RETURN ON ENVIRONMENT

The Economic Impact of Protected Open Space in Mercer County, New Jersey






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PREPARED BY

ECONSULT SOLUTIONS INC.

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MERCER COUNTY RETURN ON ENVIRONMENT
EXECUTIVE SUMMARY

Mercer County is home to diverse landscapes and people, containing urban, suburban and rural areas and people of all ages, races and cultures.

The County's emphasis on land preservation began over 30 years ago, resulting in a multitude of preserved parks and open spaces. From the elevation of Baldpate Mountain to the tidal floodplains of the Abbott Marshlands; the urban South Riverwalk Park to Howell Farm, the County's park offerings reflect the diversity of the County's natural features.

Protected open space provides substantial economic, environmental, and health benefits to surrounding communities, but these benefits are often overlooked or undervalued in policy debates and investment decisions. A better understanding of these benefits can demonstrate how protected open space contributes to economic development and fiscal stability and reverses the common misconception that conserved undeveloped land is non-productive and non-revenue producing.

There are around 38,995 total acres or approximately 27 percent (up from 9 percent in 1990) of Mercer County's land area permanently preserved in one form or another, either as public parkland and open space, or as privately-owned conserved land or farmland. The parks, farms, and forests of Mercer County account for millions of dollars each year in savings, earnings, and avoided costs.

Building on a previous Return on Environment report completed in 2011 by the Greenspace Alliance and the Delaware Valley Regional Planning Commission that estimated the economic benefits of protected open space in the 5-county region of Southeastern Pennsylvania, this report is the first attempt to apply this methodology to Mercer County, New Jersey, measuring impacts of four major categories: property values, economic activity, environmental benefits, and recreation and health.

Property Value Impact
Open Space Generates Premium for Home Values

The property value impact from open space is reflected on 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 Mercer County adds to the overall value of its housing stock. This increased wealth is captured by citizens through higher sales values of homes near protected open space, and generates increased government revenues via larger property tax collections and greater transfer taxes at time of sale. This report analyzes more than 38,995 total acres of protected open space and approximately 39,600 home sales in Mercer 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.

➲ $791M ADDED TO THE VALUE OF HOUSING STOCK

There is an average increase of over $7,100 in the value of homes in Mercer County that are located up to a ½ mile from protected open space. When added together, this proximity to protected open space totals $791 million in increased property value.

➲ $21.5M IN ANNUAL PROPERTY TAX REVENUES

By increasing the value of homes within a ½ mile radius, protected open space also increases the amount of property taxes and transfer taxes that local governments and school districts receive. These increased property tax revenues total $21.5 million per year.



Mercer Lake

Economic Activity

Open Space and Farmland Generates Jobs and Attracts People to Spend in the Region

Open Space in Mercer County generates economic impacts by creating management and maintenance expenditures and related jobs at public parks. The direct spending which goes to labor income gets circulated back into an economy when those employees spend some of their earnings on various goods and services, which creates ripple effect in the regional economy. What's more, agricultural activities occurring on protected farmland will also generate economic impact. Lastly, open space and farms attract tourists to visit the region, whose associated expenditures will also create economic impacts in the region.

➲ $76M IN ANNUAL EXPENDITURES

It is estimated that $76 million in annual spending occurs on and because of protected open space in Mercer County. Examples of these expenditures include spending related to 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.

➲ 750 JOBS SUPPORTED FROM OPEN SPACE-RELATED UPKEEP, PROTECTED FARMLANDS, AND OPEN-SPACE TOURISM

Protected open space in Mercer County contributes an estimated 750 jobs to the economy. Examples of these jobs include public maintenance workers, municipal, county, and state 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.

➲ $34M IN ANNUAL SALARIES

Salaries paid to individuals working jobs on or related to protected open space in Mercer County total $34 million per year.

Environmental Benefits

Open Space Reduces Pollution and Storm Water Risks

Protected open space in Mercer County provides visible environmental benefits for the communities they serve, 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 would incur additional costs to recoup their value.

➲ $96.7M ANNUALLY THROUGH THE PROVISION OF SIX ENVIRONMENTAL SERVICES

The six ecosystem services include replenishment of water supply, water quality improvement, flood mitigation, wildlife habitat, air pollution removal, and carbon storage in trees on protected open space. This sum represents value gained and costs avoided by not having to sacrifice or artificially replace vital ecological services currently provided by protected open space within Mercer County.

➲ $107.9M IN CARBON STORAGE IN TREES

It is estimated that trees on Mercer County's protected open space store a tremendous amount of carbon that would cost $108 million to replicate.

➲ $102.1M IN AVOIDED ANNUAL STORMWATER SYSTEM MAINTENANCE AND STORMWATER POLLUTANT REMOVAL COSTS.

Protected open space helps mitigate stormwater impacts by reducing the volume of runoff from storm events and the pollutants that stormwater carries. This 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 habitats, recreational resources, and sources of current and future public water supplies.



Protected open space avoids $66.8 million of capital cost for stormwater infrastructure construction, plus an additional $8.9 million to operate and maintain the additional infrastructure. This avoids an additional annual investment of $102.1 million needed to remove annual pollutant loadings.

Direct Use Benefits

Open Space Provides Low Cost or Free Recreational Opportunities and Promotes Health

Protected open space in Mercer County provides a multitude of free and low-cost recreational activities to residents. Many of these activities consist of strenuous or moderate exercise, which contributes to physical well-being and defrays health-care costs. 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 (coming to work while sick or injured).

➲ $47.6M IN ANNUAL RECREATION BENEFITS FOR RESIDENTS

Nearly $47.6 million in benefits accrue annually to residents who participate in recreational activities on protected open space within Mercer 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 that they currently enjoy on protected open space.

➲ $84.1M IN MEDICAL COSTS AVOIDED ANNUALLY

Physically active people typically enjoy a variety of health benefits, including lower incidence of cardiovascular diseases, diabetes, depression, certain cancers, and obesity. It is estimated that the moderate and strenuous activity that takes place on protected open space in the county accounts for almost $84.1 million in avoided medical costs annually.

➲ $65.2M IN LOST PRODUCTIVITY COSTS AVOIDED ANNUALLY

It is estimated that businesses in Mercer County avoid $65.2 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 combined value of costs not incurred as a result of avoided productivity losses due to physical activity on the protected open space in Mercer County.

Conclusion

As demonstrated in this report, preserved open space in Mercer County is more than a pretty landscape. These lands increase property values, add to the economy and economic diversity, protect the natural environment and offer direct recreation and health benefits to residents and visitors. The greatest benefits result from well managed and well maintained parks and open spaces, where best stewardship practices are implemented and clean, safe public access and amenities are provided for our diverse citizenry. Mercer County will continue the efforts for the next 30 years including continuing acquisition of key parcels to expand and improve upon existing parks and open spaces, increased focus on stewardship of the land—caring for the intrinsic values of the land to ensure environmentally healthy parkland, and keep providing a broad range of recreational facilities and passive parks, adapting and evolving to meet the needs of County residents.



Baldpate Mountain

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

PROPERTY VALUE

$791M
added to the value of housing stock located within a ½ mile of protected open space.

$7,100+
average increase in the value of homes that are located within a ½ mile of protected open space.

$21.5M
in annual property tax revenues

ECONOMIC ACTIVITY

$76M annually
from expenditures associated with protected open space.

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

$34M annually
in salaries.

ENVIRONMENTAL

$96.7M annually
from water supply replenishment, water quality improvement, flood mitigation, wildlife habitat, air pollution removal, and carbon storage in trees.

$107.9M
value of carbon storage in trees.

$102.1M annually
in avoided stormwater system maintenance and pollutant removal costs.

DIRECT USE

$47.6 million annually
in recreation benefits for residents.

$84.1M annually
in medical costs avoided.

$65.2M annually
in lost productivity costs avoided.



Baldpate Mountain



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.

A better understanding of these benefits can demonstrate how protected open space contributes to economic development and fiscal stability and reverses the common misconception that conserved undeveloped land is non-productive and non-revenue producing.

The methodology used to estimate these benefits is based on a previous Return on Environment report completed in 2011 by the Greenspace Alliance and the Delaware Valley Regional Planning Commission that estimated the economic benefits of protected open space in the 5-county region of Southeastern Pennsylvania. This report is the first attempt to apply this methodology to Mercer County, New Jersey.

Defining Return on Environment

Based on the methodologies from a previous Return on Environment report completed in 2011 by the Greenspace Alliance and the Delaware Valley Regional Planning Commission that estimated the economic benefits of protected open space in the 5-county region of Southeastern Pennsylvania, Mercer County's Return on Environment study seeks to quantify the economic value of protected open space specific to Mercer County. This economic analysis is critical to understand the true value of the policies and initiatives that support open space preservation.

This report estimates the economic benefits associated with preserved protected open space in Mercer County by measuring impact in four key areas (see Figure 1.1).

Figure 1.1:
The Four Key Areas of Impact Measurement

Property Value
The effect that protected open space has on residential property values.

Environmental
The value associated with environmental benefits provided by Mercer County's protected open space.

Economic Activity
Jobs and revenues created as a result of maintaining open space and the activity on and connected to protected open space.

Recreation and Health
The recreation value and associated health benefits that accrue to users of public open spaces.

1.1. Open Space in Mercer County

Open Space Preservation Background

Mercer County has been aggressively preserving open space and farmland since 1990. This work has been undertaken as a result of the County's first open space preservation trust fund tax ballot question, overwhelmingly approved by the voters in 1989 and continually supported since. Prior to 1989, County residents were served by a handful of County park facilities including Mercer County Park in West Windsor/Hamilton/Lawrence; two County golf courses, Mountain View in Ewing and Princeton Country Club in West Windsor/Princeton; and Howell Living History Farm and Rosedale Park in Hopewell. In the 1980's and 1990's many areas in the County were experiencing substantial residential, commercial and corporate development. Suburban sprawl was encroaching upon the County's rural landscape and threatening the natural environment. It was evident that there was a need for more protected open space, both for recreation and to protect natural resources. Large environmentally significant lands were unprotected, but still undeveloped and available, and the new open space trust fund and a favorable real estate market provided the financial resources needed to preserve lands of regional importance.

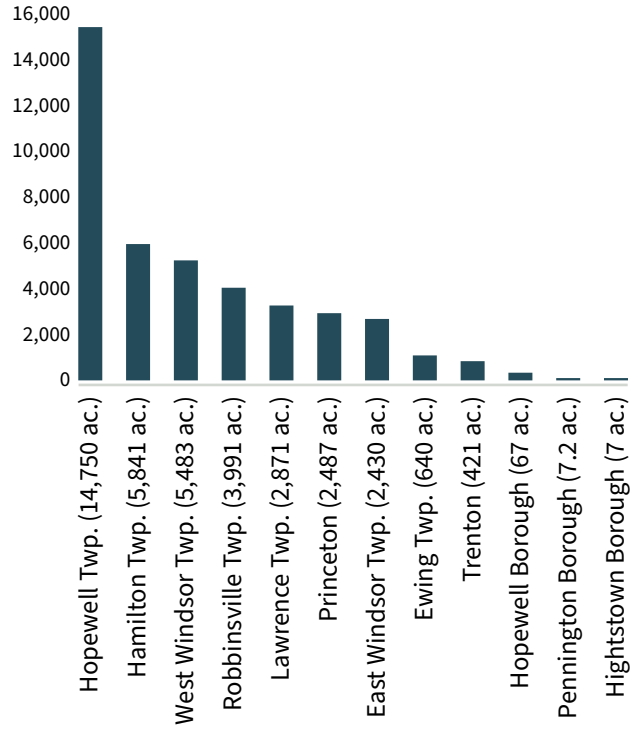
Thirty years later, 27 percent (up from 9 percent in 1990) of Mercer County's land area is permanently preserved in one form or another, either as public parkland and open space, or as privately-owned conserved land or farmland.[1] The organizations and governmental entities involved in preservation have long believed in the benefits of our preservation efforts and have anecdotal evidence of the positive effects of preservation on our communities, but no concrete and quantifiable evidence. This Return on Environment study seeks to provide measurable confirmation of the benefits of open space preservation to our community and the environment. These preserved lands provide benefits to Mercer County residents and businesses in increased property values, increased economic activity, and environmental and direct use benefits.

