



## MIDDLESEX GREENWAY ACCESS PLAN HEALTH IMPACT ASSESSMENT





## Acknowledgements

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## Prepared by

### New Jersey Health Impact Collaborative

Edward J. Bloustein School of Planning & Public Policy  
Rutgers, The State University of New Jersey

The New Jersey Health Impact Collaborative (NJHIC) promotes the integration of public health impacts into planning and decision-making about projects and policies. NJHIC advances the practice of Health Impact Assessment (HIA) as a tool to improve planning and decision-making throughout New Jersey.

### Report Authors

Karen Lowrie, Ph.D.  
Associate Director, Environmental Analysis & Communication Group  
Facilitator, New Jersey Health Impact Collaborative

Leigh Ann Von Hagen, AICP/PP  
Senior Research Specialist, Alan M. Voorhees Transportation Center  
Facilitator, New Jersey Health Impact Collaborative

Elizabeth Sewell  
Research Associate, New Jersey Health Impact Collaborative

### Contact NJHIC

Address: 33 Livingston Avenue, New Brunswick, NJ 08901  
Phone: 848-932-2725  
Email: [NJHIC@ejb.rutgers.edu](mailto:NJHIC@ejb.rutgers.edu)

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## About Together North Jersey

In November 2011, the U.S. Department of Housing and Urban Development (HUD) awarded TOGETHER NORTH JERSEY (aka, North Jersey Sustainable Communities Consortium) a \$5 million Sustainable Communities Regional Planning Grant. The grant was matched with an additional \$5 million in leveraged funds from project partners. Grant funds have been used to implement the Local Demonstration Project (LDP) Program, develop a Regional Plan for Sustainable Development (RPSD) for the 13-county planning Together North Jersey planning region in northern New Jersey, and provide technical assistance and offer education opportunities that build the capacity of jurisdictions, organizations and the public to advance sustainability projects and initiatives. For more information, visit [togethernorthjersey.com](http://togethernorthjersey.com)

## About The Local Demonstration Project Program

The purpose of the Together North Jersey Local Demonstration Project (LDP) Program was to advance sustainable community development projects and initiatives at the local level to identify or advance short-term, implementable projects that are consistent with Together North Jersey goals and desired long-term sustainability outcomes. The LDP Program provided technical assistance for strategic planning studies focused on designated areas or corridors associated with established or anticipated transit services and/or facilities. Eligible LDP projects were sponsored by municipalities, counties, non-governmental organizations, community development corporations, and other interested organizations.

## Disclaimer

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## Table of Contents

EXECUTIVE SUMMARY .....	5
INTRODUCTION.....	11
SCREENING .....	13
SCOPING .....	15
BASELINE ASSESSMENT.....	29
PHYSICAL ACTIVITY .....	41
ENVIRONMENTAL EXPOSURES.....	48
SECURITY.....	51
SAFETY.....	55
SOCIAL COHESION .....	58
LOCAL ECONOMY .....	60
RECOMMENDATIONS WITH SPECIFIC ACTIONS .....	66
EVALUATION AND MONITORING PLAN .....	68
REFERENCES .....	92

*Note: Statements in quotes located throughout the document are taken from written comments from the online survey and are all anonymous. Unless otherwise noted, all images, figures and tables are property of New Jersey Health Impact Collaborative*

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**Tables in this document.**

Table 1. HIA Analysis – Summary of Findings.....	8
Table 2. Research Questions, Indicators and Data Sources.....	20
Table 3. Residence of Survey Respondents.....	25
Table 4. Age of Survey Respondent.....	25
Table 5. Stakeholder Engagement in HIA Process.....	27
Table 6. Demographic Profile of Three Towns and County.....	30
Table 7. Profile of Traditionally Disadvantaged Populations in 1 mile Radius of Greenway.....	32
Table 8. Impacted Subpopulations of Special Interest.....	34
Table 9. Middlesex County Health Statistics (2013).....	38
Table 10. Survey Question Response 1.....	39
Table 11. Survey Question Response 2.....	39
Table 12. Survey Question Response 3.....	39
Table 13. Increased Physical Activity from Greenway by Income...43	
Table 14. Increased Physical Activity from Greenway by Race.....43	
Table 15. Survey Question Response 4.....	44
Table 16. Perception of Safety by Gender.....	53
Table 17. HIA Analysis – Summary of Findings.....	65

**Maps in this document.**

Map 1: Map of Middlesex County, New Jersey and Surrounding Municipalities.....	12
Map 2: Middlesex Greenway Study Areas.....	16
Map 3: Middlesex Greenway Study Area Community Asset Map...17	
Map 4: Middlesex Greenway Study Area Households with Members Over 75 Years of Age.....	35
Map 5: Middlesex Greenway Study Area Persons with Disability...36	
Map 6: Middlesex Greenway Study Area Hispanic Population.....	37

**Figures in this document.**

Figure 1. Health Pathway Example.....	21
Figure 2. Middlesex Greenway Use Plan: Causal Pathway for Health Determinants.....	22
Figure 3. Purpose of Greenway Use (Survey Respondents).....	26
Figure 4. Mode of Use on Greenway (Survey Respondents).....	26
Figure 5. Middlesex County Inactivity Trendline.....	38
Figure 6. Middlesex County Obesity Trendline.....	38
Figure 7. Reasons for Not Using Trail.....	54
Figure 8. Trail Use Concerns.....	54
Figure 9. Survey Chart 1.....	59
Figure 10. Survey Chart 2.....	62
Figure 11. Survey Chart 3.....	62

**Appendices.**

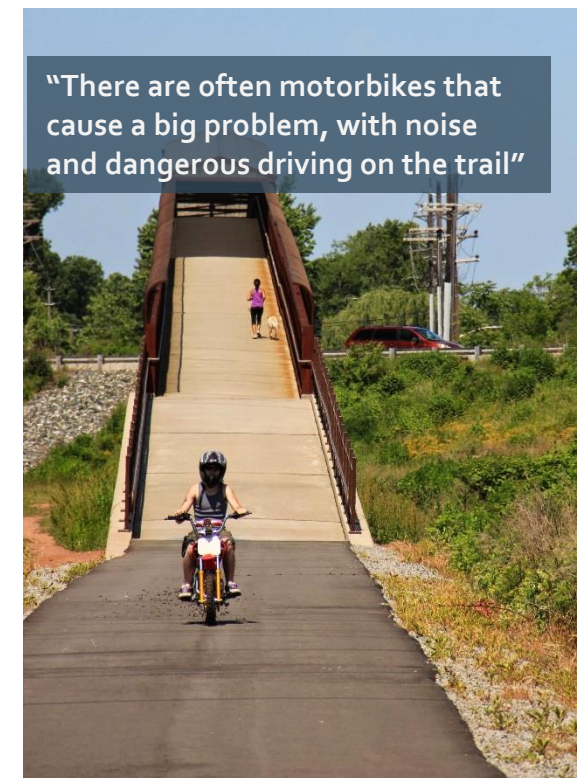
Appendix A.....	70
Appendix B.....	72
Appendix C.....	73
Appendix D.....	77
Appendix E.....	85

## Executive Summary

In conjunction with development of the Middlesex Greenway Access Plan, the New Jersey Health Impact Collaborative at Rutgers University conducted a Health Impact Assessment (HIA). By combining scientific data, health expertise and public input, HIAs identify and assess the potential positive and negative health effects of decisions related to policies, programs or projects. The HIA considers a range of social, environmental and economic influences on health and places an emphasis on identifying groups of people who might be particularly vulnerable or disproportionately impacted. HIA follows a 6-step method that results in a set of recommendations and a monitoring plan.

The Middlesex Greenway HIA included reviewing background data and literature, engaging stakeholders, and conducting a survey of residents in surrounding communities, to both characterize the baseline health status and also project health impacts of increased use of the Greenway for nearby communities. The HIA focused on these six questions:

1. *How will increased Greenway use affect physical activity?*
2. *How does increased use of the Greenway affect environmental exposures?*
3. *How will increased use of the Greenway affect security?*
4. *How will increased use of the Greenway affect safety? (crashes and injuries)*
5. *How will increased use of the Greenway affect social cohesion?*
6. *How will increased use of the Greenway affect the local economy?*



### Visions for a Healthy, Safe and Vibrant Greenway

The vision of a healthy Middlesex Greenway improves physical fitness and mental health for all ages and abilities, minimizes exposure to environmental hazards and pests. Traversing densely populated semi-urban communities crisscrossed with a heavily travelled network of roads and highways, the relative safety and serenity of a flat, paved 3.5 miles path offers an ideal opportunity for nearby residents to walk, jog or bike without cars zooming past, enjoying the outdoors while also exercising. The greenway offers varied health benefits including improved fitness, reduction in obesity-related diseases and conditions, and stress reduction that results from both the natural beauty of the outdoors and from an enhanced sense of community. Results from the Health Impact Assessment (HIA) suggest that the greenway is an important asset for physical fitness, but also that residents have some concerns about health risks from animals, insects and allergens. Recommendations address how to maximize physical and mental health benefits for greenway users, and also minimize risks to health from environmental exposures.

The vision of a safe Middlesex Greenway has taken all reasonable steps to reduce crime and the perception of crime, and to minimize crashes, collisions and accidental injury risks. Feedback from the outreach process suggests that even without a single reported physical assault or attack, many women and elderly people have personal safety concerns and are fearful that the relative isolation of the greenway makes them vulnerable to physical attack or mugging. Likewise, accidental incidents pose injury risks for greenway users.



Either en route to the trail or at places where the trail intersects a roadway, street design and crosswalks should be as safe as possible. Along the trail itself, bicyclists, joggers, people pushing strollers and people in wheelchairs are moving at different speeds and at different levels of attention. Education for trail users about safety etiquette is important. Recommendations address how to reduce both perceived and real crime, and to minimize accidental collisions and falls.

The vision of a vibrant Greenway enhances a sense of community and helps to support local businesses, resulting in the stress-reducing and mental health benefits of positive social interaction and a healthy business climate. People are getting to know their neighbors while also bringing vibrancy to the local economy with purchases from businesses in the nearby downtown commercial districts and the adjacent shopping center.



## SUMMARY OF HIA FINDINGS

The chart below summarizes the direction, extent, likelihood, distribution and strength of evidence of the health outcomes associated with the determinants studied in this HIA. If trail use is increased, the amount of social interaction and physical activity will increase, and lead to substantial improvement in the mental and physical health of trail users, with disproportionate positive impacts for lower income individuals who have limited options for fitness. The increase in exposure to green space will reduce stress, but allergens or animal/insect bites could also lead to negative health outcomes, particularly for children who may be more likely to touch flora and fauna and for those with allergies or asthma. With more people using the trail for walking, bicycling, skateboarding and

rollerblading, there is a possibility of more collisions and thus more injuries. However, if the flow of movement is well-managed and users are educated about proper trail etiquette and crosswalk use, collisions can actually decrease. Perception of crime should decrease, as more people using the trail will reduce feelings of isolation for senior citizens and women alone, and more awareness and publicity about the Greenway will help to dispel rumors about crime events. An increase in pedestrians using nearby streets to access the trail or to make walking or biking loops will likely benefit the local economy, as survey respondents noted that they purchased refreshments and equipment from local businesses.





**Table 1. HIA Analysis – Summary of Findings**

The table below lists the key health factors examined in the study, along with a summary of the projected impacts of increased use of the Greenway for each. The table summarizes the *direction* of the expected impact, the *likelihood* that the impacts will occur, the *level* of any expected impacts, and the distribution of those *impacts* to specific *populations*.

Health Outcome or Health Determinant	Direction	Likelihood	Level of Impact	Population Impacted
Physical Activity	Positive	Likely	High	Trail Users Lower Income Population (with limited access to paid health clubs) Hispanic Population
Exposure to Green Space	Positive and Negative	Likely	Low	Trail Users Children People with Allergies/Asthma
Safety (Crashes)	Unknown	Uncertain	Medium	Trail Users, Drivers on Area Roads
Security – Crime	Unknown	Unlikely	Medium	Trail Users Nearby Homes and Businesses
Security – Perception of Crime	Positive	Possible	Medium	Trail Users Senior Citizens and Women
Social Interaction	Positive	Likely	High	Trail Users Surrounding Municipalities
Local Economy	Positive	Possible	Low	Residents of Surrounding Municipalities

Positive	Changes that may improve health	Likely	it is likely that impacts will occur	Low	Causes minor impacts
Negative	Changes that may detract from health	Possible	it is possible that impacts will occur	Medium	Causes some substantial impacts
Unknown	Unknown how health will be impacted	Unlikely	it is unlikely that impacts will occur	High	Causes major or serious impacts
		Uncertain	it is unclear if impacts will occur		

## Health Impact Assessment Recommendations

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Following are recommendations for a healthy, safe, and vibrant greenway.

### HEALTHY

#### Physical Activity

##### Enhance usability and expand physical fitness options

###### Specific Actions:

- Improve access and use for bicycles
- Consider rental stations for bikes and rollerblades
- Provide benches and picnic tables in strategic locations
- Encourage use of activity loops for exercise
- Consider installing exercise stations in proximity to trail
- Facilitate connection between Greenway and other parks and trails
- Provide signs indicating access for restrooms and refreshments

##### Enhance trail cleanliness and maintenance

###### Specific Actions:

- Install additional garbage and recycling cans, and dog refuse bags
- Install "no littering" signs
- Partner with local groups on cleanup program, such as adopt a trail
- Facilitate easy ways to report graffiti

##### Increase use and benefit by vulnerable subpopulations

###### Specific Actions:

- Involve local health providers to prescribe greenway use for weight reduction/health improvement
- Increase number of ADA-accessible ramps
- Implement chaperone program for seniors and disabled
- Increase access and awareness of Greenway by NJ Transit bus riders
- Translate promotional and educational materials and signs, where appropriate, into Spanish
- Encourage safe use of Greenway for school students

#### Environment Exposures

##### Minimize exposure to environmental hazards, pests, and noxious weeds

###### Specific Actions:

- Improve drainage to reduce standing water
  - Notify greenway users of mosquito treatments
  - Institute periodic animal patrols for stray or nuisance animals
  - Add signage/education about ticks
  - Monitor exposure to poison ivy and other noxious weeds in close proximity to trail
-

**SAFE****Security**

Improve feeling of security for Greenway users

Specific Actions:

Improve signage along Greenway for emergency preparedness

Improve lighting and fences in strategic locations like bridges and schools.

