’s Spring Mountain area in Upper Salford Township. The story on page 52 about the Spring Mountain Conservation Area robustly demonstrates how creative partnerships can provide for great gains in open space conservation. A collection of entities working together can yield synergistic results by drawing upon the unique abilities, tools, and resources at their disposal.

CONCLUSIONS, NEXT STEPS, AND SUCCESS STORIES

How do we simplify the message and communicate it—answering the important question, “What’s in it for me?”

Advisory Committee members talked about how to boil the message down and make it relevant and understandable for regular families or individual citizens, including non-homeowners. And while it may be hard to translate the study’s results into a simple equation that spits out an answer for every dollar spent on preserving open space, it is essential to make the data results meaningful and understandable. The committee members noted the need to not only “preach to the choir”, but to reach further to both municipal leaders and their constituents alike throughout the county. The messaging can be communicated in new ways and old – from small pamphlets at trailhead kiosks to short “TikTok-style” videos.

This study does not capture the value that smaller, targeted environmental conservation and restoration efforts yield.

While this study measures the value associated with *acres* of protected open space, it does not include the value that many other, smaller, yet significant environmental efforts such as preserving existing trees in developed areas, planting new street trees, installing green stormwater infrastructure, and green parking lots and roofs can also contribute. It would be extremely difficult to identify and quantify the resulting economic value from these many environmental attributes that are more modest and woven into the fabric of our landscapes and backyards. One member noted that while the monetary value from this “embedded greening” may not show up in this study’s data results, these efforts also yield critical and impactful value that should be noted and encouraged.

Protected open space presents an opportunity to support and foster greater diversity, equity, and inclusion in our communities.

Protected public open space should be available for everyone to enjoy. Greater efforts need to be made to help connect all communities to publicly available open space through better access, transportation, and awareness. Measures to make people feel more welcome on our trails and in our parks also need to be implemented—such as welcoming signage and community outreach programs. Access to nature provides an opportunity for improved physical and mental wellbeing for all people. One member commented that polling in advance of past open space referendums has shown that people are “willing to pay for something that does not get used up and go away.” As we recognize the unquestionable demand for safe and welcoming public outdoor places in our communities, amidst the pandemic’s requirements for social distancing and the growing and collective desire for our communities to embrace one another, protected open space provides this place and is something that will always be there for us. Montgomery County is home to diverse people of all ages, abilities, races, and cultures, all of whom can find benefit and joy from protected open spaces.

The data analysis in this study proves quite dramatically and undeniably the tremendous economic value of protected open space. As shared by some involved with this study, although people may not necessarily remember the numbers, they do realize by the end of reading such a study as this, that protected open space brings them immense value—and the return is in the *millions* each year in savings, earnings, and avoided costs.

A FEW CLOSING WORDS

At their last meeting, Advisory Committee members were asked, “What do you most value about open space?” Here’s what they said:

fun and serenity
property, environmental, and economic value
its ability to help our environment to be clean, beautiful, and healthy
provides health, calm, and community
nature’s beauty, scenic, houseless, smart, and worthwhile
diverse activity, beauty, peace and quiet
fresh air
national and state parks and forests
finding refuge and indulging curiosity
buffering – the world from natural areas and resources and the other way around too
you know, if you close your eyes this sounds like a really nice, long poem
quality of life
establishing and protecting a strong sense of place
picturesque and serene landscapes
communion with life
fresh air, movement and exploration - I was recently in Yosemite, so I have to also say waterfalls!
clean air
the perpetual protection of habitat
nature’s home, my grandbabies love it, and educating youth
I love the word home - what was going through my mind was - taking care of home
in the time of COVID, I would say recreation and community
natural and cultural preservation
the invigoration of fresh air, trees, birds, sunshine
protecting nature’s beauty
community and serenity
engage, rebalance, renew, and reexamine
for me, it’s always been the trees

*Photo Credit: Brian McNeill
Unami Creek*

SUCCESS STORY: The Path to Creating an Open Space Fund for Lower Frederick Township

Authored by Marla Hexter, Lower Frederick Supervisor and Montgomery County Agricultural Land Preservation Board Member

The Goal: Protecting Open Space The Preserving Land for Open Spaces Act of January 19, 1968 authorized local governments to preserve, acquire, or hold land for open space use. The funds can be collected as either a property or earned income tax (EIT). After municipal authority approval, a referendum on a tax is presented to the voters at the next general election.