Overview of Protected Open Space in Mercer County

As of April 2020, there were 38,995 total acres of preserved land in Mercer County, or approximately 27 percent of the county's land area. The analysis in this report deals with the economic benefits associated with six categories of protected open space in Mercer County:

- State Parks
- County Parks
- Municipal Parks
- Nonprofit Lands
- Preserved Farms
- Conservation Easement and Deed Restricted Open Space (noted as "Other" in Fig. 1.3)

Figure 1.2:
Acreage of Protected Open Space by Municipality



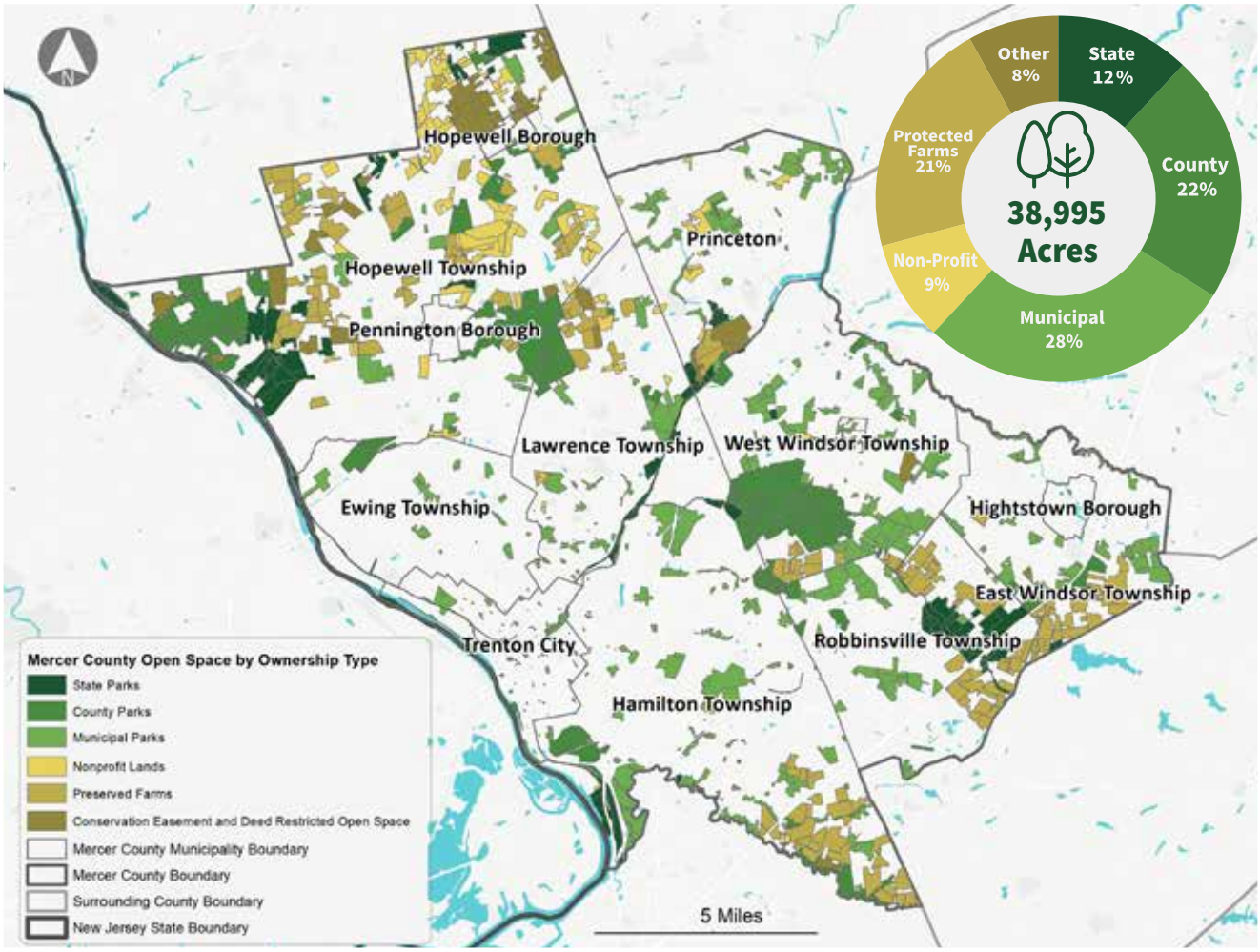
Source: Mercer County (2021)

1 The 27% was calculated using spatial GIS data layers and does not reflect actual surveyed acres.

Municipally owned open space makes up the largest share of preserved open space in Mercer County, accounting for around 28 percent of the total protected open space area. County parks, making up around 22 percent of total protected open space, are the second largest open space category. Farmland, including deed restricted farms, state deed farms, municipal farms and non-profit farms, makes up around 21 percent of total protected open space. State parks, non-profit lands and conservation easement and deed restricted open space makes up around 12 percent, 9 percent and 8 percent of the total protected open space, respectively.

As might be expected, most of the protected open space is in suburban municipalities. Hopewell Township is the municipality with the most acreage of protected open space in Mercer County, totaling around 14,750 acres of parks and open space, followed by Hamilton Township and West Windsor Township. More urban municipalities such as Trenton, Ewing, Hopewell Borough, Pennington Borough and Hightstown Borough are some of the municipalities with the least amount of open space, due to their dense development patterns (Figure 1.2 and Figure 1.3).

Figure 1.3:
Map of Mercer County Protected Open Space and Percentage by Ownership Type



Source: Mercer County (2021), Econsult Solutions, Inc. (2021), ArcMap (2021



1.2. Public Support

Public support for the County's Open Space Farmland and Historic Preservation Trust Fund Tax (Trust Fund) is the key to the thousands of acres of land permanently preserved in Mercer County. The Trust Fund was established in 1989 by the voters of Mercer County who approved by a large margin. The tax approved at that time was the collection of one cent ($.01) per $100 of equalized assessed value, first collected in 1990. Over the last 30 years the voters have continued to support the Trust Fund Tax in four additional referenda, outlined below.

The Mercer County Trust Fund has contributed to the preservation of 18,654 acres of open space:

- 5,174 acres of County parkland, open space and conservation easements ;
- 5,997 acres through the Mercer County Municipal and Non-Profit Open Space Assistance Program utilizing grants to local governments and nonprofit conservation organizations;
- 5,413 acres through the County farmland preservation program;
- 167 County acres transferred to municipal open space;
- 1,903 acres of cooperative open space and farmland properties with direct County funding.

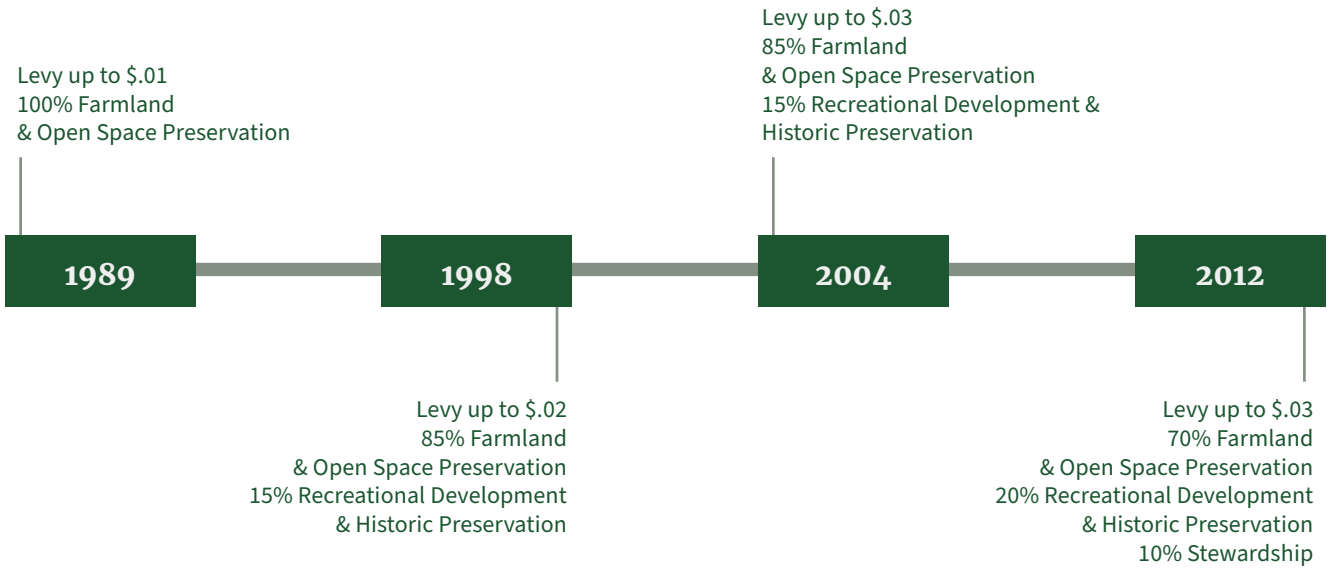
Examples of stewardship projects funded with the Trust Fund:

- Native meadow and grassland restoration;
- Forest restoration;
- Freshwater tidal wetland restoration;
- Invasive species management;
- Parkland and open space boundary monitoring.

Historic preservation projects funded with the Trust Fund include:

- Petty's Run interpretive restoration in Trenton;
- Rogers House interpretive restoration at Mercer County Park;
- Hunt House restoration at Mercer Meadows;
- Abbott Farm National Landmark Interpretive Plan and signage;
- Kahn Bathhouse restoration and associated improvements in Ewing.

Figure 1.4:
Trust Fund Tax Timeline





Examples of park planning and development projects funded with Trust Fund:

- Dam Site 21 Master Plan;
- Moores Station Quarry Master Plan;
- Stony Brook Pedestrian Bridge;
- Mercer County Park Splash Pad;
- Baldpate Mountain building renovations, parking, and site improvements;
- Tulpehaking Nature Center.

This tax along with all state, local and farmland preservation funds helped to ensure that over 27 percent of the county's land has been protected and preserved. As open space acquisition slows and as the need to provide for park development, public access and stewardship grow, plans are underway to go out to Mercer County voters in November 2021 to adjust the open space tax allocation accordingly.

1.3. Planning for the Future

There have been many changes over the last 30 years which impact the County's thinking about open space, recreational lands and stewardship of those lands. Today we are more mindful about the effects of climate change, and the resulting damage to our lands and communities. There is a heightened awareness to address issues such as social justice, healthy communities, climate change and resiliency, and a need to provide more livable, walkable settings for residents and employees, and for quality urban open space. What has also changed is the amount of land that the County manages which has increased by more than double over thirty years. In addition to an increase in general park maintenance is the growing need to care for the lands' natural and ecological values. Damage from invasive species, overabundant deer, natural disturbance and increased public use in our parks have negative impacts and can degrade the quality of the land for the public enjoyment as well as the environment. Since the authorization of stewardship as a permitted expense, the Park Commission and Planning Department have hired professional staff dedicated to identifying stewardship needs and implementing programs on the ground. The stewardship team has completed numerous projects throughout the Park System to address invasive species management, wildlife management and habitat restoration. The lands that the County has so diligently preserved require land stewardship and resource management, now and into the future. Finally, the pace of land acquisition for preservation purposes has slowed over the last decade. This is due, in part, to limited State funds but mostly because there is less land available to acquire and the lands remaining for preservation are much smaller in scale and more challenging to acquire.

There is still much to be accomplished. Over the last decade the County has preserved linkages in our Greenways, expanded our parkland and focused on providing open space close to where people work and live, while also instilling good land stewardship practices and policies. The 2021 Mercer County Open Space Plan examines updated data, including population, and a County-wide inventory of open space lands to identify gaps and new opportunities.

1.4. Development Pressure

Until recently, residential and non-residential development in Mercer County had slowed but not stopped since the great recession of 2007-2009. However, as the country moves out of the COVID-19 pandemic, development pressure has increased steeply in Mercer County, primarily for residential and warehouse development. In addition, during the development lull, New Jersey affordable housing mandate settlements have been reached which will result in an expected increase of residential development across the County. Court-ordered Settlement Agreements are estimated to produce an additional 9,750 residential units and 23,607 people over the next 10 years. This growth is expected to influence local and county infrastructure. It is necessary to consider the impact of population growth on our systems including but not limited to transportation, water supply and treatment, libraries, and environmental mitigation measures as well as open space and recreational needs. Mercer County currently meets the open space guidelines set forth by the Balanced Land Use Guidelines from the NJ



Statewide Comprehensive Outdoor Recreation Plan (SCORP) and the National Recreational and Park Association (NRPA). Due to our aggressive land preservation efforts over the last 30 years the County will continue to meet those standards even if the maximum projected residential growth occurs.