Consider strategic vegetation maintenance and management to promote eyes on the greenway.

Foster walking groups through local civic groups and employers to bring safety in numbers

Consider 'trail watch' program similar to neighborhood watch

Increase police patrols at certain times of day/days of week

**Safety**

Minimize crashes and injuries along the Greenway

Specific Actions:

Consider crosswalk improvements at locations where the trail intersects with a roadway

Identify potentially dangerous crosswalks near trail access points

Install greenway etiquette/safe use signs (e.g. yield to pedestrians, pass with care, keep right)

Where, if possible, consider widening greenway.

**VIBRANT****Social Cohesion**

Encourage local groups to use Greenway for events and exercise

Specific Actions:

Encourage local organizations to program events along the Greenway

**Local Economy**

Encourage increased local economic benefits

Specific Actions:

Foster enhanced usage and promotion of the greenway by hotels and conference centers

Develop and encourage use of bike and pedestrian-friendly activity loops that connect the Greenway to downtowns and local businesses.

Promote the Greenway to area businesses/local chambers.

Encourage partnerships, contests or incentives that support local business.

Complete an analysis on the real estate and economic impact of the Greenway.



## Introduction

### Project Team

The New Jersey Health Impact Collaborative (NJHIC) at Rutgers University carried out the Middlesex Greenway Access Plan Health Impact Assessment (HIA) concurrently with a Together North Jersey Local Demonstration Project (LDP). Partners on the LDP team were Middlesex County, NJ Office of Parks and Recreation; Edison Greenways Group; Borough of Metuchen, NJ; Edison Township, NJ; Woodbridge Township, NJ; and the Middlesex County, NJ Office of Planning. The purpose of the LDP project was to create a Middlesex Greenway Access Plan (the Plan) to provide the Middlesex County Office of Parks and Recreation and the Edison Greenways Group with recommendations for improving access to Greenway and increasing usage of the Greenway by residents and visitors. The HIA was undertaken to expand knowledge and understanding of how increased use of the Greenway impacts public health and to inform decision-makers as they weighed the benefits and costs of various options for increasing Greenway utilization. The Regional Plan Association managed the Access Plan project, guided by NJTRANSIT and a project steering committee comprised of project partners and others listed in Appendix A.

### Organization of Report

After an introduction describing the Plan and the HIA process generally, the report details the phases of the HIA, summarizing the key steps and findings associated with each phase. The screening section describes the value of the HIA, and the scoping section describes the plan and framework for the HIA, including discussion of research questions, pathways and populations affected. The assessment section presents a baseline profile of population demographics and health, and then provides evidence to support recommendations and predicted impacts associated with increased use of the Greenway. The recommendations section lists a set of actions designed to promote health and the evaluation section describes impact and process evaluation and suggests a monitoring plan.

### Background on Middlesex Greenway Access Plan

The Middlesex Greenway is a 3.5 mile long rails-to-trails project in Middlesex County, located in east-central New Jersey. From its western end in the borough of Metuchen, the linear path runs through the borough of Edison to its eastern end in Woodbridge Township. The trail is owned by Middlesex County. Situated on an abandoned portion of Lehigh Valley rail corridor, the currently completed portion of the Greenway, opened in 2012, is located within a 42-acre mostly wooded corridor that provides a 10-foot wide, flat, paved trail suitable for walking, biking and jogging. The trail runs directly adjacent or near to several parks, schools and other community assets and crosses through a variety of

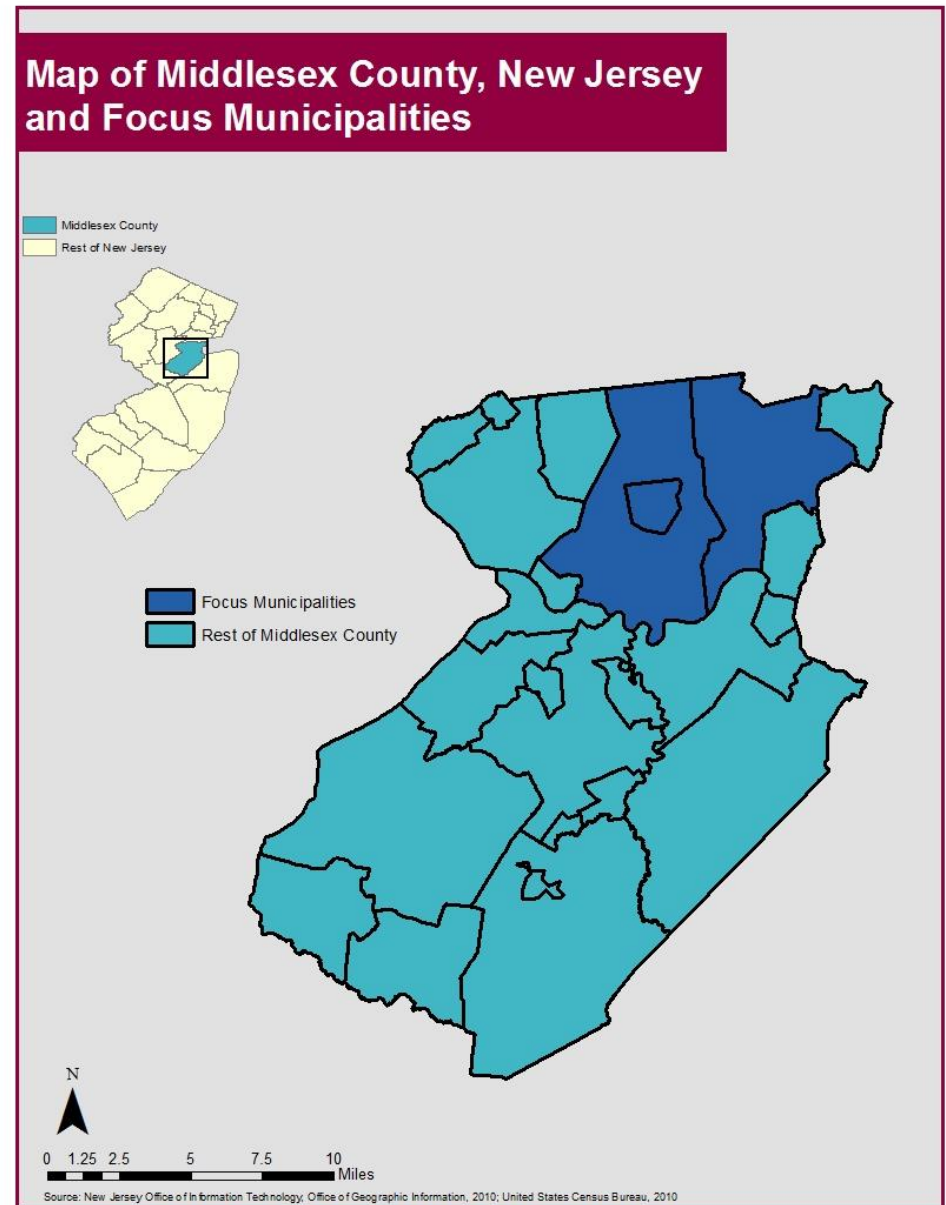
landscapes, from low density residential and commercial to industrial and institutional. A portion of the Middlesex Greenway is also part of the East Coast Greenway, a developing trail system spanning nearly 3,000 miles between Canada and Key West, FL.

The goal of the project, carried out from February through July of 2014, was to develop a plan for increased use and access of the Greenway by area residents and visitors. The “Middlesex Greenway Access Plan” provides recommendations to trail managers and decision-makers for promoting awareness, facilitating access and enhancing linkages to result in greater use of the Greenway.

Project partners identified several barriers to current use of the greenway, including the lack of safe pedestrian/bicycle access from surrounding streets and a lack of maps or signage (wayfinding) pointing to the Greenway from any of the commercial districts, activity centers or transit stops. In addition, the County would like the principles of Crime Prevention Through Environmental Design (CPTED) considered in future trail improvements.

### Health Impact Assessment Process

As a complementary process to the development of the Plan and carried out simultaneously, the HIA adds a specific focus on health, investigating the potential health impacts associated with increasing utilization of the Greenway and putting forth recommendations for how Greenway use can best protect and promote health. By combining scientific data, health expertise and public input, HIAs identify and



assess the potential positive and negative health effects of decisions related to policies, programs or projects. The HIA considers a range of social, environmental and economic influences on health and places an emphasis on identifying groups who might be particularly vulnerable or disproportionately impacted. HIA follows a 6-step method (screening, scoping, assessment, recommendations, reporting, monitoring/evaluation) that results in a set of recommendations and a monitoring plan.

## Screening

The screening step determines whether an HIA is needed, likely to be useful, and feasible. Common questions asked during this step may include: What project or decision will the HIA address or inform? How important to health is the project or decision? Will the HIA provide new and important information to inform decision-makers? Is an HIA feasible given available resources?

## Identification of Decision and Decision-makers

The decision to incorporate health into the content of the Plan was made by the study participants. At the conclusion of the study, the decision to be influenced is the adoption of the Plan as a guide for trail managers to invest in physical improvements or foster new programming to improve access and increase use of the Greenway. Middlesex County Office of Parks and Recreation is the owner and primary manager of the trail, and staff from this department will make final

decisions regarding which Plan elements will be implemented. Nonprofit Edison Greenways Group, instrumental in acquiring the corridor, developing the trail and promoting its use, will also play a lead role in implementing some Plan elements.

Recommendations about how to maximize health and safety, developed from the HIA, are woven directly into the Access Plan, so that decision-makers can consider the direct and indirect health impacts of future trail enhancements. Project team members, including those who will make decisions based on the Plan, are open to considering the HIA recommendations to inform changes in design and alternative planning and programming. In fact, two of the stated objectives of the plan are to use the Greenway as an illustrative example of the public health benefits created by such multi-use paths, and to enhance public health in the Borough of Metuchen, Edison



Middlesex Greenway Steering Committee Meeting, March 8 2014.  
Photo by Regional Planning Association



Township and Woodbridge Township by increasing usage of the Greenway. It is anticipated that the results of the Local Demonstration Project will influence decision-makers toward adoption of the recommendations within the plan. Following the plan adoption, physical improvements to the trail facility and event and programmatic recommendations will be implemented.

All project partners (consultant, project leads, project steering committee) actively participated in the HIA process, including being available to be interviewed and help to obtain existing local data and information and to assist with collection of any new data. Because the project was designed to already include a number of stakeholder outreach events and processes, the HIA process could leverage this capacity and these opportunities to meet with stakeholders. HIA project staff overlaid and integrated health assessment steps within each step of the project.

### Determination of Value of HIA

As part of the Together North Jersey Local Demonstration Project selection process, representatives from NJ TRANSIT, Regional Plan Association (consultant team), and NJHIC conferred with Together North Jersey staff and met with representatives from Edison Greenways and Middlesex County's Office of Parks and Recreation in the Fall of 2013 to consider the added value of the HIA to the project. Based on

those discussions, the project team determined that greater utilization of the Greenway has the potential to significantly impact determinants of health and health outcomes for Greenway users and others in the nearby community (both positively and perhaps negatively). With relatively large minority populations and a number of senior living facilities in close proximity to the Greenway, there is the potential for disproportionate impacts on and benefits for these vulnerable populations. An HIA would be a beneficial way to add explicit health considerations to the development of recommendations regarding how best to increase Greenway utilization and future decisions. (See Screening Checklist in Appendix B).

It was further determined that an intermediate level HIA was feasible given available staff and budget resources and the timeline of the Local Demonstration Project. That is, it could involve more local data collection and stakeholder input than a "rapid" HIA, with the leverage of the overlay with the LDP steering committee and stakeholder process, but resources could not support a full comprehensive assessment with extensive new primary local data collection. The existing relationships formed by the municipal, county, state and nonprofit representatives on the steering community and their buy-in to the HIA would facilitate and enhance the HIA process, without slowing it down and adding controversy.

Finally, this HIA will have visibility and broader application to other communities in New Jersey and nationwide who are considering development or increased use of Greenways and linear trails – an important opportunistic issue. As the first Greenway HIA in New Jersey, project leaders hope to provide a replicable model for future HIAs and promote Health in All Policies for other efforts in New Jersey.

## SCOPING

Scoping establishes the foundation for the design and conduct of the health impact assessment. During this phase, the HIA team identified key health issues, determinants and pathways that should be considered, affected population(s) and methods to be used in the assessment. Scoping included input from a range of technical experts and stakeholders.