Lower Frederick Township, a community of just under 5,000 residents, passed an open space fund in a November 2020 referendum, and the fund level was set at just 0.0005 or five-hundredths of a percent. In 2021, Lower Frederick began collecting the tax, passed an ordinance that codified open space purchase procedures, and appointed residents to a committee to make open space recommendations.

Letting the Voters Decide The path to Lower Frederick’s open space tax started in 2019. The community had been grappling with the imminent loss of large tracts of land to developers and hoped to avoid the rapid development experienced in nearby townships. A group of residents began the process with a petition circulated at the Pennsylvania Primary asking for support for an open space fund. The petition, which eventually received over

300 signatures, was submitted to the county for authentication. A few months later, the issue came before the township’s Board of Supervisors. After discussions spanning several meetings, it failed to achieve a vote. Following expansion of the board from three to five supervisors—decided in a referendum at the 2019 election—the open space measure returned for board consideration. By a 3-2 vote, the measure passed and was placed before, and approved by, the township’s voters at the 2020 General Election.

Resident Education Key What were the key factors leading to its passage? First, with board expansion in 2020, board members more favorable to the concept of an open space fund approved the resolution to place it on the ballot. Second, residents were educated about the upcoming referendum through a pair of mailers designed and printed with assistance from local nonprofits. These mailers provided details about the tax and benefits to the community. To ensure that residents lead the process of proposing future land acquisition opportunities following passage of the fund, the board created an open space committee in 2021.

Challenges Remain The vote for the open space fund was not unanimous, either by the board or within the community. To continue the process of building community support, the board and open space committee must be good stewards of the funds. Pro-development supporters argue taxes will be lost if potential residential land is preserved. Others oppose any new tax, no matter how small or important to the community. An ongoing, constructive dialogue with the community is critical to resolving these inherently conflicting interests.

It's About Preserving Our Quality of Life

Families love Lower Frederick Township. We live here because we enjoy our natural setting and our quality of life. It's no wonder. The Township is home to many natural and cultural treasures.

Stone Hill Greenway/ Mung Preserve
A treasured publicly accessible preserve in Lower Frederick Township.

Swamp Creek
An idyllic stream with DEP designated "Trout Stocking" water quality.

Wildlife habitat
Lower Frederick boasts over 95 bird species, 229 plant species, 52 types of fungus and 20 species of mammals.

How Will Open Space Preservation Benefit Me?

- **Saves money—not preserving open space costs money!** More development means more and bigger public schools, increased police, fire and other municipal services and higher taxes
- **Preserves quality of life**—maintains the character of our community and its wildlife habitats
- **Increases property values**—for all of us
- **Protects valuable groundwater**—most of us depend on wells for a constant supply of clean, fresh water
- **Reduces traffic and noise**—which means less time sitting in traffic

Q) How much would an open space program cost township taxpayers?

A) A 5/100 of 1% tax increase (0.0005), on earned income only, would cost a household with an income of \$100,000 about \$50 per year, or 14 cents per day. This approach typically has no impact on fixed-income or retired residents.

Q) How would these funds be used and monitored?

A) The township is required by PA Act 153 to use open space revenue ONLY for open space protection. The funds would be used to purchase conservation easements, development rights or land to be permanently preserved. An application process will be used for evaluating and selecting properties to ensure that funds are used effectively and equitably.



What Am I Being Asked to Approve?

When you vote on November 3, 2020, you will have the opportunity to vote Yes or No on a ballot question. The essence of the question is:

The Preserving Land for Open Spaces Act of January 19, 1968 (P.L. 992) authorized local governments to preserve, acquire, or hold land for open space use. The Board of Supervisors of Lower Frederick Township is seeking permission to impose an additional earned income tax levied annually in the amount of five one-hundredths (5/100th) of one percent (0.0005) for the purpose of preserving open space. The revenue received from the new tax will be used to acquire, preserve, develop, improve, design, engineer, and maintain open space land in Lower Frederick Township. The open space lands that are acquired shall be used for open space preservation in strict compliance with the Act.

A Yes Vote Will:

- Preserve natural beauty and protect natural resources
- Enhance property values
- Protect our quality of life
- Prevent increased traffic
- Provide passive recreation opportunities
- Reduce storm water runoff problems



A No Vote Means:

- Loss of immediate land preservation opportunities
- Possible environmental degradation
- Potential loss of our rural country atmosphere and wildlife habitat
- Need for more municipal services
- Increased traffic congestion
- Additional storm water runoff



Vote YES November 3rd! Save land! Save Lower Frederick Township!