1.5. Agriculture

Although it may not be obvious from the urban and suburban nature of Mercer County, agriculture is a thriving industry, providing open landscapes, access to fresh food and other agricultural products.

In addition to preserved open space and parkland, there are also over 7,200 acres of farmland preserved over the past thirty years in Mercer County, principally through the purchase of agricultural easements. This farmland greatly contributes to the quality of life in the County by providing locally grown food and an agricultural economic job sector, among other benefits.

Farms in Mercer County range from organic produce CSAs to field crops and wineries, horticultural producers that supply the nursery industry, equine operations that breed and train racehorses, livestock and poultry producers and fruit and vegetable producers that supply both local consumers and the regional restaurant industry. Local products can be found at the County's many farmers markets. Agritourism, such as Pick Your Own operations and other on-farm experiences are a popular and growing industry. This diversity of farm operations is represented in the permanently protected agricultural base in Mercer County.

The United States Department of Agriculture's Census of Agriculture, most recently conducted in 2017, provides statistics to compare Mercer County to other counties in New Jersey. Mercer's average and median farm size are 78 acres and 18 acres, respectively, which is very similar to the average (74 acres) and median (16 acres) farm sizes in the state. Mercer ranks 10th in the state in terms of the value of agricultural products sold by County, with almost $25 million dollars of agricultural products sold in 2017. In addition, the Census shows that Mercer ranked 8th statewide in the sale of grains, oil seeds and beans, 10th statewide for the sale of livestock, poultry and their products, and 10th in the state for the sale of vegetables, primarily sweetcorn and pumpkins.

1.6. Preservation and Funding Partners

Taxpayer support has been the key to the success of the County Open Space and Farmland Preservation program. The County's accomplishments have also relied on the many partnerships and programs that have leveraged and supported the County program. The many funding programs and partnerships include NJDEP State Green Acres program, NJDEP Environmental Infrastructure Trust financing program and the State Agriculture Development Committee (SADC) as well as local government and non-profit organizations. The availability of multiple funding sources has allowed Mercer County to leverage its taxpayer money.

In the early days of our program, the Green Acres program provided grants and loans to Mercer County for assistance in preserving several significant County properties. The funding structure was typically a 25% grant and a 75% low interest loan. Projects funded under this program include 1,100 acres on Baldpate Mountain, the 243-acre equestrian facility and Curlis Lake Woods, the 812-acre AT&T (Pole Farm) property and land along the Crosswicks Creek in Hamilton Township, among the most well-known. Since the Garden State Preservation Trust was established in 1998 and new State funding was established in 2009, the County has received $12,725,000 in Green Acres planning incentive grants. These grants are based on 50% of the Certified Fair Market Value for each property acquired and have helped to keep the County acquisition program active. Many other projects that have already been preserved by the County are eligible for Green Acres grants and Green Acres reimbursement is expected in the future.

The County open space program and County Agricultural Development Board work together to ensure that the goals of each program are accomplished where possible. For example, when preserving farms with a stream on the property boundary which is part of a priority Greenway, the County seeks to preserve an area along the stream corridor for public access while preserving irrigation rights for the farmer. This cooperative effort illustrates the value in having all



of the County's land preservation efforts directed by one office with access to Trust Fund dollars. In these projects and others, State Green Acres funds and SADC funds have been leveraged with County funds.

Since its inception in 1997, the County Non-profit and Municipal Assistance Program has awarded over 140 grants to municipalities and non-profit land conservancies resulting in the preservation of 5,997 acres of locally important open space. Non-profits leverage these grants, and through their outreach and landowner relations they have been extremely successful in securing bargain sales and private individual and business donations. These funds raised by the non-profits, along with Green Acres grants, and County grants have been the formula for the success of this program.

The County has also partnered on large regional acquisitions such as the historic Tusculum property, lands that expand The Watershed Institute (formerly Stony Brook Millstone Watershed Association) preserve, State purchases next to Baldpate Mountain and the State Assunpink Wildlife Management Area, land adjacent to Hamilton's Veterans Park and property in the Hopewell Borough Greenbelt. Preserving large costly projects cooperatively with numerous partners and programs has provided the opportunity to leverage multiple funding sources and greater flexibility, leading to great success.

The continued availability of a stable source of State funding is critical to the County open space program, as well as programs throughout the entire State. Future voter support for local and county open space initiatives is also essential.

The County continues its cooperation and partnerships with non-profit organizations, not just as it relates to funding, but to share all resources including professional staff knowledge and experience as well as volunteer groups and efforts. With the current state of the economy due to COVID-19 and the demonstrated importance of nearby open space and public recreation during the pandemic, it is vital that all these funding sources and efforts continue to be available.

In May 2021, President Biden announced a goal of conserving 30% of U.S. lands and waters by 2030. This goal relies on "locally led and voluntary" efforts and is part of the administration's overall objective of tackling the climate crisis. Fortunately, Mercer County has had a 30-year head-start on this "30 by 30" goal. As the County's population grew, our residents recognized the need for land preservation and the County has been hard at work to achieve substantial land preservation objectives since 1990, while enjoying the many benefits associated with land preservation. Although the President's goal is important and worthwhile, it will be challenging to achieve in Mercer County. To accomplish this goal it would require the preservation of an additional 4,397 acres by 2030, which is ambitious but possible as we continue to work cooperatively with our partners and leverage available funds. The President's goal is for the nation as a whole; some areas of the country will exceed 30% while others preserve much less. Nevertheless, Mercer County, along with our land preservation partners, will continue our efforts to preserve land for its environmental qualities, for use by people, and for its public health and economic benefits.



South Riverwalk Park



SECTION 2

HOME AND PROPERTY VALUES

2.1. Introduction

This section seeks to quantify the impact of nearby protected open space on home values in Mercer County regarding the proximity of the protected open space, the size of protected open space, and the attributes in which the home and protected open space are located. The analysis estimates the percent premium and dollar premium on house price from proximity to protected open space, and the increase in property tax revenues for counties, municipalities, and school districts due to increase of home value.

Homes in Mercer County capture a measurable increase in value as a result of protected open space. Three primary variables impact the amount of value added are:

- Proximity to nearest protected open space;
- Size of the nearest protected open space;
- Whether total area of all protected open space within quarter mile and half mile is greater than 50 acres.

2.2. 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). The analysis used more than 39,600 arms-length transactions of single-family homes in Mercer 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 to protected open space from the effect of other variables that influence home value.

The analysis included more than 1,830 protected open space parcels including state parks, county parks, municipal parks, nonprofit lands, preserved farms, conservation easement and deed restriction open space.

2.3. Property Value Impact

As a home is closer to protected open space, part of its value can be directly attributed to its proximity to open space. Homes that are within a half-mile distance to protected open space receive a 2.72% increase in its total home value, which is $791 million in added home value. This value share increases when a home is even closer to protected open space. For those homes that are located within a quarter-mile of protected open space, the proximity of open space is responsible for a 3.02% increase of home value. For homes that are located between a ¼ to ½ mile distance from open space, protected open space is responsible for a 1.63% increase of home value.

In other words, if all of the protected open space in Mercer County were eliminated, the total assessed value of the housing stock would decrease by $791 million. For homes within a ½ mile of protected open space, this represents an average property value increase of almost $7,156 and nearly $7,857 for homes within a ¼ mile of protected open space.

By increasing the value of homes within a half-mile radius, protected open space also increases the amount of property taxes that the owners of these homes pay to county and municipal governments and to school districts. County-wide, these additional property tax revenues amount to $21.5 million dollars per year for homes within a half-mile of protected open space.

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 (like proximity to protected open space) by holding constant other relevant housing characteristics (like 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.

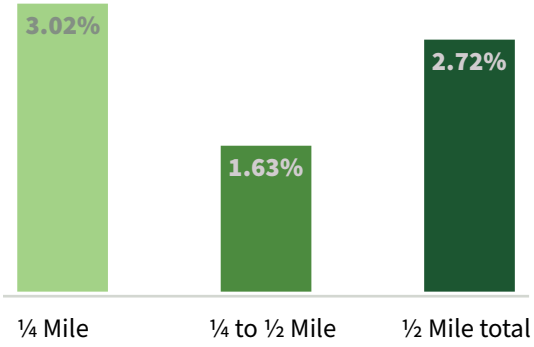


Figure 2.1:
Mercer County Open Space Impact

	¼ Mile Total	¼ Mile to ½ Mile Total	½ Mile Total
Number of Houses	87,776	22,726	110,502
Assessment Value	$22,836,957,020	$6,219,097,660	$29,056,054,680
Value of Open Space (Assessed Value)	$689,652,429	$101,074,506	$790,726,935
Value of Open Space	3.02%	1.63%	2.72%
Value/House (Assessed Value)	$7,857	$4,448	$7,156
Tax Value	$18,769,702	$2,693,473	$21,463,174
Tax/House	$214	$119	$194

Source: Econsult Solutions, Inc. (2021)

Figure 2.2:
Percent Premium from Proximity to Mercer County Open Space

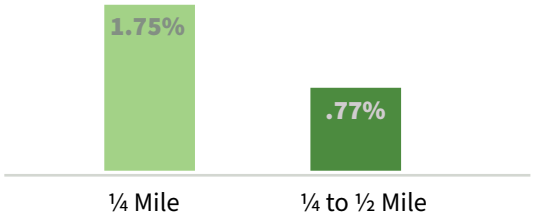


Source: Econsult Solutions, Inc. (2021)

Impact of Size of Open Space

The amount that nearby protected open space will add to a home's value is largely dependent on size of the open space. Figure 2.3 shows if the total acreage of open space within ¼ mile from a property is greater than 50 acres, the aggregate property value premium from all nearby open space on the property value is around 1.75%; if the total acreage of all nearby open space within ¼ mile to ½ mile distance band from a property is greater than 50, the property will receive an additional 0.77% value premium.

Figure 2.3:
Percent Premium in House Value for each 50 Acres of Open Space within ¼ and ½ Mile



Source: Econsult Solutions, Inc. (2021)