### Goals of HIA

The Middlesex Greenway Use Plan includes strategies for improving access to the Greenway, facilitating linkages and enhancing programming, with a goal to increase the number of people using the Greenway. The goals of the HIA, in relation to the stated goals of the Plan, are to:

- define research questions related to health determinants influenced by increased Greenway use
- determine and carry out methods to assess baseline conditions and projected health impacts
- develop recommendations intended to maximize health benefits and mitigate negative health impacts of increased Greenway use with a focus on increasing equity
- engage stakeholders throughout the entire HIA process

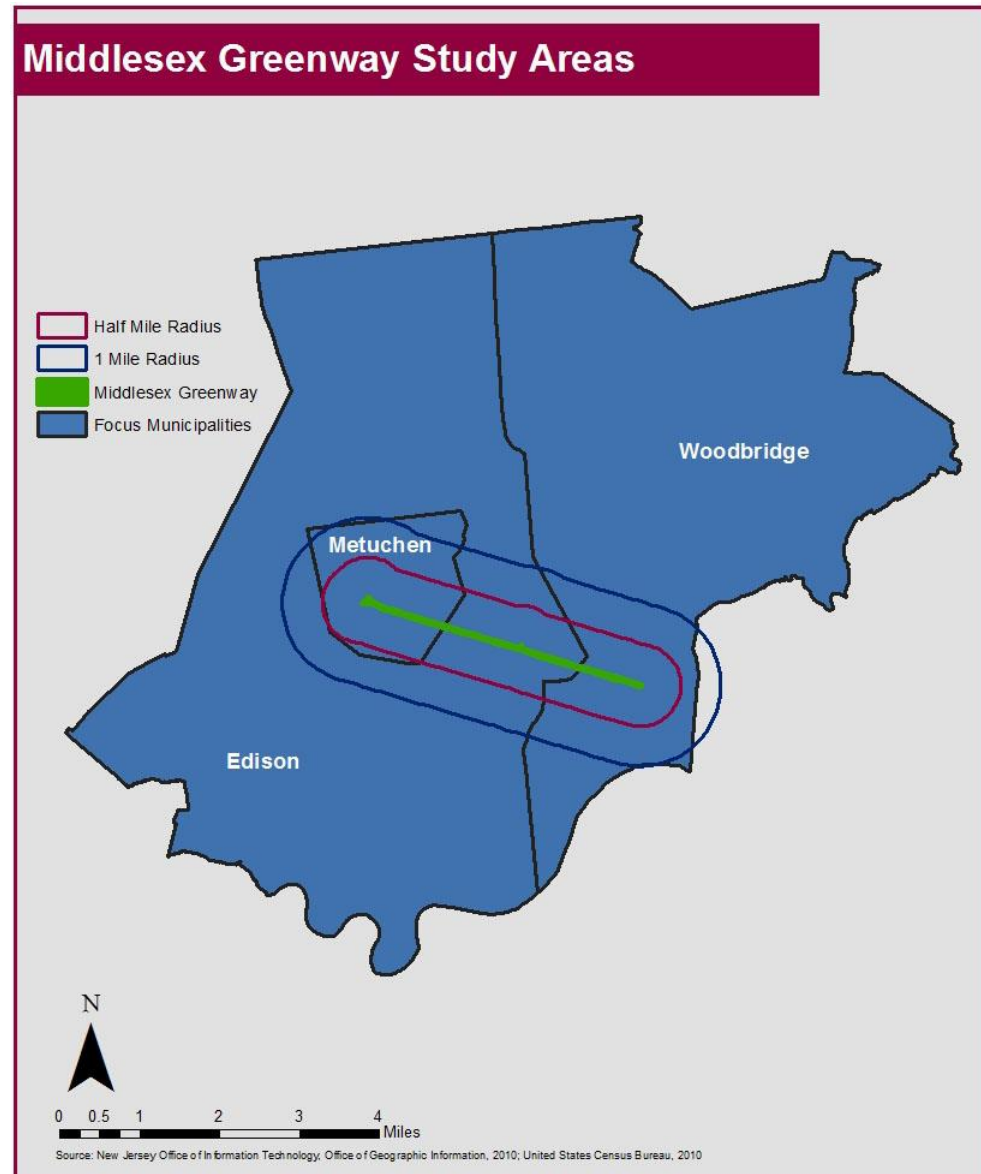


## Study Boundaries

### Geographic

The Greenway extends through the three municipalities of Edison Borough, Metuchen Borough and Woodbridge Township. The “community” under consideration for the HIA is at two different scales. One boundary includes the entire area of the three municipalities (area = 57.48 sq. mi.). The other is a subset of the three jurisdictions that consists of just the areas within easy walking or biking distance of the Greenway (.5 mile or 1 mile radius, 4.55 sq. mi. and 10.25 sq. mi.). These smaller areas that radiate several blocks from the Greenway are those most heavily impacted by most of the health determinants affected by increased use of the trail. That is, residents within this boundary are most likely to actually use the trail regularly for recreation, exercise, socializing or transit to shopping/work, and therefore subject to the direct impacts associated with physical fitness, mental health, social cohesion, safety, security and environmental exposures. Economic impacts related to local income and employment are more appropriately distributed to the larger community boundary that includes the three towns.

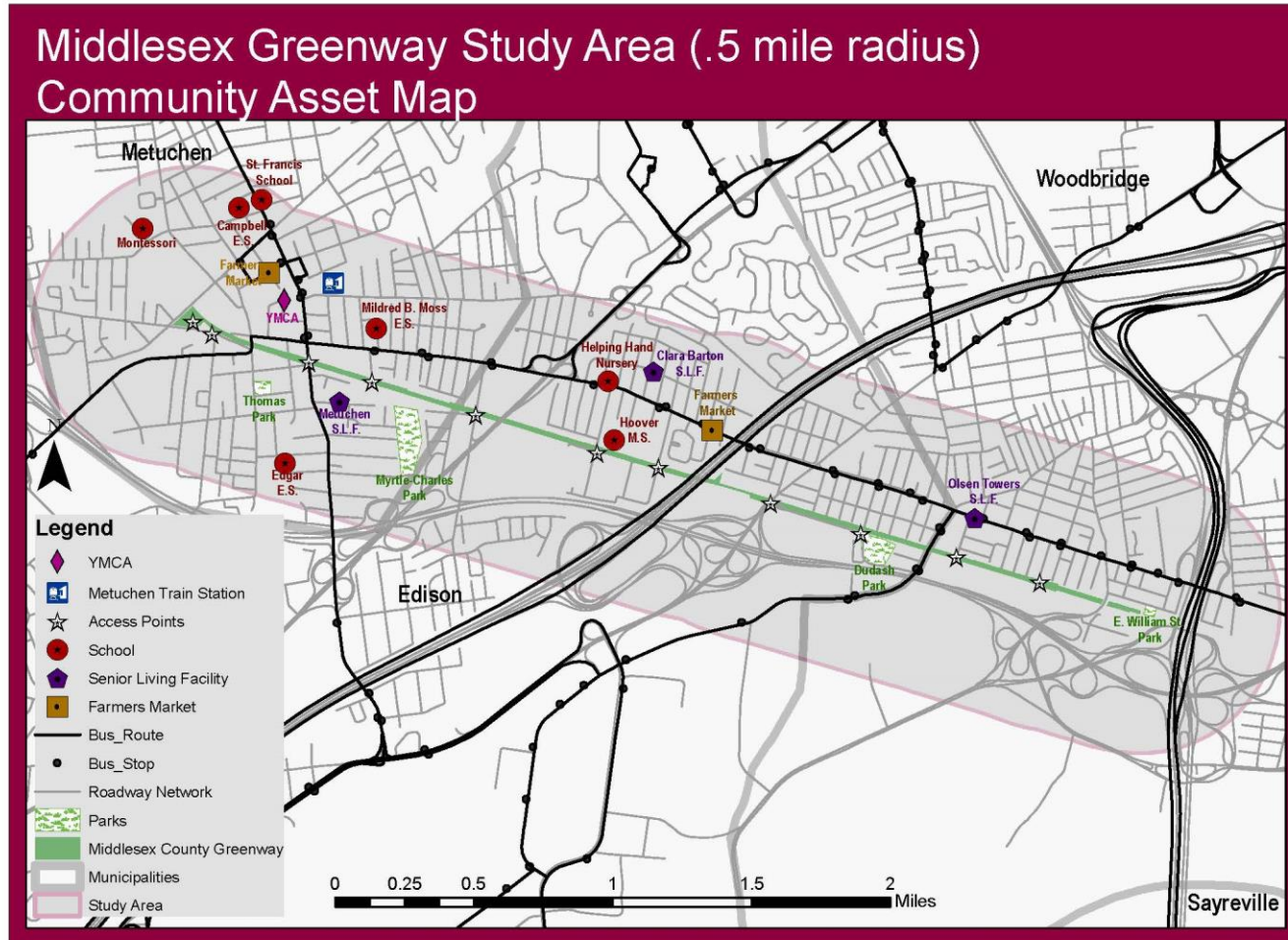
As the Asset Map shows (below), there are many nearby public assets and populations that will be affected by increased Greenway use. One public school (Herbert Hoover Middle School in Edison Twp.) is located directly





adjacent to the Greenway, while 7 additional schools are within the .5 mile radius. Four local parks are located in close proximity to the Greenway, and three senior living facilities

are within one block of the trail. Two Farmer's Markets that operate periodically, we within close walking distance of the trail, as well as a YMCA and a local business district.



Source: New Jersey Geographic Information Network; Middlesex School District, [www.middlesex.k12.nj.us](http://www.middlesex.k12.nj.us); Middlesex County Aging and Disabled Services, 2014 Resource Directory for Aging & Disabled Services; Middlesex County Parks & Recreation, Middlesex Greenway Trail Map; New Jersey Department of Agriculture, Jersey Fresh, [www.jerseyfresh.nj.gov](http://www.jerseyfresh.nj.gov)

## *Temporal*

The HIA analysis is concerned with both immediate impacts and with long-term impacts that may only be realized in decades. Specifically, some health outcomes that could result from increased use of the Greenway are very immediate, both negative ones (an exposure, a crime, an injury) and positive (improved mental well-being from social interaction and being in nature). Others are more long-term and are in the positive direction, such as those brought about by improved physical fitness and better local economic conditions.

## Impacted Subpopulations

Users of the Greenway are the population affected most directly by its increased use. Users themselves will achieve benefits of physical activity or social cohesion associated with being on the Greenway, as well as health risks such as safety, security or other exposures. Residents of neighborhoods within walking or bicycling distance of the Greenway are the most likely to use the Greenway on a regular basis for exercise, socializing or fitness. Those who use the Greenway to commute to and from work are also directly impacted. If any subpopulations within these groups are unable to access or use the Greenway due to limited ADA access, perception of isolation or crime or other real or perceived barriers, the benefits of the Greenway will not be community-wide.

## Health Determinants and Outcomes

Health determinants are personal, social, economic, and environmental factors that are influenced by societal decisions and ultimately affect the health of individuals or populations. Health determinants are linked through research to health outcomes, such as life-expectancy, disease and injury rates. Considering the health effects of decisions comprehensively requires employing a holistic definition of health and considering a broad set of health determinants, intermediate and final health outcomes and their pathways.

## Research Questions

The six research questions that frame the Greenway Plan relate to health determinants under three broad categories – healthy, safe and vibrant. That is, the first two determinants, physical activity and environmental exposures, are both about how use of the Greenway impacts the fitness and disease conditions of the individual and broader population. The second set of two determinants connect increased use of the Greenway with risks related to safety – that is, isolated criminal or accidental incidents that could occur and also the public's perception about the safety of using the trail. Finally, the last two questions explore how increased numbers of Greenway users can affect the vibrancy of the wider community through building social cohesion and stimulation of the local economy.

The indicators on the following page were selected because they are either data that are readily available through existing secondary sources, or information that could be collected at either an exact or approximate level through new primary data collection (interviews and surveys). Literature review is critical to make the connection between the indicators and the broader questions about health determinants and projected outcomes. HIA is a tool for applying evidence from the literature to local contexts.

For all health determinants, the analysis examines any disproportionate impacts on traditionally disadvantaged populations including seniors, youth, low-income, disabled and ethnic minorities. Some determinants were not selected for assessment in this study, either because there was little or no stakeholder interest or concern expressed throughout the scoping process, or because the research team had little or no basis for evaluating the impacts of the determinant. For

example, even though air pollution could impact health negatively, particularly where the Greenway crosses a busy four-lane road and passes close to a major highway, we did not address this to any extent in the HIA because the issue was not raised by stakeholders and also because we did not have the technical capacity to gather any new data on the baseline or predicted impacts of this exposure. Likewise we did not explore the impact of possible reduced motor vehicle use (and hence impacts on individual transportation costs or on local air pollution), largely because it did not occur as an issue from early discussions with stakeholders in scoping and also because, as a relatively short trail with very little use as a work-to-home or work-to-errands commuting path, the impact on air pollution or personal costs is likely to be very small. For the same reasons, the impact of the Greenway on access to healthy food was not examined. However, this is an aspect worth examining in more detail in future study (see Monitoring section).

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Table 2. Research Questions, Indicators and Data Sources

	Research Questions	Indicators	Data Sources
Healthy	<i>How will increased Greenway use affect physical activity?</i>	Physical Activity of Residents Poor Mental Health and Physical Health Days Obesity-related disease rates	<b>Baseline:</b> County Health Rankings, BRFSS, Community Health Assessments (if available) <b>Projection:</b> Survey, Literature Review, Expert interviews
	<i>How does increased use of the Greenway affect environmental exposures?</i>	Asthma and allergy rates Animal bites Poor Mental Health Days	<b>Baseline:</b> Community Health Assessment (if available), Local health depts. <b>Projection:</b> Literature Review, Experts
Safe	<i>How will perceptions of security impact Greenway use?</i>	Number and type of reported crime Perceptions of security	<b>Baseline:</b> Local crime reports, local police, survey <b>Projection:</b> Literature Review, survey
	<i>How will increased use of the Greenway affect traffic safety (collisions and injuries)?</i>	Number and type of crashes Reported injuries	<b>Baseline:</b> Local health depts., traffic incident reports, local hospitals and doctors <b>Projection:</b> Literature Review
Vibrant	<i>How will increased use of the Greenway affect social cohesion?</i>	Self-reported preferences for social engagement Success/evaluation of social events – number of people attending	<b>Baseline:</b> Survey, Stakeholder input <b>Projection:</b> Literature Review, Survey
	<i>How will increased use of the Greenway affect the local economy?</i>	Revenues for businesses within .5 mile of Greenway Job growth for businesses within .5 mile of Greenway Elevated housing prices	<b>Baseline:</b> Chamber of Commerce, Local Business Patterns, Survey, Stakeholder Input <b>Projection:</b> Literature Review, Survey

## Health Pathways

Causal models, or pathway diagrams, are used in HIAs to represent and visualize cause-and-effect relationships that potentially exist between environmental or social conditions and a variety of health outcomes. Pathway diagrams help organize existing knowledge and research, guide analyses, and communicate information in a clear and systematic manner.