Lower Frederick Open Space
P.O. Box 128
Zieglerville, Pa. 19402

Open Space Fund Tax on the Ballot this Year. Vote YES.



Pamphlet prepared by: Natural Lands

SUCCESS STORY: Spring Mountain Conservation Area: A Win-Win-Win for All!

Authored by Ted Poatsy, Upper Salford Supervisor

This story is about private entrepreneurs and local government working together to preserve one of Montgomery County's highest valued environmental assets for its residents and future generations—our beloved Spring Mountain.

The Spring Mountain area of Montgomery County was determined to be the highest priority site for preservation in the 1995 Montgomery County Natural Areas Inventory. Thus, when the property was threatened by development, a joint public-private partnership effort was formed to help conserve it.

In a joint partnership between Montgomery County, Upper Salford Township, and Spring Mountain Adventures, the ski slopes (84 acres) were preserved by Upper Salford Township in 2000 by taking out a \$600,000 mortgage (no matches or grants were involved). The township then turned around and leased the slopes to Spring Mountain Adventures for 30 years. Montgomery County also acquired 84 acres of open space woodlands around the slopes on the north side of Spring Mountain for an additional \$600,000 (\$500,000 of which came from a state grant). Spring Mountain Adventures, which bid for the lease on the ski slopes, makes payments to Upper Salford Township to pay off the township's 15-year mortgage through a unique economic structure. Over the years, Upper Salford Township has paid off the mortgage for the ski slopes, and as stated in the lease agreement, any additional ski revenues are to be utilized to

purchase more open space within the township. The township has created an economic vehicle to provide open space revenues to purchase open space for future generations in perpetuity. Over 35,000 skiers per year ski and enjoy Spring Mountain. Fresh air, beautiful viewsheds, and night skiing is enjoyed by visitors from Montgomery, Philadelphia, Chester, Bucks, and Delaware Counties and even some parts of New Jersey.

Furthermore, the Perkiomen Trail runs along the western portion of the Spring Mountain Conservation Area, so thousands of hikers and bike riders utilize the trail to climb over the mountain connecting Schwenksville through Upper Salford Township to Green Lane Park.

Spring Mountain Adventures installed an ice-skating rink at the base of the mountain in 2021. The ice-skating customers also pay an amusement lease fee (as is the case with ski lift tickets) to Upper Salford Township to fund future township open space acquisitions. The rink also employs more local workers—yet another benefit of this most recent addition to Spring Mountain Adventures' offerings.

Additionally, the 20 acres of commercial property that Spring Mountain Adventures owns is a tax-producing property for the county, township, and school district. Furthermore, the 40 employees of Spring Mountain Adventures pay state income taxes, school district, and township earned income taxes. Overall, the ski area is providing jobs to residents and generating income for the township, school district, county, and state.

Other activities on this preserved open space include mountain biking and hiking, a zip-line concession, the WMGK annual Bon Fire, mountain biking events, and competitive endurance races.

Besides the preservation on the north side of the mountain, Upper Salford Township, Schwenksville Borough, and Lower



Photo Credit: Michael Stokes

Photo Credit: Michael Stokes



Frederick Township purchased the south side of the mountain, formerly the site of the Spring Mountain House Resort, using Montgomery County Open Space funds from the 1993 and 1998 open space programs. Due to these combined efforts, the entire mountain will never be developed for houses and will instead provide recreation opportunities, open space vistas, natural habitat for birds (including endangered species) and other wildlife, storm water recharge for the area, and the health and climate benefits of trees that clean the air forever!

In summary, the major benefits of the Spring Mountain Conservation Area include undeniable environmental benefits, the economic benefits of jobs and taxes, recreational opportunities for thousands, and continuing economic fee-generating skiing and ice-skating concessions. These fees allow Upper Salford Township to continue expanding regional open space connectivity and conservation, such as with the current \$1.2 million Park to Perkiomen Trail currently under construction, which when completed will connect Upper Salford Park, Spring Mountain Adventures, and the Perkiomen Trail.

The Spring Mountain Conservation Area is truly a success story based on the cooperation of many stakeholders from surrounding townships, Montgomery County, PA DCED, PA DCNR, residents, skiers, hikers, bikers, and environmentalists. Of course, one of the biggest players is the private enterprise of Spring Mountain Adventures. This is a perfect example of a Win/Win/Win project for all in the region and demonstrates the powerful results when a vision becomes a reality! This very unique preservation story can serve to inspire other communities seeking to protect their natural assets and beauty.



GLOSSARY

Agricultural activity: Activities that occur on protected farmland in direct support of the production of an agricultural product.