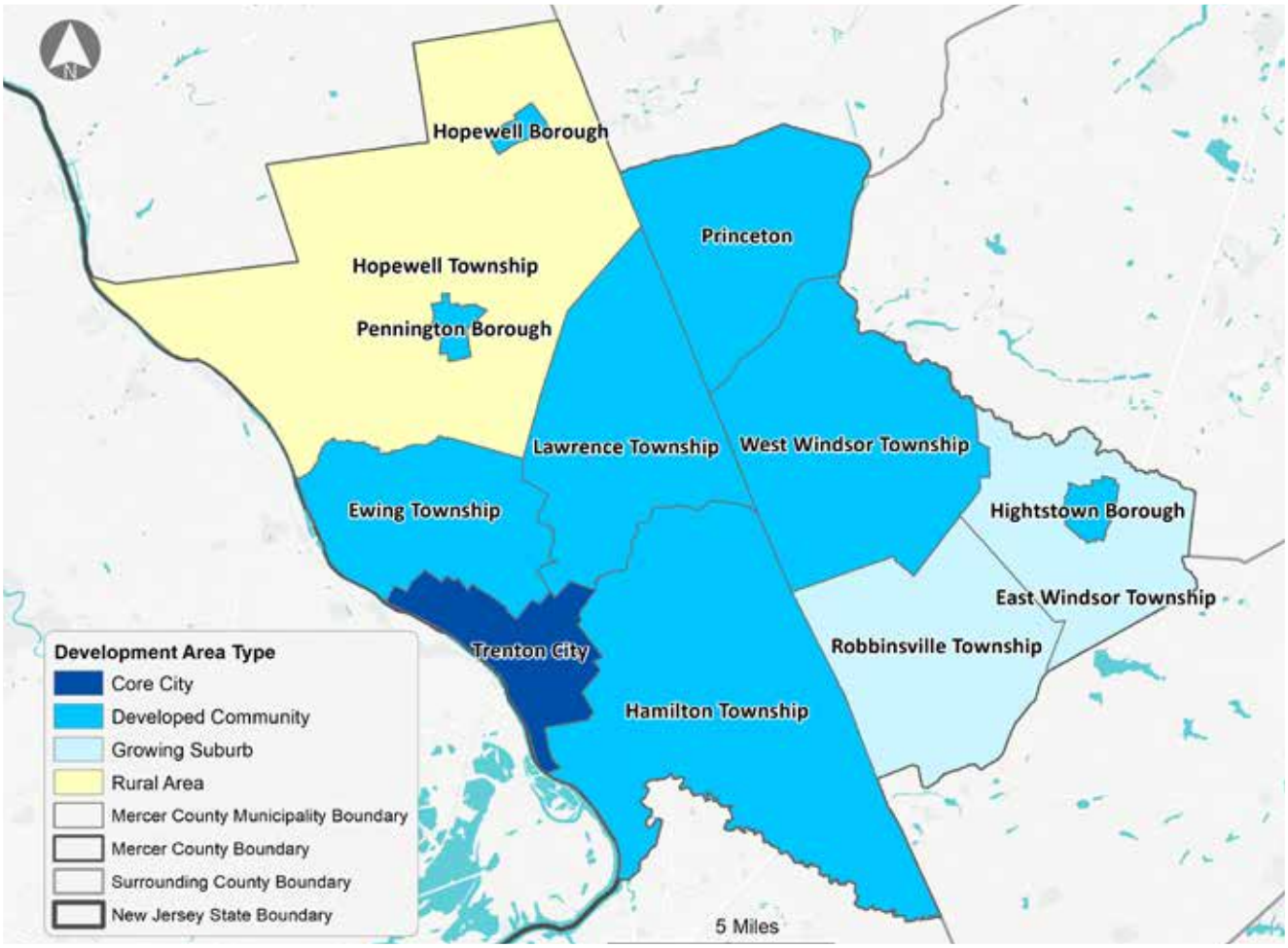


Impact by Different Development Patterns

The Delaware Valley Regional Planning Commission categorizes the region's municipalities as belonging to one of four planning areas: "Core City", which in Mercer County includes Trenton City; "Developed Community", which includes inner-ring and older suburbs such as Ewing Township, Hamilton Township, Lawrence Township, Hopewell Borough, Pennington Borough, Hightstown Borough, West Windsor Township and Princeton; "Growing Suburb", including outer-ring, younger suburbs such as East Windsor Township and Robbinsville Township; and, "Rural Area", which includes exurban, sparsely developed communities such as Hopewell Township. Figure 2.4 presents a geographic breakdown of these planning areas in Mercer County.

This section analyzed the additional housing value generated by protected open space within these four categories of development. The analysis reveals that a home's value is more impacted by proximity to protected open space in rural municipalities than in growing suburbs, developed communities or core cities (see Figure 2.5 and Figure 2.6). An average house in rural municipalities in Mercer County receive around 4.1% premium in house price from proximity to open space if it is within ¼ mile from open space, which equals to around $19,900 per house. Many people choose to live in

Figure 2.4:
Planning Areas in Mercer County

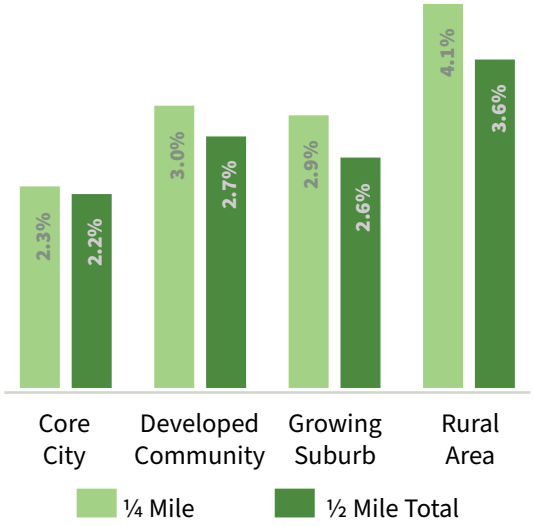


Source: DVRPC (2021); Econsult Solutions, Inc. (2021)



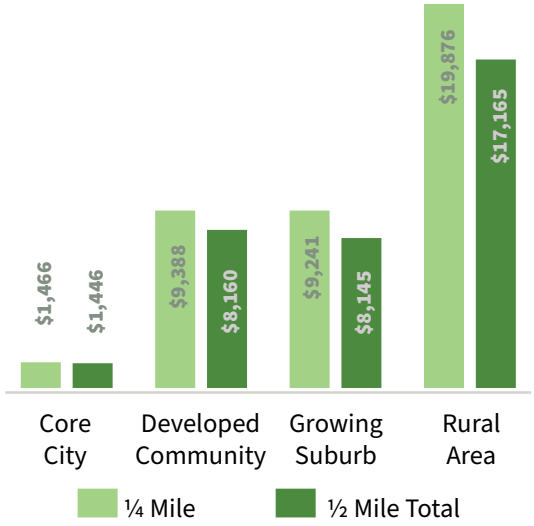
rural municipalities because of access to abundant open space and natural areas. This has become more evident since the COVID-19 pandemic started, when stay-at-home orders and social distancing made open space become an extremely desirable amenity for homes. Protected open space in rural areas is observed to have higher housing premium due to larger size and higher quality. The percentage premium on house price from protected open space in developed communities and growing suburbs is lower than that in rural area and is similar to the county average. The percentage premium on house price from protected open space in core city is lower comparing to that in the other planning areas.

Figure 2.5:
Percent Premium of Open Space by Planning Area



Source: Econsult Solutions, Inc. (2021)

Figure 2.6:
Premium of Open Space per House by Planning Area



Source: Econsult Solutions, Inc. (2021)



Mercer Meadows and the Lawrence Hopewell Trail



CASE STUDY

MERCER MEADOWS & THE LAWRENCE HOPEWELL TRAIL

LAWRENCE & HOPEWELL

Mercer Meadows is a County Park that consists of over 1,700 acres. The portion known as Rosedale Park has been part of the County Park system since the late 1960's. The remaining lands were acquired in the 1990's with funding made available by the County Open Space Trust Fund tax. The Park provides passive recreation and has a network of trails for hiking, bicycling and horseback riding. The landscape includes historic farm fields, grasslands, woodlands and wetlands. Interpretive areas within the Park highlight former historic uses of the property as the AT&T International Communications Array and as an early 20th Century farming community. The Park includes two small lakes, a dog park, picnic pavilions and a playground area. The main office of the Park Commission is housed within the Park at the Historic Hunt House. Mercer Meadows also includes the County equestrian facility.

The Park's main trail is a significant link within the Lawrence Hopewell Trail (LHT). The LHT's 22-plus mile trail winding through Hopewell and Lawrence Townships offers safe access to various sections of the towns for children, families, bicyclists, joggers, hikers and commuters. In addition to Mercer Meadows, the LHT connects to six other preserved parks and open spaces, as shown on the map, Figure 2.8.

Living in a community that has close proximity to a large trail system is a great benefit to residents. The LHT provides safe recreation for bicycling, walking, hiking and other trail uses such as skate boarding and, in some areas, horseback riding. The recreational activities provided by the trail promote public health and enjoyment and the trail connects people and places within the larger community. These benefits are reflected in the increased real estate values of properties in close proximity to the parks and open spaces containing the trail. An estimated 15.8% of the property value of homes within ½ mile from the parks and preserved lands containing the LHT is attributable to their proximity to the trail. Around 15.1% of property values of homes within ½ mile from Mercer Meadows itself is attributable to being close to the park. Mercer Meadows and the LHT have premiums higher than the overall county increase in value for land near preserved open space. The higher return on property values is attributable to the size and quality of the parks and amenities nearby. Proximity to a larger, quality open space further adds to property values.

Figure 2.7:
Property Value Impact of Mercer Meadows and Parks Along Lawrence Hopewell Trail

	Totals w/in ½ Mile of Mercer Meadows (only)	Totals w/in ½ Mile of Parks along Lawrence Hopewell Trail (incl. Mercer Meadows)
Number of Houses	839	4,810
Assessment Value	$396,161,600	$2,230,860,700
Value of Open Space (Assessed Value)	$59,958,387	$352,578,640
Value of Open Space	15.1%	15.8%
Value/Housing Unit (Market Value)	$71,464	$73,301
Tax Value	$1,622,118	$2,328,594
Tax/Housing Unit	$1,933	$484

Source: Econsult Solutions, Inc. (2021); Mercer County (2021)

Figure 2.8:
Map of Parks along Lawrence Hopewell Trail (Including Mercer Meadows)



Source: Lawrence Hopewell Trail (2021); Econsult Solutions, Inc. (2021); ArcMap (2021)

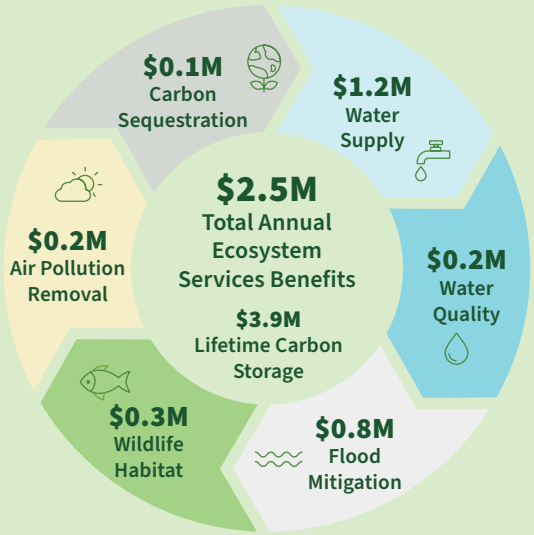
Environmental services benefits attributable to Mercer Meadows total over $2.5 million per year, which include cost savings related to water supply, water quality, flood mitigation, provision of wildlife habitat, air pollution control, and carbon sequestration (Figure 2.9). An estimated 560 tons of carbon are removed from the atmosphere annually from Mercer Meadows, which is estimated to be $100,000 in cost savings, and 22,880 tons of carbon is stored at Mercer Meadows, which is estimated to be $3.9 million in cost savings (Figure 2.11).

Environmental services benefits attributable to parks along the Lawrence Hopewell Trail total over $6.9 million per year, which include cost savings related to water supply, water quality, flood mitigation, provision of wildlife habitat, air pollution control, and carbon sequestration (Figure 2.13). An estimated 1,707 tons of carbon are removed from the atmosphere annually, which is estimated to be $300,000 in cost savings, and 69,978 tons of carbon is stored, which is estimated to be $11.9 million in cost savings (Figure 2.15).



MERCER MEADOWS

Figure 2.9:
Annual Environmental Benefits by Type for Mercer Meadows



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

Figure 2.10:
Annual Air Pollution Removal Benefits for Mercer Meadows

Pollutant	Pounds	Cost Savings ($)
O_3	27,955	$142,750
PM-10	1,150	$3,950
NO_2	2,610	$13,350
SO_2	1,355	$1,700
CO	440	$350
Total	**33,510**	**$162,100**

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

Figure 2.11:
Annual Carbon Sequestration and Lifetime Carbon Storage and Associated Benefits for Mercer Meadows

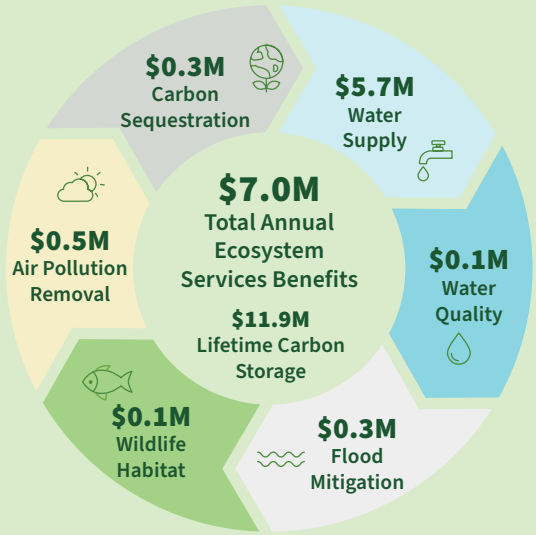
Carbon Storage
22,880 tons
$3.9M Cost Savings

Carbon Sequestration
560 tons
$0.1M Cost Savings

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

PARKS ALONG LAWRENCE HOPEWELL TRAIL

Figure 2.13:
Annual Environmental Benefits by Type for Parks along Lawrence Hopewell Trail



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

Figure 2.14:
Annual Air Pollution Removal Benefits for Parks along the Lawrence Hopewell Trail

Pollutant	Pounds	Cost Savings ($)
O_3	85,506	$436,604
PM-10	3,525	$12,016
NO_2	7,987	$40,784
SO_2	4,143	$5,179
CO	1,349	$998
Total	**102,510**	**$495,582**

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

Figure 2.15:
Annual Carbon Sequestration and Lifetime Carbon Storage and Associated Benefits for Parks along Lawrence Hopewell Trail

Carbon Storage
69,978 tons
$11.9M Cost Savings

Carbon Sequestration
1,707 tons
$0.3 Cost Savings

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



CASE STUDY

SOUTH RIVERWALK PARK TRENTON

South Riverwalk Park, an urban park located in south Trenton, was created by the New Jersey Department of Transportation and sits atop of the Route 129 Tunnel. It is a six-acre linear park and is adjacent to the Mercer County Minor League Baseball Stadium. NJDOT developed the park and gave it to the County.