In general terms, a pathway diagram shows how a change in an environmental or social condition (a health determinant) can lead to proximate effects and then to intermediate outcomes (e.g. stress) that can result in ultimate health effects (a disease condition, improved mental health, etc.). Figure 1 is an example of a health pathway diagram and Figure 2 on page 21 is the pathway diagram used for the Middlesex Greenway Use Plan.

Figure 1. Health Pathway Example

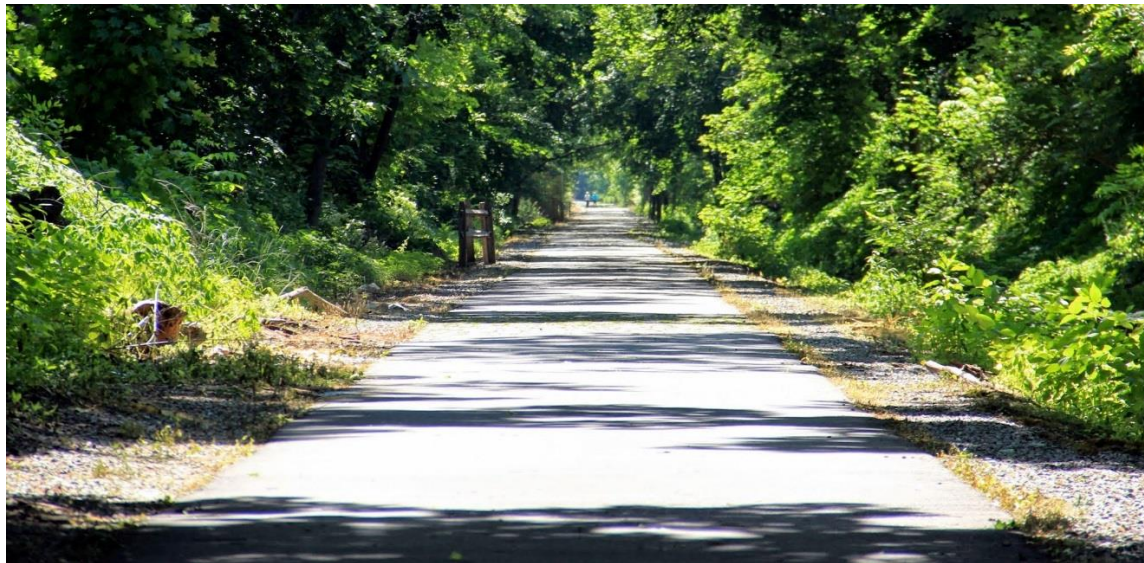
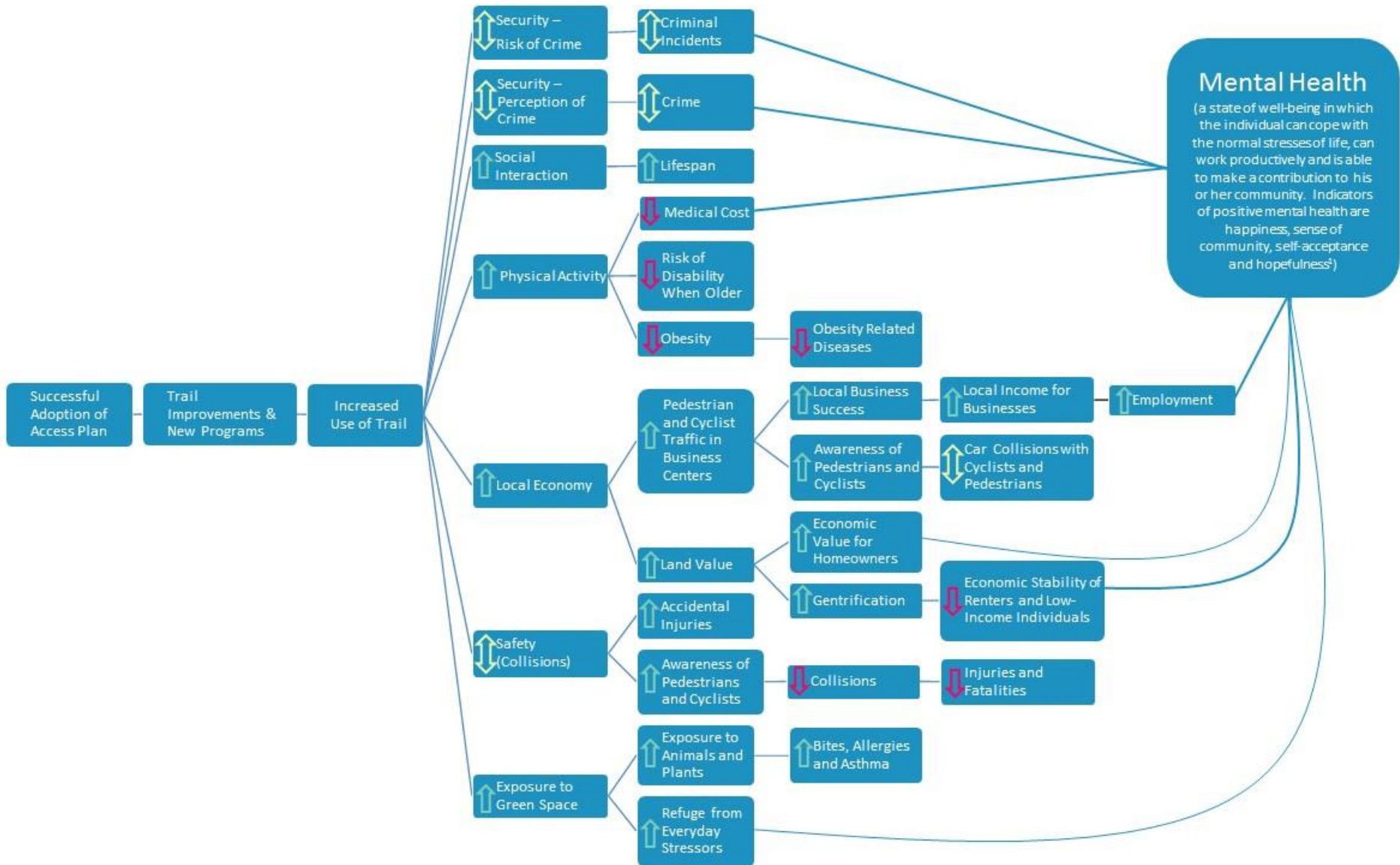


Figure 2. Middlesex Greenway Use Plan: Causal Pathway for Health Determinants



## Methods

### *Literature Review*

To predict health impacts, the team reviewed empirical research from scholarly journals to find evidence related to physical activity, social interaction, increased access to green space, increased pedestrian exposure to traffic risks, and other areas defined as part of the scoping process. More weight was given to peer-reviewed studies where the scientific merit has been judged by experts in the field.

### *Secondary/Existing Data Collection*

To conduct the baseline demographic and socioeconomic analysis, US Census data is the primary source. For health data, the research team conducted a broad search for national data including Behavioral Risk Factor Surveillance System (BRFSS) which collects data health-related risk behaviors, chronic health conditions, and use of preventive services and County Health Rankings and Roadmaps, which weighs and summarizes over twenty sources of public health data from national sources. In addition, we contacted local professionals to obtain any recent local health studies or data collection efforts.

### *Stakeholder Engagement*

A variety of methods and formats for stakeholder engagement resulted in the collection of a rich set of local input to inform the assessment of local conditions and to support assessment of impacts and recommendations.

### *Steering Committee*

A steering committee comprised of 21 members representing 15 organizations was assembled for the Access Plan project. Since the HIA was woven directly into the goals of the project, project team members attended every meeting (total of 4 meetings), and had many conversations with members about their major concerns and suggestions regarding health and the Greenway.

### *Public Open Houses*

Two Open House events were conducted by the Access Plan team, one in March 2014 near the outset of the project and another in June 2014 near the conclusion of the research. At each event, HIA project team members staffed a table designed for public awareness and for public input into the HIA process. At the initial Open House, comments from the general public helped to inform the direction of the inquiry through “sticky notes” placed on a map of the Greenway that identified areas of concern or opportunity. The survey (described below) was also available to be taken either online or by paper copy. At the concluding Open House, the list of Health recommendations was presented for public feedback and prioritization. Very little input was received from the public on prioritization, however state agency representatives submitted input on the plan including recommendations for technical assistance and funding. Recommendations are included in a priority framework.





Middlesex Greenway Public Open House, March 18  
Photo by Regional Planning Association

The HIA team also conducted a separate Open House event at the Olsen Towers senior living facility, after initial analysis and community input identified seniors as a particularly impacted population. Seniors provided input and filled out surveys.

### *Roundtables*

The team invited health and safety officials and experts, as well as representatives from important subpopulations to attend a roundtable discussion to respond to questions about safety, security, physical activity and social/mental health aspects related to Greenway usage. The roundtable was attended by 15 people. In addition to this roundtable dedicated to health and safety issues, the HIA team also

attended two roundtables organized by the Access Plan project team and devoted to issues of education and economics. Additional input was obtained from these roundtables that supported projected impacts and recommendations about health determinants. (See Appendix C for roundtable questions and notes.)

### *Expert/Informant Interviews*

Frequent contact with members of the project steering committee served the function of providing expert and key informant input into the HIA information-gathering process. In addition to this contact, the team also conducted interviews with several additional health stakeholders including the County Health Department and local nonprofits with health missions.

### *Survey*

The purpose of the Awareness, Use and Perception Survey was to collect data on Greenway awareness and utilization and understand better the health and safety concerns of residents. Answers to the questions would help to provide some evidence of baseline health, but primarily would help to support impact projections and recommendations.

The 40 questions on the survey asked about: how people became aware of the Greenway; how often and for what purposes people are using the Greenway; perceptions of Greenway safety; what can/should be done to improve and increase utilization of the Greenway. (See Appendix D for multiple choice survey questions.) A total of 565 surveys were completed, most through a web-based survey platform and some through paper copies. Respondents were recruited at the initial Open House event (see above), through email solicitation sent out by county, municipal and nonprofit partners, the TNJ website and other links posted on partner websites to drive people to a web-based survey. Survey respondents were not representative of the surrounding population in their place of residence or demographic and socioeconomic characteristics, so results cannot be generalized to the larger population. However, with over 550 completed surveys and many of them (407) trail users, the input is a good source of new primary local information, useful for understanding use patterns, preferences and concerns for those who responded.

*Respondent Characteristics*

Most respondents were from Metuchen, followed by Edison and Woodbridge (see Table 3). The respondent group is highly educated and fairly stable. Over 50% have lived in their neighborhoods more

Table 3. Residence of Survey Respondents	
Residence	Percentage of Respondents
Metuchen	62%
Edison	19%
Woodbridge	6%
Other Middlesex County	9%

than 10 years, with more than 80% in single-family houses. About 80% have a college degree, with 40% having a graduate degree, and only 13% with only a high school education. More than 60% of respondents have household incomes over \$100,000. In terms of demographics, the sample was 62% female, with about 80% in the young adult to middle-aged group. (See Table 4). More than three-quarters (77.5%) of the sample were white non-Hispanic and only about 1% black, with another 7.5% indicating Hispanic ethnicity, and more than 9% of Asian ethnicity. (See Table 5.)

Table 4. Age of Survey Respondent	
Age	Percentage of Residents
18-30	9%
31-45	39%
46-65	40%
65 +	12%

*Greenway Use Patterns*

Of the 400 users who responded to the survey, almost one third (31%) reported using the Greenway at least two to three times per week, and another one third (33%) reported using it two to three times per month. More than two thirds (70%) typically go on the Greenway with other people. Most trail users reported being on the Greenway for half an hour to an hour (64%), but more than a quarter (26%) reported spending one to two hours on a typical visit. Greenway users most often use the greenway for fitness and for pleasure (see Figure 3 on the following page). While most Greenway use is walking, 35 – 40% of users said that they most often jog or bicycle on the Greenway. (See Figure 4 on the following page).

Figure 3. Purpose of Greenway Use (Survey Respondents)

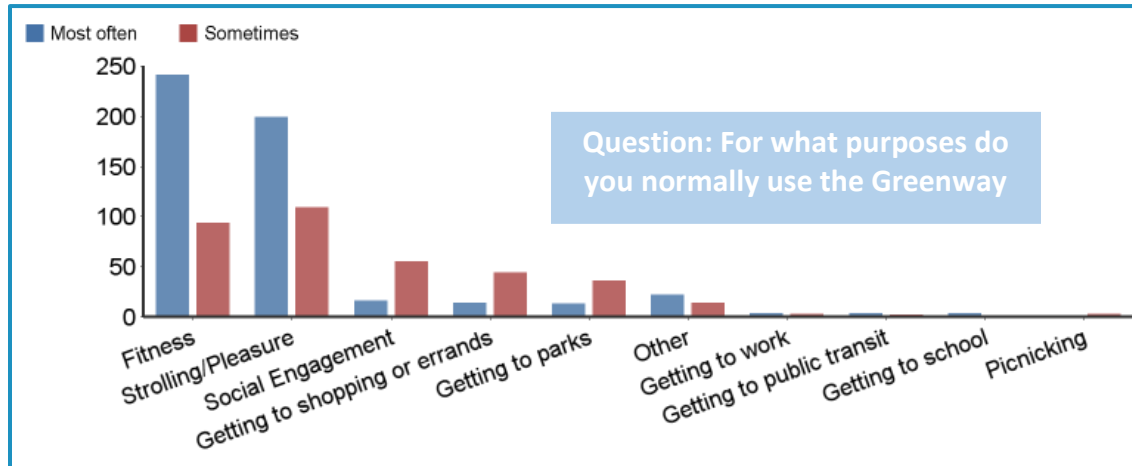
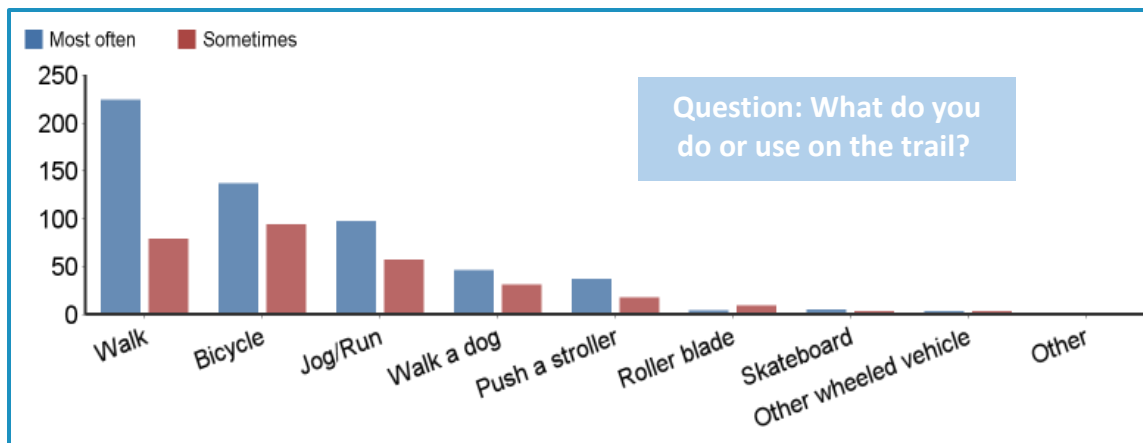


Figure 4. Mode of Use on Greenway (Survey Respondents)



The Rutgers-Bloustein research team secured approval from the Rutgers Institutional Review Board for the Protection of Human Subjects (IRB) for the online survey protocol. Table 5 reviews our interaction with the stakeholders in every stage of the HIA.