Best Management Practice (BMP): A technique to most appropriately conserve natural resources and manage surface runoff on a site based on unique site conditions, planning, and engineering requirements. A BMP involves site development design that incorporates the most suitable technique or combination of techniques to best manage the resource and/or to prevent or reduce surface runoff and water pollution.

Easement, agricultural: An interest in land, less than fee simple, which represents the right to prevent the development or improvement of a parcel for a purpose other than agricultural production. This voluntary easement may be granted by the owner of the land to a third party or to the Commonwealth, to a county governing body, or to a unit of local government. The easement is granted in perpetuity, as the equivalent of covenants running with the land.

Easement, conservation: An interest in land, less than fee simple, that is a voluntary and legally binding agreement between a landowner and a land trust or government that limits certain uses on a property to achieve conservation objectives while keeping the property in the landowner's ownership and control. The holder of the conservation easement has the right to block inappropriate uses while the owner may continue to use the land within the constraints set in the easement. Conservation easements do not create a right for the public to access a property, unless specifically established, and bind present and future landowners.

Economic value: This report measures economic value in relation to three aspects: wealth generation, tax revenues and avoided costs. It does not attempt to measure other important but difficult to quantify measures of economic value such as cultural, spiritual, aesthetic and stress reduction benefits.

Ecosystem services: Any positive benefit that wildlife or ecosystems provide to people as a result of their natural functions. This report estimates the economic benefits associated with the ecosystem services of provision of water supply, water quality improvement, flood mitigation, wildlife habitat, air pollution removal, and carbon sequestration and storage that results from the natural environments on protected open space.

Environmental benefits: The economic benefits derived from ecosystem services.

Hedonic regression: Hedonic regression analysis seeks to isolate the explanatory power of a single variable of interest (like proximity to protected open space) by holding

constant other relevant housing characteristics (such as square footage, number of bedrooms, year built, etc.). This technique is commonly applied to housing market transaction data to evaluate the value premium associated with various amenities.

Input-output modeling: This economic modeling technique is used to represent the flow of money in an economy. In an inter-connected economy, every dollar spent generates two spill-over impacts: First, some proportion of spending on locally-purchased goods and services is circulated back into an economy. This represents an "indirect effect" and reflects the fact that local purchases of goods and services support local vendors, who in turn create business-to-business transactions when they purchase from their own set of vendors. Second, some proportion of that expenditure that goes toward employee salaries is circulated back into an economy when those employees spend some of their earnings on goods and services. This represents what is called the "induced effect" and reflects that fact that some of those goods and services will be purchased from local vendors, further stimulating a local economy.

Land cover: Patterns of vegetation or man-made features that occur on the earth's surface. Examples of land cover include forest, pasture, wetland and developed area.

Open space: For the purposes of this study, open space is predominantly vegetated land that has little or no development. Open space can include undisturbed natural areas, farmland, public parks, and trails.

Protected open space: Land or water areas that have little or no development and are used for working lands, recreation, or preserving cultural or natural resources; and are either permanently protected from development by an easement, owned by a governmental agency, or protected through a municipality's zoning ordinance. In some instances, only a portion of a property is subject to a conservation or agricultural easement.

Value transfer: An estimation method that assigns a monetary value to something non-monetary to gauge how much people value the asset/service and would be willing to pay for it if they had to. This method is used where data collection proves too costly or time consuming. An example of value transfer is asking someone how much they would be willing to pay to remove a ton of carbon from the atmosphere.

Willingness to Pay (WTP): The maximum price a customer is willing to pay for a product or service. It is typically represented by a dollar figure or, in some cases, a price range. While potential customers are likely willing to pay less than this threshold, it's important to understand that, in most cases, they won't pay a higher price.

PREPARED BY



ABOUT **ECONSULT SOLUTIONS, INC.**

This report was produced by Econsult Solutions, Inc. (“ESI”). ESI is a Philadelphia-based economic consulting firm that provides businesses and public policy makers with economic consulting services in urban economics, real estate economics, transportation, public infrastructure, development, public policy and finance, community and neighborhood development, planning, as well as expert witness services for litigation support. Its principals are nationally recognized experts in urban development, real estate, government and public policy, planning, transportation, non-profit management, business strategy and administration, as well as litigation and commercial damages. Staff members have outstanding professional and academic credentials, including active positions at the university level, wide experience at the highest levels of the public policy process and extensive consulting experience.

Photo Credit: Margaret Rohde
Green Ribbon Preserve