Situated above Route 29 on the Delaware River, the Park provides an elevated view of the River. There is a paved brick path, benches, historic interpretation, and outdoor event space. The history of Trenton is interpreted by a linear timeline that starts at the southern end of the park and travels through time beginning with early native Americans, and continuing with European settlement, the American Revolution, the development of industry in Trenton and the modern 20th and 21st century. The Park hosts many annual community events. Its location next to the Baseball Stadium creates a destination for visitors to the City and provides outdoor recreation to residents and local office workers.

The Baseball Stadium and the park were created out of an effort to revitalize the area and restore access to the Delaware River waterfront. Route 129 was redesigned to include the cap park which provides the neighborhood with a view of the park instead of the highway and a connection to the River. The park is owned, operated, and maintained by Mercer County.

It is estimated that 3.8% of the property value of homes within ¼ mile of the park is attributable to the proximity to the park. That is slightly higher than the County average of 2.72% and significantly higher than the premium for homes in a core city which is 2.3%. Unfortunately, NJ Route 129 is within ½ mile from the park. This barrier prevents residents on the other side of the highway safe, walkable access to the park, and properties on the far side of the highway don't receive the property value benefit from the park. This case study is an example of the importance of investing in urban areas with safe, quality open space, accessible to urban and underserved populations.

It is also a clear example of the negative effects of the historic and inequitable practice of building highways through urban neighborhoods. These highways built through cities and urban areas disconnected communities from public amenities such as parkland and the riverfront. Safe access to parks is not just an urban issue, and the impediment does not have to be a high-speed highway. Often highways, and even busy local and county roads with no bike lanes, shoulders or sidewalks, prevent walkable and bike-able access to parks.

Figure 2.16:
Map of South Riverwalk Park



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

Figure 2.17:
Property Value Impact

	¼ Mile Total
Number of Houses	742
Assessment Value	$44,648,900
Value of Open Space (Assessed Value)	$1,713,829
Value of Open Space	3.8%
Value/Housing Unit (Market Value)	$2,309.74
Tax Value	$87,799
Tax/Housing Unit	$118

Source: Econsult Solutions, Inc. (2021); Mercer County (2021)



Howell Farm

SECTION 3

ECONOMIC ACTIVITY

3.1. Introduction

This section estimates both the annual economic and fiscal impacts associated with three types of economic impact, see figure 3.1. Economic impact is measured in terms of expenditures, employment, earnings, and tax revenues.

3.2. 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 an 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 an 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.

Figure 3.1:
The Three Types of Economic Impact Associated with Protected Open Space



Protected Farmland
Agricultural activities occurring on protected farmland.



Protected Open Space
Management and maintenance expenditures at public parks (state, county, and municipal).



Open Space Related Tourism
Expenditures associated with protected open space tourism.



3.3. 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. State and local economic impact, in the form of the sum of direct, indirect, and induced expenditures, and of the employment and earnings supported by that composition and scale of total expenditures, were estimated by utilizing an IMPLAN economic impact model developed by ESI.

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

1. Total sales by commodity type in Mercer County. This data was obtained from the 2017 Agricultural Census.
2. Total acres of protected farmland in Mercer County. County GIS data shows preserved farmland occupies approximately 8,000 acres, of which 7,200 acres were preserved by the County.
3. Proportion of agricultural commodities produced by revenue per acre in Mercer 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 is $7 million.

Figure 3.2

Direct Output	$5M
Indirect & Induced Output	$2M
Total Output	**$7M**

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

Annual Employment

Agricultural jobs associated with protected farmland is estimated to support 110 jobs directly and indirectly in the County. The total estimate comprises primarily direct employment related to agricultural activity on protected farmland, and a number of indirect and induced jobs related to agricultural activity on protected farmland.

Figure 3.3

Direct Employment	90
Indirect & Induced Employment	10
Total Employment	**110**

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

Annual Salaries

Salaries paid to workers in jobs related to the agricultural activity that take place on protected farmland total approximately $2 million per year.

Figure 3.4

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

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



Howell Farm

3.4. Economic Impact of Spending on Park Maintenance and Management

Public parks make up about 62 percent of the protected open space in Mercer County.[2] Economic activity on this land results from management and maintenance expenditures of state, county, and municipal budgets. Using calculated expenditures for state, county, and municipal parks, a combined expenditure number was derived that applied to all public park acres in Mercer County.

- **State Park Expenditures**: The average expenditures per acre were estimated using the state park budget from the FY2020 Governor's Detailed Budget. The state park budget is applied to the acreage associated with state-owned open space.
- **County Park Expenditures:** The Mercer County Park Commission budget was obtained from the 2020 Mercer County budget.
- **Municipal Park Expenditures:** For municipally managed parks, ESI obtained the parks and recreation budget for every municipality in Mercer County.

Annual Expenditures

Direct public expenditures on public parks—money spent for the management and maintenance of these spaces—account for an estimated $28 million. This economic activity, a government expense, supports an additional $27 million in indirect and induced expenditures, which results in a total economic impact of $55 million.

Figure 3.5

Direct Output	$28 M
Indirect & Induced Output	$27 M
Total Output	**$55M**

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

Annual Employment

The management and maintenance of parks directly and indirectly supports 460 jobs in Mercer 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 for indirect and induced employment associated with public parks, examples of which includes jobs selling and repairing equipment used for park maintenance, and jobs arising from private concessions run on public parkland.

Figure 3.6

Direct Employment	320
Indirect & Induced Employment	140
Total Employment	**460**

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

Annual Salaries

Earnings for workers with jobs related to the management and maintenance of local public parks make for an estimated $24 million per year.

Figure 3.7

Direct Salaries	$16M
Indirect & Induced Salaries	$8M
Total Salaries	**$24M**

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

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



3.5. Economic Impact of Spending from Parks Related Tourism Activity

To calculate the economic impacts of tourism spending attributable to protected open space in Mercer County, data from the 2019 Economic Impact of Travel and Tourism in New Jersey[3] was used. Traveler spending associated with recreation in Mercer 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. Not all spending with protected open space is for recreation only; for example, a tourist visiting a Mercer County Park may go to a restaurant nearby and a 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 as well, the direct, indirect, and induced economic impacts of protected open space were identified.

Annual Expenditures

Tourist activity associated with protected open space in the form of travel spending generates approximately $42 million in total economic impact.

Figure 3.8

Direct Output	$27M
Indirect & Induced Output	$15M
Total Output	**$42M**

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

Annual Employment

Open Space Related Tourism directly and indirectly supports 410 jobs in Mercer County. These jobs include employment directly related to tourism on protected open space, such as jobs in lodging, restaurants, and agritourism.

Figure 3.9

Direct Employment	320
Indirect & Induced Employment	90
Total Employment	**410**

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

Annual Salaries

Employees in the tourism industry earn approximately $14 million annually as a result of the tourist draw of local protected open spaces.

Figure 3.10

Direct Salaries	$9M
Indirect & Induced Salaries	$5M
Total Salaries	**$14M**

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

3 VisitNJ, "Economic Impact of Tourism in New Jersey," 2019, https://www.visitnj.org/sites/default/files/2019-nj-economic-impact.pdf.



Boathouse at Mercer Lake

3.6. Tax Revenues Generated by Protected Open Space

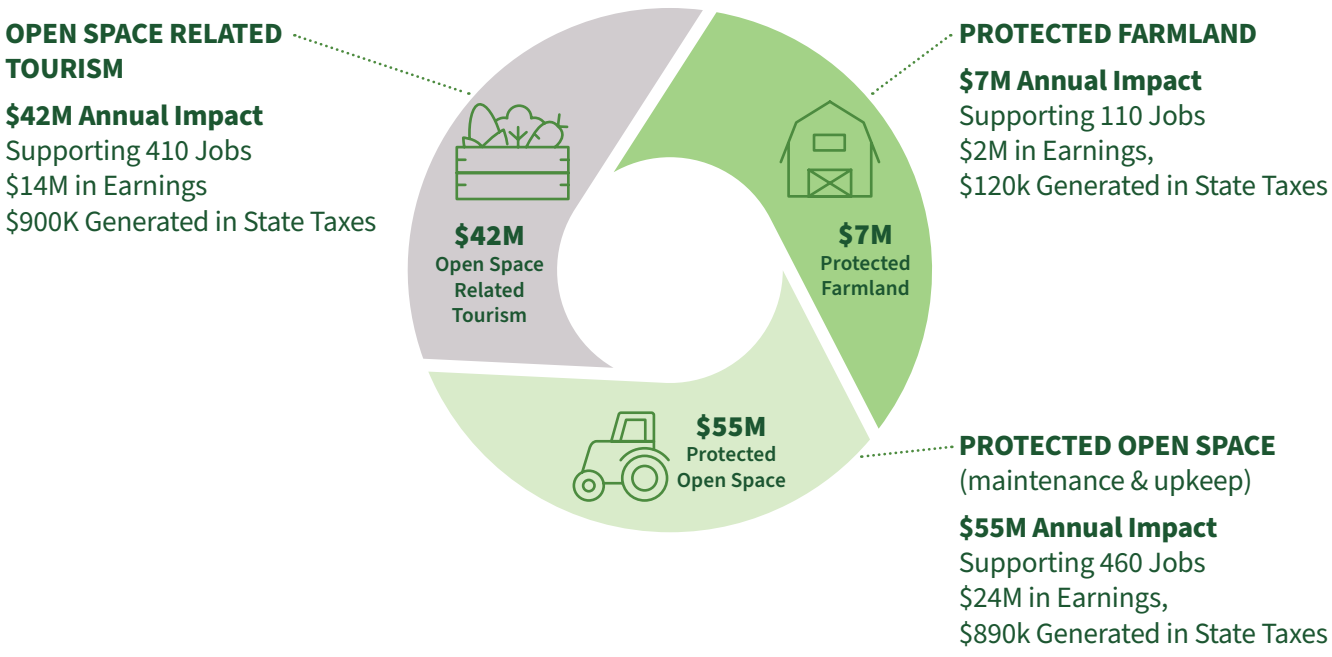
The economic activity discussed above generates tax revenues via income, sales, and business taxes. All economic activity associated with protected open space in Mercer County generates an estimated $1.9 million annually in state taxes.

Figure 3.11:
Estimated Annual Tax Revenue Impact Related to Protected Open Space to the State of New Jersey

Tax Type	Protected Farmland	Open Space Maintenance and Management	Open Space Related Tourism	Total
Income Tax	$0.03	$0.49	$0.28	$0.80
Sales Tax	$0.07	$0.32	$0.49	$0.89
Business Tax	$0.02	$0.08	$0.12	$0.22
Total State Tax Revenues	**$0.12**	**$0.89**	**$0.90**	**$1.91**

Source: IMPLAN (2020), NJ CAFR (2019), Econsult Solutions, Inc. (2021)

Figure 3.12
Total Annual Economic and State Tax Revenue Impact





CASE STUDY

FARMING DIVERSITY IN MERCER COUNTY

Although it may not be obvious from the urban and suburban nature of Mercer County, agriculture is a thriving industry, providing open landscapes, access to fresh food and other agricultural products.