**Table 5. Stakeholder Engagement in HIA Process**

Stage of HIA	Stakeholder Engagement	Throughout
Screening	<ul style="list-style-type: none"> <li>Project lead partners identify and confirm need for HIA</li> </ul>	Steering Committee Feedback and Guidance
Scoping	<ul style="list-style-type: none"> <li>Kickoff Open House event – Community members identify priority health issues and concerns</li> </ul>	
Assessment	<ul style="list-style-type: none"> <li>Survey</li> <li>Health/Safety Roundtable Discussion</li> <li>Olsen Towers Event</li> <li>Key Informant Interviews</li> </ul>	
Recommendations	<ul style="list-style-type: none"> <li>Final Public Open House - Prioritization exercise</li> <li>Review of recommendations by state agencies</li> </ul>	
Reporting	<ul style="list-style-type: none"> <li>Stakeholders communicate HIA findings to media and on websites</li> </ul>	
Evaluation/Monitoring	<ul style="list-style-type: none"> <li>Stakeholders implement recommendations and monitor decision outcomes and long-term health impacts</li> </ul>	



## Resources and Work Plan

Resources made available through Together North Jersey as a complement to the Local Demonstration Project supported the work of two senior researchers from NJHIC, along with a master's student, to conduct the HIA. Significant assistance also came from staff at RPA, whose work intersected with some of the HIA tasks, so that efficiencies were gained. For example, both projects needed to obtain basic demographic data and maps, and both projects required stakeholder meetings. These tasks were shared in both monetary and staff resources. With this leveraging available, the HIA was able to take on more breadth than a "rapid" HIA, but time and resources did not allow a full comprehensive HIA. After kicking off the project in late January of 2014, key milestones included:

- Agreement on preliminary research questions prior to first public Open House in March so that public and steering committee input could confirm the HIA scope
- Baseline data collection from February through March
- Conducting the online survey from mid-March through mid-May
- Stakeholder meetings and literature review from mid-March through Mid-May
- Prepare preliminary recommendations for the final Open House in early June so that feedback could shape final recommendations.

Process evaluation of the HIA process would be tracked by completion of these milestones, and of the final report by September of July 2014.



## Baseline Assessment

This section includes a baseline assessment of the populations impacted by use of the Middlesex Greenway.

The research team prepared two profiles of the three study area municipalities (Edison, Metuchen, Woodbridge) and the smaller .5 mile radius “walking distance” and 1-mile radius “bicycling distance” neighborhoods immediately adjacent to the existing Greenway. Profile one captures demographic and socio-economic characteristics. Profile two captures available health statistics. Similar data for Middlesex County, the “Together North Jersey” region (13 counties of the North Jersey Transportation Authority) and/or the State of New Jersey will also be displayed for comparison purposes. As part of the analysis, the research team sought to identify and document any health disparities/inequalities that exist among population subgroups and/or places, making inferences where possible and appropriate from existing evidence-based research if local data does not exist.

### Demographic Profile

The following demographic analysis utilizes data from the U.S. Census 2010, ACS 2010 5-year estimates, and ACS 2012 5-year estimates.

Collectively the three municipalities have a population of over 213,000, or approximately 26.3% of Middlesex County’s total population. Edison and Woodbridge are both home to about 100,000 residents.

Nearly 82,000 people in approximately 29,900 households live within one mile of the Middlesex Greenway. Among residents living within one mile of the Middlesex Greenway, approximately 41% are non-White; 8.8% of the population is Black, 18.6% Asian, and 26.4% Hispanic. Meanwhile, approximately 29.1% of the total population living within one mile of the greenway is foreign-born. The majority of foreign-born residents originate from Latin America and South Central Asia. Racial composition varies across the three municipalities. At approximately 60.4%, non-White residents comprise a larger share of population in Edison than in Metuchen (26.7%) and Woodbridge (49.3%). The Asian population is the largest minority populations in all three communities, followed by the Hispanic population. The three municipalities, like Middlesex County, are very diverse communities.

Ownership rates vary across the three communities; in Metuchen, approximately 78.5% of households are owner-occupied, 69% in Woodbridge, and 65.4% in Edison. Homeownership rates in Woodbridge and Edison are comparable to those of the county and region.

Table 6. Demographic Profile of Three Towns and County

Variable	Edison	Metuchen	Woodbridge	Three Municipalities	Middlesex County	Together North Jersey Region*
<b>Population</b>	<b>99,967</b>	<b>13,574</b>	<b>99,585</b>	<b>213,126</b>	<b>809,858</b>	<b>6,579,907</b>
<b>White</b>	39,577	9,952	50,531	100,060	398,724	3,779,545
<b>Black</b>	6,631	617	9,038	16,286	71,557	776,666
<b>Asian</b>	43,092	1,744	22,193	67,029	172,534	610,873
<b>Hispanic</b>	8,112	935	15,562	24,609	148,975	1,284,900
<b>Other</b>	2,555	326	2,261	5,142	18,068	127,923
<b>Foreign-Born</b>	38,763	2,191	27,928	68,882	234,531	1,529,730
<b>% Foreign-Born</b>	38.78%	16.14%	28.04%	32.32%	28.96%	23.25%
<b>Housing Units</b>	<b>36,302</b>	<b>5,440</b>	<b>36,124</b>	<b>77,866</b>	<b>294,800</b>	<b>2,611,832</b>
<b>Households</b>	34,972	5,243	34,615	74,830	281,186	2,398,756
<b>Owner-occupied</b>	22,870	4,113	23,886	50,869	187,147	1,518,205
<b>% Owner-occupied</b>	65.40%	78.45%	69.00%	67.98%	66.56%	63.29%
<b>Renter-occupied</b>	12,102	1,130	10,729	23,961	94,039	880,551
<b>% Renter-occupied</b>	34.60%	21.55%	31.00%	32.02%	33.44%	36.71%
<b>Vacant Units</b>	1,330	197	1,509	3,036	13,614	213,076
<b>% Vacant</b>	3.66%	3.62%	4.18%	3.90%	4.62%	8.16%
<b>% Single Family</b>	61.70%	79.00%	67.10%	N/A %	64.80	59.30%
<b>% Multifamily</b>	37.90%	20.80%	31.70%	N/A %	34.40	40.00%

Data from U.S. Census 2010 and ACS 2010 5-year estimates. Discrepancy in figures may result from use of these two datasets.

\* 13 counties of the North Jersey Transportation Authority

Table 6. Demographic Profile of Three Towns and County (cont.)

Variable	Edison	Metuchen	Woodbridge	Three Municipalities	Middlesex County	Together North Jersey Region
<b>Median Household Income</b>	\$86,725	\$94,410	\$79,277		\$77,615	-
<b>Total Households</b>	33,293	5,249	34,729	73,271	277,398	2365263
<b>Carless Households</b>	1,948	194	2,595	4,737	23,040	295271
<b>% Carless</b>	5.85%	3.70%	7.47%	6.47%	8.31%	12.48%
<b>1-Car Households</b>	11,501	1,862	11,828	25,191	92,915	820,446
<b>% 1-Car</b>	34.54%	35.47%	34.06%	34.38%	33.50%	34.69%
<b>Workers 16+ Commuting to Work</b>	45,596	6,660	47,845	100,101	372,797	2985328
<b>Drove Alone</b>	33,169	4,679	37,823	75,671	281,721	2,153,791
<b>Carpooled</b>	4,240	385	3,789	8,414	35,815	272602
<b>Public Transportation</b>	6,855	1,411	4,721	12,987	37,834	384005
<b>% Public Transportation</b>	15.03%	21.19%	9.87%	12.97%	10.15%	12.86%
<b>Walked</b>	1,039	169	811	2,019	12,316	108,114
<b>% Walked</b>	2.28%	2.54%	1.70%	2.02%	3.30%	3.62%
<b>Other</b>	293	16	701	1,010	5,111	66816

Data from U.S. Census 2010 and ACS 2010 5-year estimates. Discrepancy in figures may result from differences in these two datasets.



## Impacted Subpopulations

Populations most directly affected by the Greenway are those located in closest proximity to it. For this analysis, the demographic and health characteristics of people living within 1-mile radius, and the .5 mile radius of the trail (see maps) are considered the most impacted.<sup>1</sup>

**Table 7. Profile of Traditionally Disadvantaged Populations in 1 mile Radius of Greenway**

Variable	Middlesex Greenway Study Area	Middlesex County	Together North Jersey Region*
Population <sup>1</sup>	81,914	809,858	6,579,907
Households <sup>2</sup>	29,881	277,398	2,365,263
Households in Poverty <sup>2</sup>	2,255	19,081	209,488
Percent Households in Poverty	7.5%	6.9%	8.9%
<b>Racially Concentrated Areas in Poverty (RCAPs)<sup>1,2</sup></b>	<b>1</b>	<b>7</b>	<b>155</b>
Persons Living in RCAPs	3,482	35,206	564,916
Percent Living in RCAPs	4.3%	4.3%	8.6%
<b>Minority Population<sup>1</sup></b>	<b>44,726</b>	<b>411,134</b>	<b>2,800,362</b>
Percent Minority	54.6%	50.8%	42.6%
Non-Hispanic Minority Population	23,067	262,159	1,515,462
Percent Non-Hispanic Minority	28.2%	32.4%	23.0%
Hispanic Population	21,659	148,975	1,284,900
Percent Hispanic	26.4%	18.4%	19.5%
<b>Families in Poverty with Children<sup>2</sup></b>	<b>1,023</b>	<b>7,308</b>	<b>82,452</b>
Percent Families in Poverty with Children	4.9%	2.6%	5.0%

Source: 1 U.S. Census Bureau, 2010 Census; 2 U.S. Census Bureau, 2006-2010 American Community Survey; 3 U.S. Census Bureau 2008-2012 American Community Survey; 4 U.S. Department of Housing and Urban Development, A Picture of Subsidized Households, 2012, Using 2010 Census Geography;

\*13 counties of the North Jersey Transportation Authority

Table 7. Profile of Traditionally Disadvantaged Populations in 1 mile Radius of Greenway (cont.)

Variable	Middlesex Greenway Study Area	Middlesex County	Together North Jersey Region
Female Head of Household with Children <sup>2</sup>	1,896	15,614	153,224
<i>Percent Female Head of Household with Children</i>	6.4%	5.6%	6.4%
Persons with Limited English Proficiency (5 Years+) <sup>2</sup>	12,148	116,630	837,019
<i>Percent Persons with Limited English Proficiency</i>	15.9%	15.6%	13.7%
Carless Households <sup>2</sup>	2,948	23,040	295,271
<i>Percent Carless Households</i>	9.9%	8.3%	12.5%
Elderly Persons (75 Years+) <sup>1</sup>	5,356	48,730	431,770
<i>Percent Elderly Persons</i>	6.5%	6.0%	6.6%
Persons with Disabilities <sup>3</sup>	7,042	66,238	606,368
<i>Percent Persons with Disabilities</i>	8.7%	8.3%	9.3%
HUD Units <sup>4</sup>	614	6,309	84,907
<i>Units/1,000 Population</i>	7	8	13
Public Housing Units	446	2,315	31,069
<i>Units/1,000 Population</i>	5	3	5
Multi-Family Housing Units	122	2,533	38,689
<i>Units/1,000 Population</i>	1	3	6
Low-Income Tax Credit Units	46	1,461	15,149
<i>Units/1,000 Population</i>	1	2	2

Source: U.S. Census Bureau, 2010 Census; 2 U.S. Census Bureau, 2006-2010 American Community Survey; 3 U.S. Census Bureau 2008-2012 American Community Survey; 4 U.S. Department of Housing and Urban Development, A

Picture of Subsidized Households, 2012, Using 2010 Census Geography

**Elderly and Disabled**

Both the elderly (over 75) and disabled populations (of any age) can be disproportionately impacted. Specifically, it can be more difficult for them to achieve the benefits of using the trail because of mobility constraints that can limit both access to the trail, and ability to stay on the trail for as long as someone without a mobility constraint. There is a higher concentration of population over 75 (more than twice as high), and disabled population (almost 50% higher) within the .5 mile “walking distance” radius of the trail than the concentration within the 1-mile radius or the three towns.

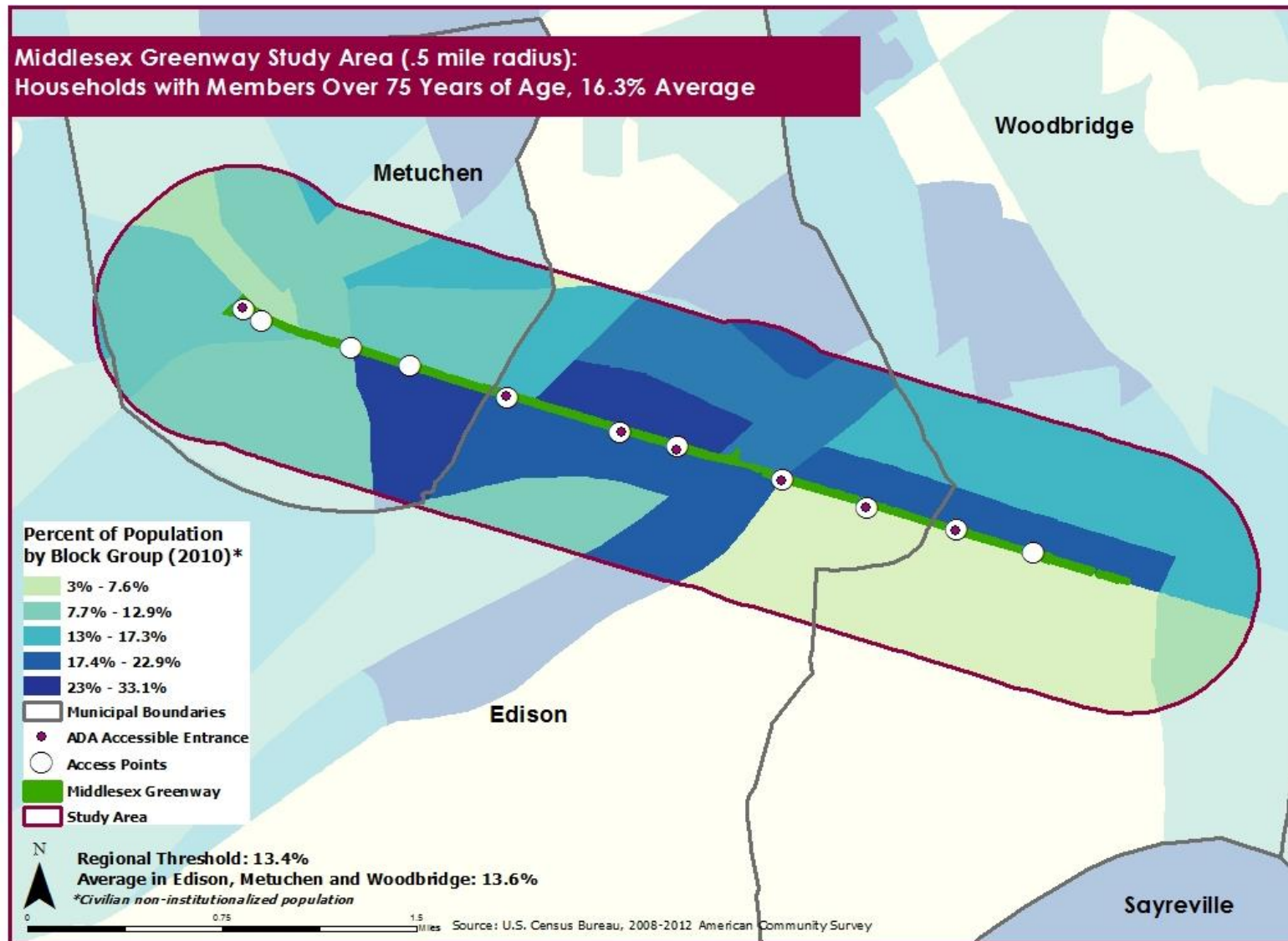
Although most access points are ADA accessible, the sidewalks getting to the entrance at Middlesex Ave. pass through the intersection of Middlesex, Central and Lake, generally considered to be one of the most dangerous for the borough’s pedestrians. The entrance at Pierson Avenue in Edison, down the street from the 300-unit Redfield Village garden apartment

complex that straddles the Metuchen-Edison border, has no sidewalks on one side and broken ones that are part of a parking lot on the other. These conditions can make it hard for those with mobility constraints, or who use canes or wheelchairs, to safely access the Greenway. A variety of other aspects of trail design and programming can also influence the degree of physical activity that an elderly or disabled person can obtain.

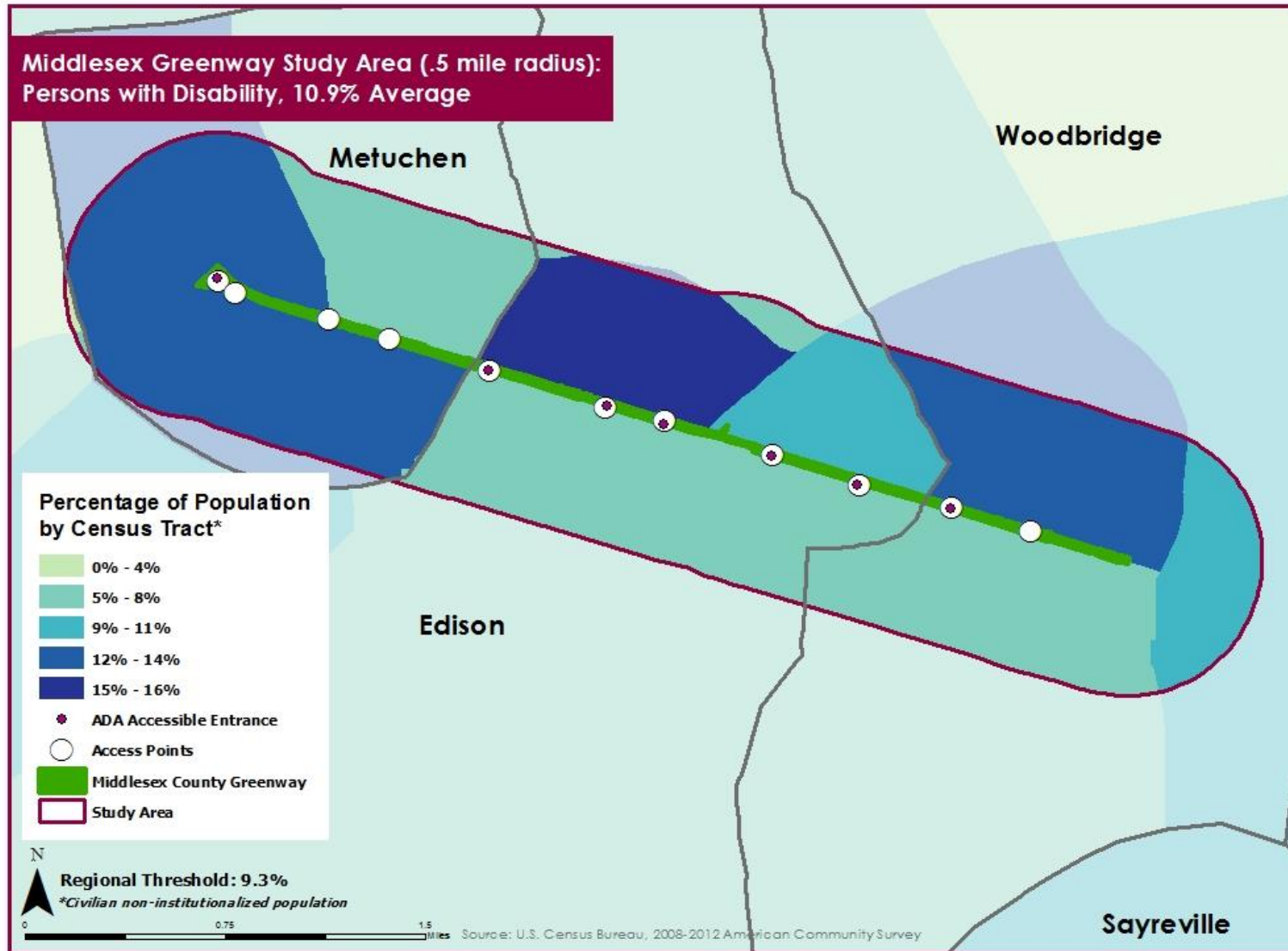
**Hispanic**

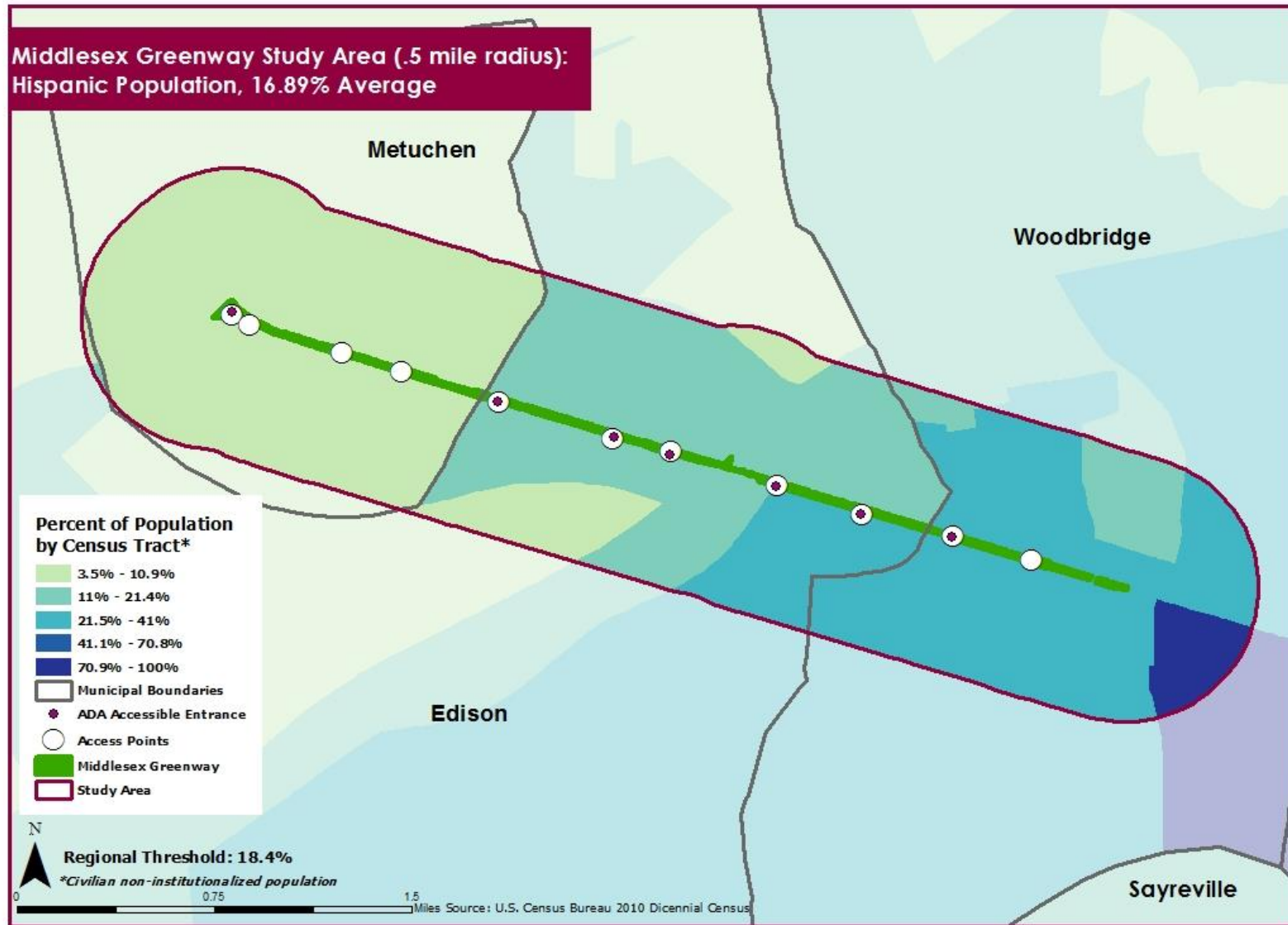
At over 26%, the concentration of Hispanic population within the 1-mile radius is significantly higher than the County average (18.4%), and while it is lower in the .5 mile radius at just under 17%, it is still a significant subpopulation with the potential to benefit disproportionately from the physical activity benefits of Greenway usage (see table 8 below for the details). The adult Hispanic population in New Jersey has overweight and obesity rates higher (66.3%) than either White (60.6%) or Asian (43%) ethnicities.<sup>ii</sup>

	Middlesex Greenway .5 mile radius	Middlesex Greenway 1 mile radius	Middlesex County
<b>Percent Hispanic</b>	16.90%	26.40%	18.40%
<b>Percent Elderly Persons (75+ Years)</b>	16.3	6.50%	6.00%
<b>Percent Persons with Disabilities</b>	10.90%	8.70%	8.30%









## Health Profile

Statistics from Weight of the Nation (2012) indicate that over one-third of adults and 12.5 million children (ages 2 to 19 years) are obese.<sup>iii</sup> Health statistics show that Middlesex County residents are slightly less physically active and have access to fewer recreational resources compared with the average NJ County. On most other measures related to the health benefits or impacts of a Greenway, county residents rank the same or better than state metrics. Although obesity figures are lower than the state average, the percentage of obese adults has been trending generally upward in Middlesex County since 2004.

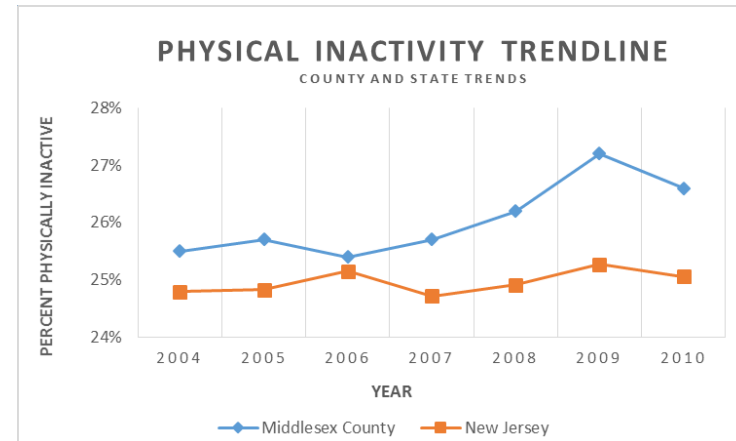
There were no current Community Health Assessments available to the research team to provide health data at a more local level that would clarify current health conditions of the population. Table 9 and Figures 1 and 2 compare health issues in Middlesex County to the State as a whole.