In addition to preserved open space and parkland, there are also over 7,200 acres of farmland preserved over the past thirty years in Mercer County, principally through the purchase of agricultural easements. This farmland greatly contributes to the quality of life in the County by providing locally grown food and an agricultural economic job sector, among other benefits. Farms in Mercer County range from organic produce CSAs to field crops and wineries, horticultural producers that supply the nursery industry, equine operations that breed and train racehorses, livestock and poultry producers and fruit and vegetable producers that supply both local consumers and the regional restaurant industry. Local products can be found at the County's many farmers' markets. Agritourism, such as Pick Your Own operations and other on-farm experiences are a popular and growing industry.

Mercer County ranks 10th in the state in terms of the value of agricultural products sold by County, with almost $25 million dollars of agricultural products sold in 2017. In addition, the Census shows that Mercer ranked 8th statewide in the sale of grains, oil seeds and beans, 10th statewide for the sale of livestock, poultry and their products, and 10th in the state for the sale of vegetables, primarily sweetcorn and pumpkins.

Farms in Mercer County are family owned and operated and several have been in the same family for generations. Various types of farm operations exist in the county, from hobby farms on small plots with livestock, vegetables, or honey bees to grain farmers who may own a single farm, leasing multiple farm properties in order to achieve the scale necessary for successful grain farming. The United States Department of Agriculture's Census of Agriculture, most recently conducted in 2017, reports that Mercer's average and median farm size are 78 acres and 18 acres respectively, which is very similar to the average (74 acres) and median (16 acres) farm sizes in the state. Farmers in Mercer County take advantage of the population density in the County, growing and raising products to sell at local farm markets, individual farm stands, at restaurants in the County, and beyond.

Several very successful farm operations in the County have become regional destinations. Farms such as Terhune Orchards and Lee Turkey Farm attract visitors from within and outside the County to their seasonal farm events and programming, Pick Your Own operations and farm markets. Several wineries are located in the County including Working Dog Winery, Hopewell Valley Vineyards, and Terhune Orchards. In these respects, farm operations contribute to the County in ways far beyond their economic value, offering nearby agri-tainment venues, the benefit of locally grown products and beautiful scenery.

Howell Living History Farm and Capital City Farm are two farm operations in Mercer County in which the County plays a lead and supporting role, respectively.



Howell Living History Farm

Mercer County's Howell Living History Farm is a 130-acre farm that was donated to the county in 1974. Howell Farm is a living open-air museum that interprets farming life in the Pleasant Valley during the years 1890-1910. The farm features over 45 acres of period crops and gardens, numerous buildings listed on the NJ State and National Registers of Historic Places, and over two miles of lanes accessible on foot and by horse drawn wagon.

Open throughout the year for self-guided tours, school group visits and weekend family programs, the farm invites visitors to join in the work and fun of seasonal activities such as ice harvesting, maple sugaring, sheep shearing, pumpkin harvesting and dozens of hands-on activities related to actual operations. The farm is also home to New Jersey's longest-running corn maze, which challenges visitors to find their way through miles of green pathways with the help of game boards, clues, compasses, and advice from a Maze Master perched high in a tower.

Over and above its own spending on operating activities, Howell Living History Farm draws regional day trippers and out-of-town spending from attendees that may not occur without its presence. This spending is considered ancillary spending from attendees, as these attendees create demand in Mercer County for restaurants, retail establishments, and hotels. In 2019, it is estimated that there were over 55,000 visitors to Howell Living History Farm. It is estimated that these visitors generated approximately $1.8 million in ancillary spending from lodging, food, retail, and transportation in Mercer County. This generates a total economic impact of $2.7 million in Mercer County, supporting 30 jobs with $1 million in earnings (figure 3.12).

Figure 3.12:
Annual Estimated Economic Impact of Ancillary Spending from Attendees of Howell Living History Farm

	Mercer County
Direct Output ($M)	$1.8
Indirect and Induced Output ($M)	$1.0
Total Output ($M)	**$2.7**
Employment	**30**
Earnings ($M)	**$1.0**

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

Capital City Farm

The property on which Capital City Farm was established was purchased by Mercer County and deeded directly to the City of Trenton. The property was an old, unsightly abandoned industrial site. The City of Trenton worked with the D&R Greenway Land Trust to remediate the site and prepare it to be used for urban agriculture.

The property is over 2 acres, lying along an old freight line siding. The Trenton Area Soup Kitchen (TASK) and Escher Treatment Center are social service agencies that are adjacent to the Farm. The land was originally preserved to provide an urban farm to be owned and managed by a nonprofit. Over the last several years, the D&R Greenway took on the responsibility of realizing this goal and has established and managed the farm. The Farm, which provides produce to the community and TASK, has beautified the neighborhood by eliminating an eyesore and has created a community space. The County has recently entered into a long-term agreement with the City of Trenton to manage the farm, and the D&R Greenway has transferred their role to a local nonprofit. The nonprofit and the County aim to further engage the community, promote employment and career training opportunities, provide fresh produce to a food insecure population and connect the community to each other and the land. There are also potential links to the Trenton Assunpink Greenway that will further connect the land for public use and recreation.



Capital City Farm



SECTION 4

ENVIRONMENTAL SERVICES IMPACT

4.1. Introduction

Protected open space in Mercer County provides visible environmental benefits for the communities they serve.

This section draws upon established research to evaluate the economic benefits in monetary terms of several types of ecosystem services provided by the County's open space network. These ecosystem services include:

- **Air Pollution Removal**
- **Water Supply Protection**
- **Water Quality Improvement**
- **Flood Mitigation**
- **Wildlife Habitat Conservation**
- **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 would incur additional costs to recoup their value.

4.2. Methodology

ESI calculated the land cover variation for the protected open space in Mercer County and applied the values associated with each of the ecosystem services to produce 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 in Mercer County.

First, acreage of ecosystems within the protected open space was determined using the land cover imagery from the Multi-Resolution Land Characteristics (MRLC) 2016 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 Constanza study, and applied to protected open space in Mercer County.[4]

The i-Tree Vue 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 Mercer 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 Vue model has the advantage of allowing for the adjustment of the per-acre pollution removal values.[5]

4 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.
5 i-Tree, USDA Forest Service, https://www.itreetools.org/.



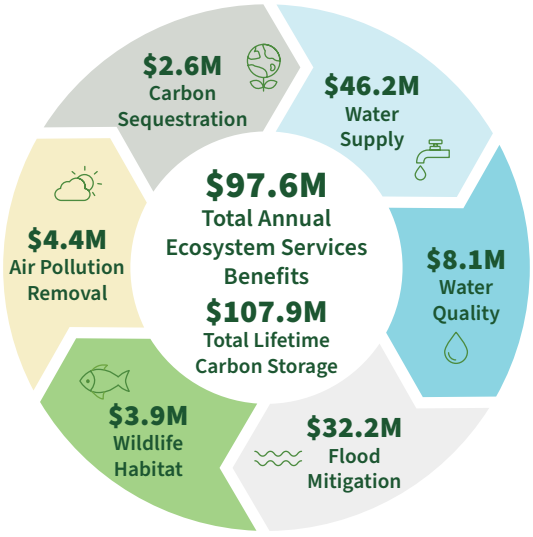
4.3. Ecosystem Services Impact

The 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 noted 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 37,600 acres of protected open space generate significant economic benefits, including the nearly 16,280 acres of tree cover to the County.

In sum, the ecosystem services and environmental benefits are $97.6 million in annual benefits from a variety of sources (see Figure 4.1) and $107.9 million in the lifetime cost savings of carbon storage from tree coverage.

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



Source: Costanza (2006), Multi-Resolution Land Characteristics Land Cover (2016), Mercer 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 on Mercer County.

Water Supply

The soil of undeveloped land stores water and replenishes streams, reservoirs, and aquifers. This natural system provides the continuous recharge of groundwater and streams. Forests and wetlands are particularly productive land covers for water provision. The larger the 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. Protected open space in Mercer County generates $46.2 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. This riparian buffer filters and stops several types of waste, including pathogens, excess nutrients, metals, and sediments, from entering the water supply. Without the riparian buffer, residents would be forced to pay for alternative groundwater filtration or water treatment methods. In sum, this generates approximately $8.1 million annually in water quality benefits from the ability to naturally maintain water quality in Mercer 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 flood 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, such as constructing dams or reservoirs. In sum, protected open space in



Mercer County generates approximately $32.2 million annually from natural flood mitigation services.

Wildlife Habitat

Protected open space serves as habitats for a diverse array of plants and animals. Intact forests and wetlands harbor species that people value for both aesthetic and functional 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—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.[6] In sum, the wildlife habitats located within Mercer County's protected open space has an estimated annual value of $3.9 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 also can 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.

Protected open space in Mercer County provides approximately 16,280 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 Mercer County annually provide $4.5 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.

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

Pollutant	Pounds	Cost Savings ($)
O_3	773,289	$3.95
PM-10	31,876	$0.11
NO_2	72,235	$0.37
SO_2	37,470	$0.05
CO	12,199	$0.01
Total	**927,068**	**$4.48**

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

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 that would require a significant cost to mitigate, such as damages to agricultural productivity, human health, and property damages. 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.

The social cost of carbon—the value of carbon sequestration and storage—is $171 per ton.[7] Using this social cost of carbon, it is estimated that trees within the protected open space in Mercer County store 632,859 tons of carbon, equating to $107.9 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 $107.9 million to mitigate.

6 Ibid.
7 Ibid.



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, representing savings for communities across the County. Every year, new growth on the trees within the protected open space sequesters an additional $2.6 million in carbon.

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

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

Carbon Storage 632,859 tons x $171/ton	$107.9M Cost Savings
Carbon Sequestration 15,438 tons x $171/ton	$2.6M Cost Savings

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

4.4. 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 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 habitats, 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.

Delaware Valley Regional Planning Commission commissioned Stroud Water Research Center to examine the potential water quantity and quality benefits of open space preservation in Mercer County.

Methodology

Potential water quantity and quality benefits of protected open space in Mercer County was assessed using two different models under two different land-use scenarios. The two models used were:

- the Site Storm Model (SSM), implemented in Python (programing language);[8]
- the Watershed Multi-Year Model (WMYM), implemented within the Model My Watershed® web application[9].

Both models provide estimates of infiltration, runoff, and evapotranspiration and nitrogen, phosphorus, and sediment loads derived from landscapes as precipitation moves through a watershed. However, the SSM estimates these loads from a single 24-hr storm event defined by the user (in this case a 3.2-inch rain event; approximately a 2-year return interval storm) and the WMYM predicts average annual loadings derived from daily precipitation and temperature data from 1960-1990 that is automatically utilized in the modeling routine.

8 WikiWatershed Site Storm Model, https://github.com/WikiWatershed/tr-55.
9 Model My Watershed, https://modelmywatershed.org/.

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 in addition to the above:

- 2016 NLCD conditions with both urban and agricultural best management practices (BMPs) applied on preserved lands (“2016 Land Use with BMP’s”).

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 with the boundaries of the preserved open spaces in Mercer 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” (subcategories are 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 get new land use areas without preservation.

Stormwater Runoff and Pollution Mitigation

Protected open space generates much less stormwater volume than unprotected lands and allows much less rainfall to reach streams as stormwater runoff, which helps to mitigate erosion and flooding. On average, parcels of 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 to become stormwater runoff. The vegetative cover also has few sources of pollutants, resulting in relatively small volumes of pollutant loads being carried to streams by 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 unprotected lands.

Storm 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 N, P, and sediment than would be generated from these lands if they were unprotected from development. The modeling effort for watersheds in Mercer 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.



Figure 4.4:
Avoided Increase in Annual Pollutant Loadings Due to Protected Open Space in Mercer 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	69,162	1.78
Total Phosphorus	22,822	0.59
Sediment	64,690,359	1,662

Source: Stroud Water Resource Center (2021)

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 1.62 billion gallons per year. This is an increase in runoff of 8.5%.

If Mercer-County-protected open space within the watershed were developed to the extent and density typical of nearby unprotected (developed) lands, each 2-year storm would generate an additional 255 million gallons of stormwater runoff, an increase of 5%. This represents the volume of water not absorbed by transpiration, evaporation or groundwater recharge and instead running off the property and contributing to erosion and flooding.