**Table 9. Middlesex County Health Statistics (2013)\***

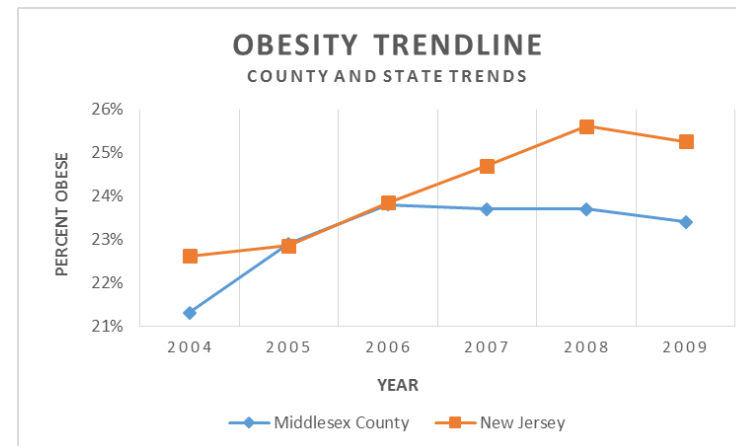
Health Issue	Middlesex	NJ
Mental Health	3.0%	3.3%
Inadequate Social Support	22.0%	23.0%
Rate of Recreational Facilities (per 100,000)	11	14
Access to Healthy Foods	63.0%	57.0%
Childhood (2 - 5) Overweight and Obesity	N/A	24.7%
Adult Obesity	24.0%	25.0%
Physical Inactivity	27.0%	25.0%
Overweight and Obesity Grades 9 - 12	N/A	24.7%
Diabetes	9.2%	9.0%
Heart Attack	35/10,000ppl	35/10,000ppl
Asthma - Adults (Current)	8.4%	7.7%

\*See reference section at the end of this document for the health statistics table along with data sources.

**Figure 5. Middlesex County Inactivity Trendline**



**Figure 6. Middlesex County Obesity Trendline**



### Baseline Health of Survey Respondents

Although not representative of the population, input from about 500 respondents who answered self-reported health questions on the survey can help to provide a snapshot of the health of the local community, particularly of those who are already use the trail (80% of them). It is important to keep in mind that those who completed the survey (very high education levels and higher incomes) could be generally healthier than the entire population of the impacted areas.

Almost three quarters of survey respondents reported that their personal health was very good to excellent. (See Table

10). Yet 42% have been told to increase physical activity by doctors (see Table 11), indicating that even some people reporting “very good” or “excellent” health are not in excellent physical condition and likely have some risk factors for obesity-related diseases. In fact, 10% of survey respondents reported obesity, but 20% said they have high blood pressure, which can be an obesity-related condition. Respondents are physically active, with 90% participating in exercise in the past month, and 70% of these people reporting that they exercise more than once a week. A quarter of respondents reported seasonal allergies and 13% indicated that they asthma – both conditions that can be exacerbated by exposure to pollens, grasses and air pollution. (See Table 12).

**Table 10. In general, my health condition is:**

Self-reported Health Condition	%
Excellent	26%
Very good	46%
Good	23%
Fair	4%
Poor	1%

**Table 11. Has your Doctor advised you to increase your physical activity?**

Doctor Advised Increased Physical Activity	% of Survey Respondents
Yes	42%
No	58%

**Table 12. Have you ever been told by a physician that you have:**

Health Condition	% of respondents
Heart Condition	5%
Diabetes	4%
Asthma or other respiratory illness	13%
Allergies to pollen, ragweed, or grasses	25%
High blood pressure	20%
Obesity	10%



## Projections and Recommendations

For each research question/health determinant, the research team conducted an assessment to result in predictions of potential health impacts resulting from increased use of the Greenway. The impact analysis is based in part on scientific or published evidence, and also on critical thinking and reasoned assessment based on experience and opinions of experts, interpretation of stakeholder concerns, and accepted principles of public health. The analysis includes consideration of any disproportionate impacts or inequities in the distribution of benefits and burdens among various population subgroups.

For each category of health impact, the connection of the health determinant to health outcomes is first discussed, based largely on literature. Then, a summary of what the research team gathered from community and stakeholder input is presented, followed by the impact projection. Finally, the related recommendations for maximizing the benefits and minimizing the negative aspects of the issue are presented and discussed.

### Discussion of Assumptions, Data Gaps and Constraints

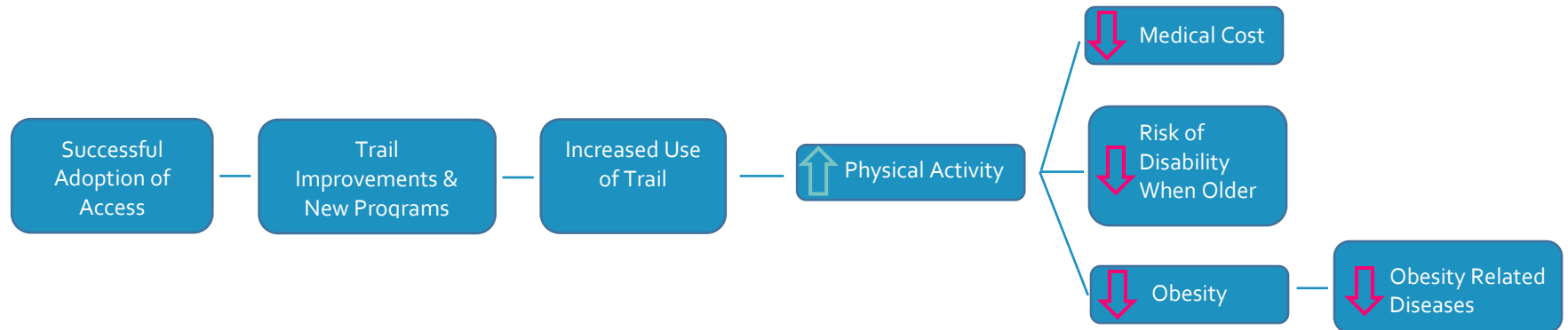
The literature cited includes only a subset of the literature available on each topic. The HIA Team selected references without bias toward positive or negative findings, though it is

possible that sentinel studies are mistakenly absent due to time limitations. As mentioned above, the HIA Team collected some new non-random primary data, but relied also on secondary data, where available. The HIA Team did not have sufficient validated quantitative data to produce statistical models to predict specific numeric degrees of change (e.g. percent reductions in obesity), but did use some equations from published literature, together with locally gathered data, to extrapolate some specific quantitative predictions, with caveats and limitations transparent.

Also, it is important to note is that some of the health benefits and risks identified in this assessment may not materialize if the goals of the Plan are not realized – that is, if the Greenway is underutilized. Utilization may be influenced by: general awareness that the Greenway exists; ease of access; perceptions of safety (both crime and infrastructure conditions); connections/linkages to nearby trip generators, public transit and a larger trail/bikeway network; and presence of amenities and programming that encourages Greenway use. If resources are not harnessed to achieve increased use, obstacles emerge, or project strategies do not work, then the working assumption behind these predictions is no longer in effect.

## PHYSICAL ACTIVITY

### Connection to Health Outcomes



The health effects of physical activity have been studied extensively. Strong scientific evidence exists for the benefits of physical activity in reducing obesity and associated diseases (heart disease, stroke, diabetes, high blood pressure) and improved fitness.<sup>iv</sup> Moderate evidence exists for physical activity's role in lowering risk of hip fracture, increasing bone density and lowering risk of future disability in adults.<sup>v</sup> For children and adolescents, physical activity is strongly connected to improved cardiovascular endurance, muscular fitness and more favorable body composition. Access to public spaces for recreation is an important factor in the ability to exercise<sup>vi,vii,viii</sup> and this would be particularly important in densely populated neighborhoods with compact properties and little open space. One study found that thirty

percent of people who are physically active exercise in public parks<sup>ix</sup> and another found that people who live near trails are 50% more likely to meet physical activity guidelines.<sup>x</sup> Individuals are more likely to utilize parks if they are close to where they live, are safe, and are regularly maintained.<sup>xi</sup>

Obesity continues to impose an economic burden on both public and private payers. Research shows that medical costs related to obesity account for almost 10% of annual medical costs,<sup>xii</sup> and could rise to 21% of health care spending by 2018 assuming current trends<sup>xiii</sup> Recent studies calculated that use of greenway trails can provide per capita medical benefit of \$564 and that medical spending for the obese was \$1,429 higher than for someone of normal weight.<sup>xiv,xv</sup>

### *Vulnerable Populations*

Although there is not a strong concentration of households in poverty in the immediate vicinity of the Greenway, for those who are of lower income, the presence of the trail helps to address common disparities in access to parks and trails for those in poor neighborhoods.<sup>xvi, xvii</sup> A study also showed that teens who live in poor or mostly minority neighborhoods are 50% less likely to have a recreational facility near home.<sup>xviii</sup> The nearby Greenway can help minority or poorer residents, who cannot afford paid membership at a health club, with the opportunity to meet daily recommended levels of physical activity and recreation.<sup>xix, xx, xxi</sup> Not surprisingly, our survey bears out that the presence of the Greenway makes more of a difference in increasing physical activity for people of lower incomes than those of higher income (See Table 13), and more for Hispanics and Asians than Whites (See Table 14). Further, those at most risk for obesity and related diseases include minority groups and low-income individuals.<sup>xxii, xxiii</sup>

Children are another subpopulation that can benefit disproportionately from easy access to a safe place to walk, run, and bike and there is moderate scientific evidence that physical activity is connected to reduced anxiety and depression in children.<sup>xxiv</sup> For senior citizens, there is a strong connection between increased levels of activity and improved cardiorespiratory and muscular fitness, prevention of falls, reduced depression, and better cognitive function. The minority groups surrounding the Greenway are predominantly

Hispanic or Asian (26% of the over 80,000 population within one mile radius of the Greenway are Hispanic, 18.6% are Asian). A study of first, second and third generation Hispanic and Asian Americans found an increasing BMI associated with later generations.<sup>xxv</sup> Additionally, children of newly arrived immigrants are vulnerable to issues with obesity.<sup>xxvi</sup> These figures indicate a large potential for vulnerable subpopulations surrounding the Greenway.

### *Community and Stakeholder Input*

Although survey data is not representative of the study area population, self-reported health of respondents was generally good, with 95% reporting personal health as “good” or better, and most reporting some regular exercise. However, more than four out of ten indicated that a physician had advised them to increase physical activity, and 10% reported suffering from obesity. The greenway can play a significant role in improving physical fitness for regular users. About two thirds of trail users surveyed reported that they use the trail most often for fitness.

Importantly, evidence from the survey and other stakeholder engagement suggests that the greenway is providing *new* physical fitness opportunities and *increasing* physical activity, not simply changing its location or venue. About two thirds of survey respondents reported that they are getting either a great deal (24% or somewhat (45%) more physical activity since the Greenway has been opened.

**Table 13. Increased Physical Activity from Greenway by Income**

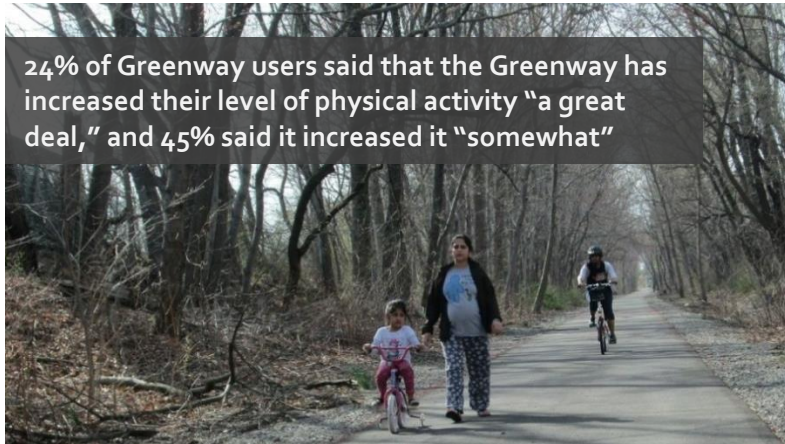
How much do you think your use of the Middlesex Greenway has increased your level of physical activity compared to before the trail was in place?						
		A great deal	Somewhat	Not much	Not at all	Total
What is your total annual household income?	Less than \$25,000	3 33.33%	3 33.33%	1 11.11%	2 22.22%	9 100.00%
	\$25,000 to \$50,000	7 38.89%	8 44.44%	2 11.11%	1 5.56%	18 100.00%
	\$50,000 to \$100,000	25 28.74%	39 44.83%	15 17.24%	8 9.20%	87 100.00%
	\$100,000 to \$150,000	20 25.00%	34 42.50%	17 21.25%	9 11.25%	80 100.00%
	\$150,000 or more	23 19.66%	60 51.28%	20 17.09%	14 11.97%	117 100.00%
	Total	78 25.08%	144 46.30%	55 17.68%	34 10.93%	311 100.00%

**Table 14. Increased Physical Activity from Greenway by Race**

How much do you think your use of the Middlesex Greenway has increased your level of physical activity compared to before the trail was in place?						
		A great deal	Somewhat	Not much	Not at all	Total
Which ONE of these descriptions of race and ethnic backgrounds most applies to you?	White Hispanic	6 23.08%	13 50.00%	7 26.92%	0	26 100.00%
	White not Hispanic	63 23.16%	123 45.22%	54 19.85%	32 11.76%	272 100.00%
	Black Hispanic	0	0	0	0	0
	Black not Hispanic	2 66.67%	1 33.33%	0	0	3 100.00%
	Asian	11 33.33%	14 42.42%	5 15.15%	3 9.09%	33 100.00%
	Native American	0	0	1 100.00%	0	1 100.00%
	Other	3 20.00%	7 46.67%	4 26.67%	1 6.67%	15 100.00%
	Total	85 24.29%	158 45.14%	71 20.29%	36 10.29%	350 100.00%



### Impact Projection



24% of Greenway users said that the Greenway has increased their level of physical activity “a great deal,” and 45% said it increased it “somewhat”

The Greenway is the only linear path of its kind easily and freely accessible to the residents of the three towns. Because it can be safely used for exercise, it has the potential to make a significant positive impact on fitness of regular users. From our survey of over 560 people, mostly from the surrounding communities, 24% of Greenway users said that the Greenway has increased their level of physical activity “a great deal,” and 45% said it increased it “somewhat.” 57% of non-users said they would probably use the trail in the coming year, so if the same 24% of these might increase their physical activity a great deal, then we could extrapolate that about 14% (57% X 24%) of nearby residents (20,000 within .5 mile) that don’t currently use the trail might gain significant health benefits. A rough estimate comes out to about 2,800 people who could gain health benefits from trail use.