Figure 4.5:
Avoided Increase in Stormwater Runoff due to Protected Open Space in Mercer County

Storm Level Runoff	Total Avoided Stormwater Volume	Percent Increase in Stormwater Volume: Protected Open Space vs. Unprotected Lands
Average Annual	1.62B gal./yr	8.5%
2-Year Storm Event (3.2"/24 hrs)	255M gal./event	5%

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 2-year storm events, as well as annual cost for removal of stormwater pollutant loadings were developed based on existing research publications. The results concluded that protected open space avoids $66.8 million of capital cost for stormwater infrastructure construction, plus an additional annual investment of $8.9 million to operate and maintain this additional infrastructure, and an additional annual investment of $102.1 million needed to remove annual pollutant loadings. Thus, protected open space, on average, avoids $2,623 per acre of stormwater infrastructure construction costs, $156 per acre per year of annual operations and maintenance costs, and $1,167 per acre per year of annual pollutant load reduction costs, the latter two costs often being the responsibility of the municipality.



Figure 4.6:
Avoided Costs of Removal of Annual Stormwater Pollution Loads due to Protected Open Space in Mercer 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	69,162	$314,400	$8
Total Phosphorus	22,822	$7.6M	$196
Sediment	64.7M	$94.1M	$2,419
Totals		**$102.1M**	**$2,623**

Source: Stroud Water Resource Center (2021); Econsult Solutions, Inc. (2021)

Figure 4.7:
Avoided Costs of Construction and Annual O&M to Manage 2-Year Storm Runoff Due to Protected Open Space in Mercer 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/gal .runoff	$0.03/gal. runoff
$66.8M total capital cost	$8.9M/yr. O&M cost
$1,167/ ac. of protected open space	$156 per year per care of protected open space

Source: Econsult Solutions, Inc. (2021)

CASE STUDY

JOHN A. ROEBLING MEMORIAL PARK AND THE ABBOTT MARSHLANDS

HAMILTON

Mercer County's John A. Roebling Memorial Park was first established when the land was donated to the County in the early 1960's. Over the last three decades the County Open Space Preservation tax was used to expand the park to 464 acres and build the Tulpehaking Nature Center. Roebling Park is within the Abbott Marshlands. The Abbott Marshlands, formerly referred to as the Hamilton-Trenton-Bordentown Marsh, was named and branded in 2009 when the County prepared an Interpretive Plan that promotes the public resources of the Marsh and the Abbott Farm National Historical Landmark. The Landmark, established in 1976, recognizes the work of Charles C. Abbott, an amateur archaeologist and naturalist whose discoveries sparked an international debate and forty-year controversy concerning the antiquity of man in the New World. The Abbott Marshlands contains the farthest freshwater tidal wetland along the Delaware River. The diverse habitats found in the Marshlands—freshwater tidal and non-tidal marshes and swamps, ponds, and woodlands – are home to many kinds of plants and animals. The Abbott Marshlands boast a long and rich human history. As shown by archaeological studies, Native Americans began to inhabit the area 13,000 years ago. The Abbott Marshland was settled by Europeans in the 1670's and tells many stories of early American history. The Landmark includes several historic homes that are still standing today such as the Watson House (1708), the oldest house in Mercer County and located in Roebling Park, the Isaac Pearson House (1773), and the Abbott-DeCou Mansion (1797).

Roebling Park offers passive recreation within this diverse cultural and natural habitat. It is home to the Mercer County Tulpehaking Nature Center (TNC) which provides educational programming for families and for people of all ages. The County works closely with the Friends for the Abbott Marshlands, a nonprofit which partners on programs and resources pertaining to preserving and protecting the Marsh.

Figure 4.8: Map of Roebling Memorial Park and Abbott Marshlands



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

A very aggressive restoration effort by the County to eradicate over 40 acres of invasive Phragmites has been ongoing for two years and has shown some great outcomes. The removal has provided new views of the Marsh and emerging native plants have begun to return. This undertaking is funded with Open Space Preservation Trust Fund stewardship dollars.

The Abbott Marshlands preserves significant freshwater tidal wetlands and uplands. According to the National Park Service, "Wetlands provide many important services to the environment and to the public. They offer critical habitat for fish, waterfowl and other wildlife, they purify polluted waters, and they help check the destructive power of floods and storms. They also



provide a wide variety of recreational opportunities such as fishing, photography, and wildlife observation."

Understanding the importance of wetlands to both plants and animals, including humans, many concerned academics and citizens have encouraged the use of public resources to protect this unique landscape. The intentional effort to protect and enhance the natural and cultural resources of the Abbott Marshlands through good stewardship and public investment has been ongoing since the first Marshlands Stewardship Plan in 1999. The investment in the Abbott Marshlands is not just beneficial environmentally, it be can also be measured in real estate values. Since the construction of the TNC in 2014, real estate values within ½ mile of the Abbott Marshlands have increased. Prior to 2014 the property value impacts associated with the preserved open space was 1.4%; following the County's investment in TNC real estate values within ½ mile have increased to 4%. This 4% impact on property value is higher that the County average of 2.72%.

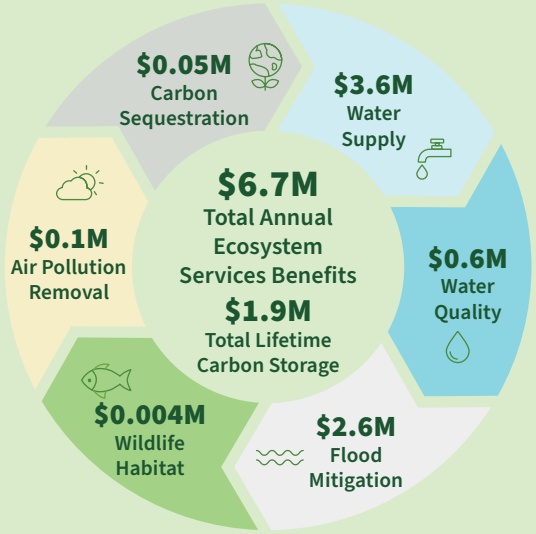
Environmental services benefits attributable to Roebling Memorial Park total over $6.7 million per year, which include cost savings related to water supply, water quality, flood mitigation, provision of wildlife habitat, air pollution control, and carbon sequestration (Figure 7.12). An estimated 270 tons of carbon are removed from the atmosphere annually from Roebling Memorial Park, which is estimated to be $50,000 in cost savings, and 11,085 tons of carbon is stored, which is estimated to be $1.9 million in cost savings (Figure 7.13). This case study highlights the benefits beyond increased property values that can be obtained by investing in safe quality open space through layered efforts—protecting the environment, providing recreational and educational opportunities, and securing historic sites.

Figure 4.9:
Property Value Impact

	Total Pre 2014	Total Post 2014
Number of Houses within ½ Mile	6,321	6,321
Assessment Value	$946,828,700	$946,828,700
Value of Open Space (Assessed Value)	$12,846,406	$37,838,377
Value of Open Space	1.4%	4.0%
Value/Housing Unit (Market Value)	$2,032	$5,986
Tax Value	$283,740	$948,792
Tax/Housing Unit	$45	$150

Source: Econsult Solutions, Inc. (2021); Mercer County (2021)

Figure 4.10:
Annual Environmental Benefits by Type



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

Figure 4.11:
Potential Annual Air Pollution Removal Benefits

Pollutant	Pounds	Cost Savings ($)
O_3	85,506	$69,150
PM-10	3,525	$1,900
NO_2	7,987	$6,450
SO_2	4,143	$800
CO	1,349	$150
Total	**102,510**	**$78,450**

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

Figure 4.12:
Potential Amounts of Annual Carbon Sequestration and Lifetime Carbon Storage and Associated Benefits



Carbon Storage
11,085 tons — $1.9M Cost Savings

Carbon Sequestration
270 tons — $0.05M Cost Savings

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



Hamilton Veterans Park Trail



SECTION 5

DIRECT USE BENEFITS

5.1. Introduction

Protected open space in Mercer County provides a multitude of free and low-cost recreational activities to residents. Many of these activities consist of strenuous or moderate exercise, which contributes to physical well-being and defrays health-care costs. 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 (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 health-care costs as a result of users' participation in strenuous and moderate exercise.

Recreational Benefits

Healthcare Cost Savings

5.2. Methodology

Recreational Benefit

The value of recreational protected open space in Mercer County is estimated by using a willingness to pay method. This estimation seeks to quantify the amount an average consumer would be willing to pay for a service (using protected open space in Mercer County for recreation) if the service were not publicly available.

The analysis uses survey data from NJ Wildlife Management Area User Survey[10] in 2018, which asked residents about the frequency in which they participated in various outdoor activities. According to the survey, it its estimated that the average annual frequency of people who participate in outdoor activities is around 28 times on average. To determine the number of households who participate in outdoor activities, we used a national average of 50.7%—meaning that 50.7% of all households participates in outdoor recreation based on the Outdoor Industry Association's study[11] in 2020.The average frequency of 28 and the percentage of 50.7% of total households participating in outdoor activates are then applied to the number of households in Mercer County to determine the total number of times residents participate in outdoor activities on protected open space. This estimate is then multiplied against a monetary amount people reported being willing to pay for different activities, producing an estimate for the economic value of protected open space in Mercer County.

It is important to note that the total values presented in this section estimate the value that residents derive from recreational activity on Mercer County's public parks. If all of these spaces were to be developed, it is likely that residents would go elsewhere to recreate and thereby replace some of the value they currently derive from recreational activity on 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.

10 Catherine A. Tredick, Daniel Moscovici, NJ Wildlife Management Area User Survey Final Report, 2018
11 Outdoor Foundation, Outdoor Industry Association (OIA), 2020 Outdoor Participation Report, 2020



Health Benefit

Recent research has established the link between physical inactivity and demand for health care 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 on Mercer County's protected open spaces.

First, the number of working age adults in Mercer County was determined using the U.S. Census Bureau's American Community Survey 2015-2020 5-Year Estimates. This number was then adjusted proportionally using Outdoor Industry Association's [12]estimates showing the number of working age people in Mercer County who actively exercise at parks or trails in the county. 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 five categories of cost savings:

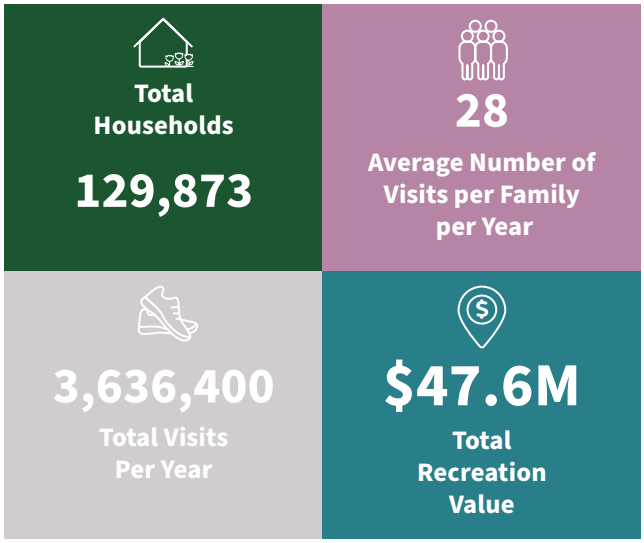
- Direct medical savings: Costs saved on the treatment of illness or medical conditions caused or exacerbated by physical inactivity;
- Indirect medical savings: Costs saved on adverse health conditions and poor quality of life resulting from physical inactivity;
- Direct workers' compensation savings: 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 (employees not coming to work because they are sick) and presenteeism (employees coming to work sick or tired, making them less productive).

5.3. Economic Value of Recreational Activity

Around $47.6 million in benefits accrue annually to residents who participate in recreational activities on protected open space in Mercer County. This value represents the additional amount of money that the residents would be willing to spend in the private market to participate in the recreational activities they currently enjoy on protected open space.

The $47.6 million annual value of recreational activity on protected open space is the equivalent of $366 per household, per year. This value represents how much the average household would be willing to pay in the private market to participate in the recreational activities its members now enjoy on protected open space.

Figure 5.1:
Recreational Benefits from Mercer County Open Space



Sources: Econsult Solutions (2021), ACS 2019 1-Year Estimates, Graefe et al. (2009), US Army Corps of Engineers (2021), Loomis (2005)

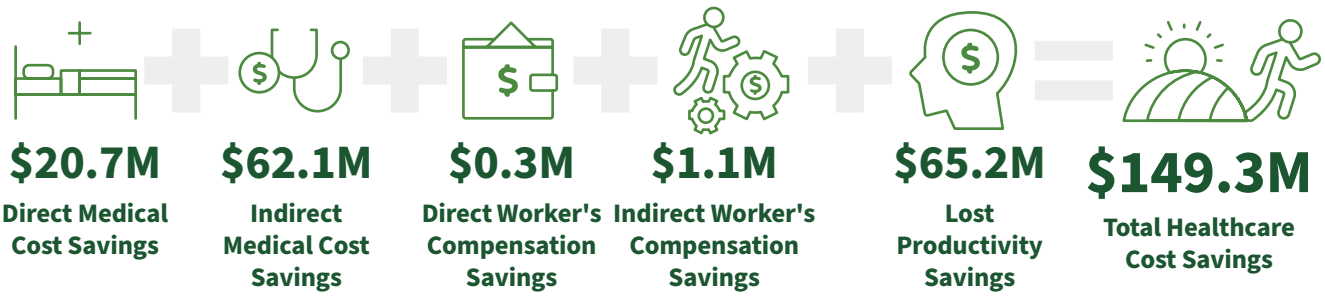
12 Outdoor Foundation, Outdoor Industry Association (OIA), 2020 Outdoor Participation Report, 2017 and 2020

5.4. Healthcare Cost Savings

Research has shown that physically active people typically enjoy a variety of health benefits, including lower incidence of cardiovascular diseases, diabetes, depression, certain cancers, and obesity. This section estimates the health-related cost savings that result from the physical activity that residents engage in on Mercer County's protected open space. In total, this physical activity results in avoided costs totaling $149.3 million per year. 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 Outdoor Industry Association's study, it is estimated that 21.8% of the U.S. population is defined as "outdoor enthusiasts" who participate in outdoor activities at least twice per week. The 2014 Outdoor Recreation Survey indicates that, on average, 41% of moderate or strenuous physical activity in Mercer County is performed in a park or on a trail. According to the 2015- 2020 US Census five-year American Community Survey, the total number of residents in Mercer County who are of working age (20 to 65 years old), is 298,886. These statistics were used as the basis for estimating the medical costs, workers' compensation costs, and lost productivity costs that are avoided as a result of all physical activity in Mercer County.

Figure 5.2:
Health Cost Savings from Mercer County Open Space



Source: Outdoor Industry Association (2020); Outdoor Recreation Survey (2014); American Community Survey (2020); Graefe et al. (2009), Carlson et al. (2014), Chenoweth & Bortz (2005); Econsult Solutions (2021).



CASE STUDY

HAMILTON VETERANS PARK
HAMILTON

Hamilton Veterans Park, a well-known active and passive recreational municipal park, is 333 acres and was built in 1977 to honor Hamilton's military veterans. The Park has four main entrances and is surrounded by suburban homes and townhouse communities, many of which have direct access to the park. The Park contains paved paths for walking, jogging and biking, as well as skating and rollerblading. In addition to paved paths, there are many natural trails and boardwalks through woodlands and wetlands. The Park has a great variety of active recreational facilities that include ball fields, tennis courts, a skate park, a roller hockey rink, an extensive playground area, a dog park, lawn bowling and court games. Picnic pavilions, grills and gazebos provide for group gatherings. The Park is often used for large regional events, fairs, fireworks and concerts. Veteran memorials are situated at the Klockner Road entrance and the Yardville Hamilton Square Road entrance.

The John Abbott II House circa 1730 and the Civil War and Native American Museum are great historical attractions at Veterans Park. For its residents, Hamilton Veterans Park functions as a typical municipal park, located in a suburban area with connections to the immediate neighbors. It also functions as a regional facility. It is estimated that 9.5% of the property values for homes within ½ mile of the park is attributable to the proximity of the park. This is considerably higher than the County average benefit of 2.72%. The Park is surrounded by a mix of varied residential units, including apartment rentals, townhomes, condos, single family and age restricted adult communities. Robert Wood Johnson University Hospital Hamilton and Steinert High School are also within a ½ mile from the park.* The access to the park is excellent for the immediately adjacent residents, but the park is surrounded by four busy, high traffic local roads so access is not as safe for other neighborhoods close to the park. Route 195 is also within ½ mile from the park. Veterans Park and the neighbors who live close by, but not adjacent to the Park, would benefit from traffic calming at intersections, wide shoulders with bike lanes and sidewalks, all of which would provide improved access. Some of these improvements have been developed, but critical connections are still needed.

The senior population has also increased in this part of Hamilton Township with the development of four adult communities facing the park on the opposite side of the local roads. Proximity to the park is attractive to this kind of development. Providing improved access and services to these communities can be very beneficial to the health and wellbeing of the aging population, as well as the population at large.

Figure 5.3:
Map of Hamilton Veterans Park



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

* Note: In order to isolate the impact of the park on house values, the analysis sampled housing transactions that are only within ½ mile radius from the park but not within ½ mile from Robert Wood Johnson University Hospital Hamilton.



Figure 5.4:
Property Value Impact

	½ Mile Total
Number of Houses	4,139
Assessment Value	$891,913,480
Value of Open Space (Assessed Value)	$84,893,240
Value of Open Space	9.5%
Value/Housing Unit (Market Value)	$20,511
Tax Value	$2,322,679
Tax/Housing Unit	$561

Source: Econsult Solutions, Inc. (2021); Mercer County (2021)

Figure 5.5:
Total Population and Older Adult Population in Census Tracts within 1/2 Mile from Hamilton Veterans Park

Year	Total Population	Age 55+	Age 55+ %
2010	28,356	9,398	33%
2015	27,557	10,656	39%
2019	27,388	11,184	41%

Source: Econsult Solutions, Inc. (2021); American Community Survey 5Yr Estimates (2010,2015,2019)



Hamilton Veterans Park



CASE STUDY

DELAWARE & RARITAN CANAL TOW PATH THROUGHOUT MERCER COUNTY

The Delaware and Raritan (D&R) Canal State Park towpath is a State of New Jersey recreational trail along the Delaware & Raritan Canal. The 77-mile statewide trail is made up of three segments which transverse three counties. In Mercer County, the feeder canal towpath runs along the Delaware River from Trenton to Hopewell. A three-mile section can also be accessed in Hamilton Township at locks 1 and 2 from the Crosswicks Creek. The towpath also runs north from Trenton to New Brunswick. The towpath is located in six of the County's municipalities, Hopewell Township, Ewing Township, Trenton, Lawrence Township, Princeton and Hamilton Township.

The D&R Canal has historic significance. It was built in the 1830's to connect to the Delaware River as an efficient and reliable means for transportation of freight between Philadelphia and New York City. Today it provides a regional trail for a large segment of Mercer County residents. The trail is used for walking and bicycling. Mercer residents can travel as far north as Frenchtown along the feeder canal and to New Brunswick along the main canal towpath.

The towpath is a great example of all four benefits analyzed in this report. The length of the towpath provides County residents the opportunity to bike or walk long distances. Walking and bicycling are physical activities with a low barrier to entry, with direct use benefits such as physical well-being, resulting in lower health care costs in indirect and direct medical cost savings. These recreational benefits have economic value by offering cost free physical activity to users in place of costly gym memberships. Other economic benefits provided by the path are the contributions to tourism spending, employment and tax generation. Visitors using the path often spend several hours or a whole day traveling along the path from one community to another. This encourages tourism spending in local restaurants, convenience stores, and sporting goods stores. The path also contributes to increased real estate values. Properties within ½ mile from the Canal State Park in Mercer County

Figure 6.1:
Map of D&R State Canal Tow Path



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

show a premium of 8.9%. As with all preserved open space there are environmental benefits.

Environmental services benefits attributable to the D&R Canal Tow Path total over $3.0 million per year, which include cost savings related to water supply, water quality, flood mitigation, provision of wildlife habitat, air pollution control, and carbon sequestration. An estimated 427 tons of carbon are removed from the atmosphere annually from Roebling D&R Canal Tow Path, which is estimated to be $70,000 in cost savings, and 17,506 tons of carbon is stored, which is estimated to be $3.0 million in cost savings.

In addition, the canal is a primary source of drinking water for the greater Mercer County area.



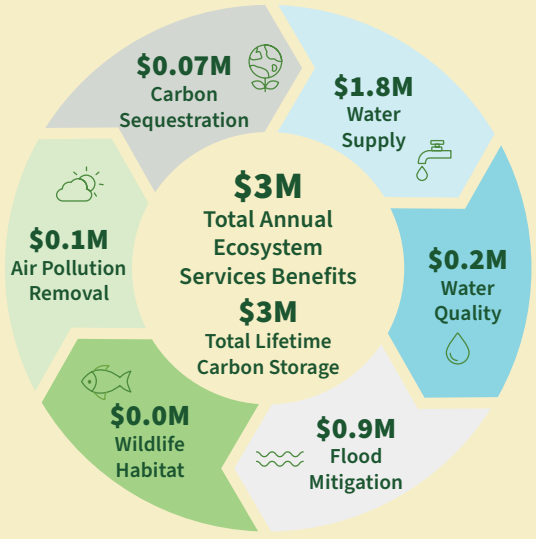
Delaware & Raritan Canal State Park Towpath

Figure 6.2: Property Value Impact

	½ Mile Total
Number of Houses	13,102
Assessment Value	$2,161,378,400
Value of Open Space (Assessed Value)	$192,716,645
Value of Open Space	8.9%
Value/Housing Unit (Market Value)	$14,709
Tax Value	$6,427,577
Tax/Housing Unit	$491

Source: Econsult Solutions, Inc. (2021); Mercer County (2021)

Figure 6.3: Annual Environmental Benefits by Type



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

Figure 6.4: Potential Annual Air Pollution Removal Benefits

Pollutant	Pounds	Cost Savings ($)
O_3	21,391	$109,223
PM-10	882	$3,006
NO_2	1,998	$10,203
SO_2	1,036	$1,296
CO	337	$250
Total	**25,645**	**$123,978**

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

Figure 6.5: Potential Amounts of Annual Carbon Sequestration and Lifetime Carbon Storage and Associated Benefits

Carbon Storage
17,506 tons
$3.0M Cost Savings

Carbon Sequestration
427 tons
$0.07M Cost Savings

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



Hamilton Veterans Park Trail



SECTION 6

CONCLUSIONS & NEXT STEPS

Mercer County is home to diverse landscapes and people, containing urban, suburban and rural areas and people of all ages, races and cultures. The County's emphasis on land preservation began over 30 years ago, resulting in a multitude of preserved parks and open spaces. From the elevation of Baldpate Mountain to the tidal floodplains of the Abbott Marshlands; the urban South Riverwalk Park to Howell Farm, the County's park offerings reflect the diversity of the County's natural features. Mercer County's location at the center of the Northeast Megalopolis, and the resulting development pressure, led to the introduction of the County's first open space tax in 1989. There was, and is, public demand to prevent over development and protect our natural resources. With the vast amount of preserved land in the County, there is a responsibility to ensure that the qualities for which the land was preserved are protected. Mercer County's Open Space Trust Fund has successfully preserved these lands and continues to be utilized to provide appropriate access and amenities for the public and stewardship of the landscape.

As demonstrated in this report, preserved open space in Mercer County is more than a pretty landscape. These lands increase property values, add to the economy and economic diversity, protect the natural environment and offer direct recreation and health benefits to residents and visitors. The greatest benefits result from well managed and well maintained parks and open spaces, where best stewardship practices are implemented and clean, safe public access and amenities are provided for our diverse citizenry. After 30 years of aggressive land preservation, Mercer County has several important and related goals for the next 30 years, for which the Trust Fund will be critical. One area of focus is the continued acquisition of key parcels to expand and improve upon existing parks and open spaces. The County has an increased and intentional focus on stewardship of the land – caring for the intrinsic values of the land to ensure environmentally healthy parkland. Finally, the County continues to provide a broad range of recreational facilities and passive parks, adapting and evolving to meet the needs of County residents. Living near a park is not enough. Safe multi-modal access is critical to the planning and development of our parks. In addition, the County is planning for new facilities, such as a passive park at Dam Site 21, and interesting, new recreational features and activities at Moores Station Quarry. All told, Mercer County's protected open space provides over hundreds of millions dollars in value to us every year.



Baldpate Mountain



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.



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