In terms of medical costs, studies have estimated the medical cost savings of physical activity at anywhere from \$615 to

Table 15. How much do you think your use of the Middlesex Greenway has increased your level of physical activity compared to before the trail was in place? (n = 377)

Answer	%
A great deal	23.87%
Somewhat	45.09%
Not much	20.16%
Not at all	10.88%
Total	100.00%

\$823 per year.<sup>xxvii</sup> Even taking just the 90 people who reported in the survey that the Greenway has increased their level of activity “a great deal” and multiplying by the more conservative \$615 yields a benefit of \$55,350 per year in medical cost savings. Of survey respondents who have not yet used the Greenway, 77 (57%) said that they would “probably” or “definitely” use it in the next year. If the same 24% of these 77 new users increase their activity a great deal, another \$47,355 in savings would be achieved, for a total of over \$100,000 in medical cost savings just among known and predicted users from our sample. Although this is only a rough estimate and not a scientifically valid economic model, the

potential exists for actual savings, including current and future users, to be many times this figure.

### *Related Recommendations*

#### Enhance usability and expand physical fitness options.

To obtain maximum fitness and health benefits from the greenway, it should be designed and programmed to safely accommodate a full range of non-motorized use options. Stairs or at-grade entrances at access points currently allow non-disabled walkers, runners and joggers easy access, but all access points should also accommodate people with disabilities with ADA-accessible ramps. The presence of rental stations, even temporarily on weekend or heavy use days, would encourage those who don't own bikes or rollerblades to rent them for day use. Exercise benefits can also be enhanced by identifying and promoting activity loops that include but extend beyond the greenway, particularly for bicyclists who desire a longer ride. Well-signed and accessible connections between the greenway and other nearby local parks (like Dudash and Myrtle) and corridors (East Coat Greenway) will promote more possibilities for users to both lengthen and diversify their trips, and also to consider other outdoor activities like picnicking or playing sports. The three towns might consider installing exercise stations in close proximity to the trail and seeking local business sponsorship for the equipment. Edison Greenways and other local nonprofits can continue to encourage the formation of exercise groups and events to help to promote fitness and social interaction. Finally, use of the trail would be more conducive to varied



**"I always wish there were more benches. Lots of times I just need a place to rest & a place to relax"**



uses with benches and picnic tables installed in strategic locations to allow a place to rest, or to put on roller blades, for example. Signs to indicate nearby restroom and refreshment locations may allow users to enjoy the trail for longer stretches of time, while supporting the local business district. While Middlesex County would need to oversee installation, the cost for benches, tables and signs could be underwritten by local sponsors. Results of public engagement supported the installation of benches and exercise stations, and more events as strategies for increasing use and benefits

#### Increase use and benefit by vulnerable subpopulations.

The greenway's health benefits should extend to users of all ages and abilities, including vulnerable and traditionally disadvantaged populations. Vulnerable populations include those with existing health conditions or disabilities, the young and the elderly, and others with more limited ability to access or use the greenway because of poverty, ethnic or linguistic isolation or other constraints. For those with diagnosed health conditions that would benefit from regular physical activity, local health providers could prescribe use of the greenway for weight reduction and overall health improvement. The use of physical activity prescriptions by physicians is an increasing practice to address inactivity and healthy behaviors. Assuring that all ramps are ADA-accessible will eliminate any barriers for use by those in wheelchairs or using other walking aids. For example, young adults from local colleges could provide companions for seniors who need extra physical help to access or use the

greenway. Senior citizens in our survey and other stakeholder engagement suggest that adding benches and implementing chaperone programs would facilitate their use of the greenway. Benches would allow seniors and those with heart conditions to rest frequently.

Efforts should be made to assure that publicity about the trail is translated into Spanish, the largest local ethnic minority, so that those who are linguistically isolated in these communities are aware of its location and features. Also, there is a train station and over 45 NJ TRANSIT bus stops located within a block of the trail, many within walking distance of trail access points. Facilitating better access and awareness by bus and train riders of the trail, through signage or pamphlets, could lead to more transit riders adding a walk on the trail to their trips, or using the trail as a route to or from home. For youth populations in the area, nearby schools,



particularly Herbert Hoover Middle School, could promote the greenway as both a safe route to school and also for fitness activities.

#### Enhance trail cleanliness and maintenance.

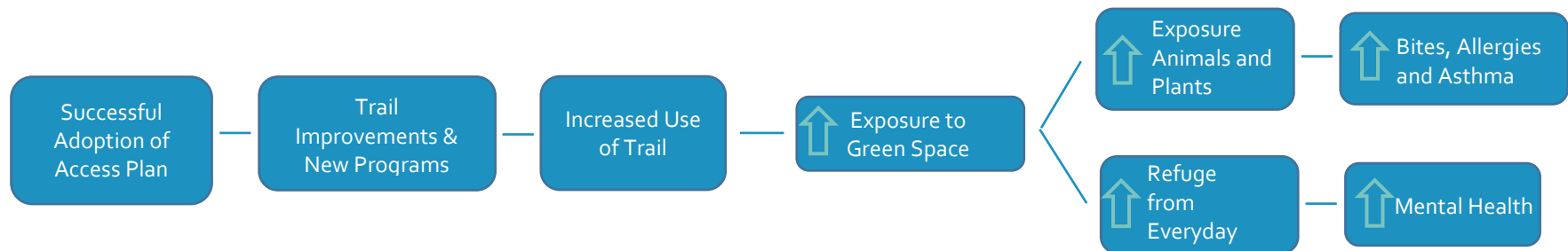
A trail that is clean, free of litter and well-maintained creates a healthy environment for residents seeking enjoyment and health benefits. If trash is strewn on or alongside the path, it can create odors or harbor insects or rodents that could aggravate users, in addition to being unsightly and thus discouraging use. There were no strong indications that garbage or lack of maintenance is a problem along this greenway, but members of the public suggested installation and regular emptying of additional trash and recycling cans, as well as dog refuse bags. More prominent “no littering” signs, with fees associated with non-compliance, are a low-cost way to minimize littering. Local groups could organize cleanup days, or a more formal “adopt-a-trail” cleanup program, to foster voluntary trash pickup. Working together with the County maintenance crew, these efforts should go a long way toward keeping the trail as trash-free as possible.

Forms of vandalism including graffiti can also visually disrupt the trail experience and cause distress, as reported by some members of the public in the engagement process. Through signage or public announcements, the County and local police or health departments could facilitate easy ways to report signs of vandalism or graffiti to proper authorities so that they can remove it.



## ENVIRONMENTAL EXPOSURES

### Connection to Health Outcomes



Being on the Middlesex Greenway means being near to and surrounded by vegetation in the form of trees, some open fields with grasses, and some weeds alongside the trail. Vegetated paths that pass by backyards, parks and empty lots will expose users to potential hazards that can result in acute incidents (e.g. bites), diseases (Lyme diseases) or allergic reactions (e.g. poison ivy). People who already suffer from asthma or allergic reactions to pollens, trees and bushes, may suffer aggravated symptoms from these exposures. However, if asthma is well-managed, there is no associated between asthma symptoms and leisure-time physical activity in children.<sup>xxviii</sup> It also means possible contact with plant or insect pests like poison ivy, ticks or mosquitoes. Bites or rashes can range from being nuisances to more serious conditions requiring hospitalization. Negative encounters

with wildlife or stray pets that may live or wander near the trail can also be a concern to trail users. In this case, users risk encounters with an aggravated or rabid animal that could result in an acute incident. On the other hand, exposure to nature and open space has a positive effect on mood and improves symptoms of stress. There is a strong connection between exposure to the outdoors and improved mental health, particularly when it is shared as a social activity. The relative quiet and beauty of nature provides a refuge from everyday stressors, and social interaction combats loneliness.<sup>xxix</sup> Studies have shown decreased symptoms of depression and anxiety, and an overall improvement in well-being from physical activity and from access to green spaces.<sup>xxx,xxxi</sup>



### *Vulnerable Populations*

Those who suffer allergies and asthma are more vulnerable to environmental exposures to pollen or pollution. Research has shown that children living in low-income families since birth have twice the rate of likelihood of developing asthma.<sup>xxxii</sup> These populations could be advised to avoid greenway use and outdoor environments on days with high pollen or other trigger elements.

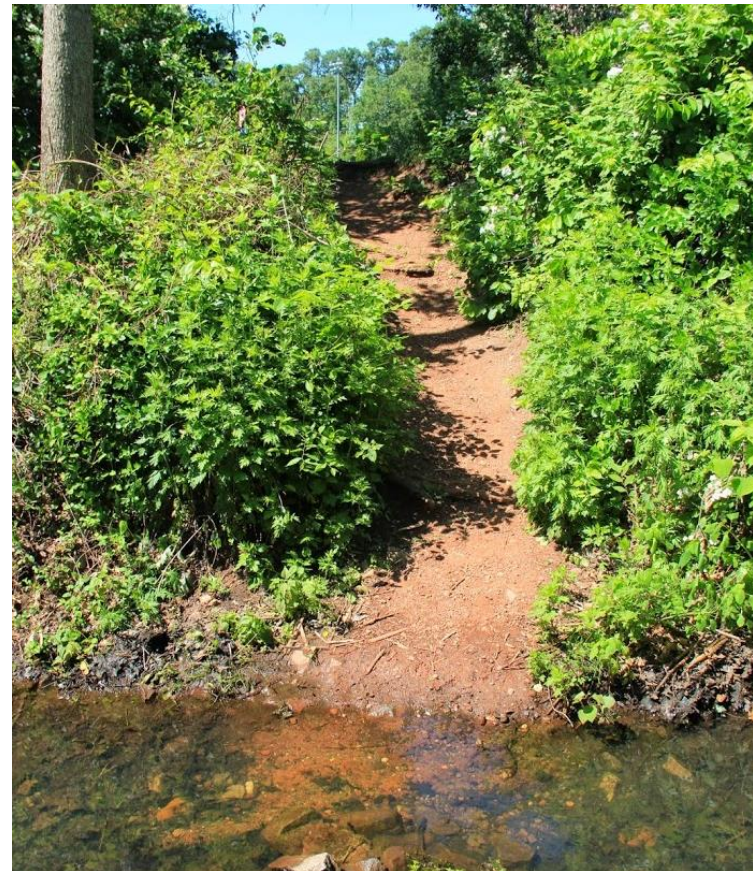
Exposure to greenspace has been shown specifically to assist the development of feelings of well-being in children, helping them to learn emotional and behavioral connections to nearby natural and social environments.<sup>xxxiii</sup> Exposure has also been shown to reduce symptoms of Attention Deficit Hyperactive Disorder in children.<sup>xxxiv</sup>

### *Community and Stakeholder Input*

Survey results showed that close to one third of trail users are concerned about encounters with animals, whether wild or perhaps wandering pets. Public comments revealed concerns about mosquitoes, ticks and poison ivy, in particular. Although not a representative sample, 25% of those completing a survey reported suffering from allergies and 13% from asthma symptoms that could be aggravated by air pollution or allergens.

### *Impact Projection*

Increased time outdoors will bring about more exposure to pollutants, pests and allergens, but there is no strong evidence from either literature or from local data collection that the increase in exposure would be significant or would outweigh the other stronger physical and mental health benefits. Little impact on rates of asthma or respiratory illness, poison ivy or animal and insect bites is expected from increased trail use.



***Related Recommendation***

Minimize exposure to animal and insect pests and noxious weeds.

County parks and public works personnel should make every effort to improve drainage to reduce standing water where mosquitoes can breed, and continue its mosquito control program, being sure to notify users when treatments occur.

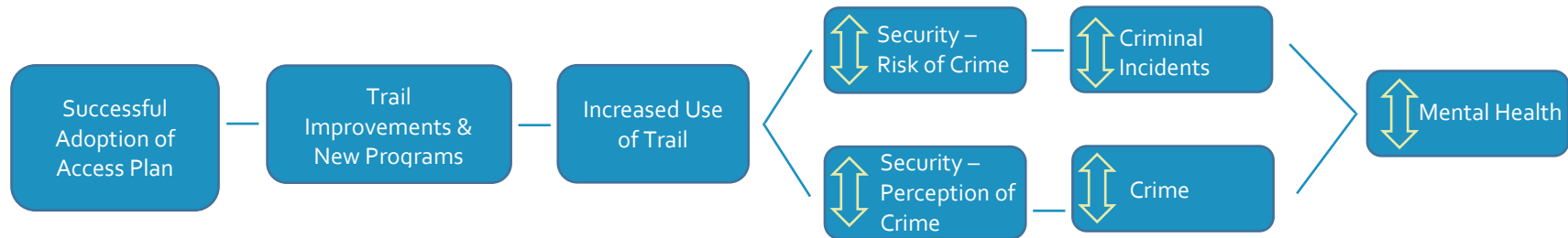
The County, along with local health departments, could also monitor for presence of poison ivy and other noxious weeds close to the trail, and add signage to educate users about mosquitoes, poison plants and ticks - how to identify them and guard against exposure. Continued periodic patrols for stray animals and quick response to reports of nuisance animals are also important strategies to prevent these negative impacts.





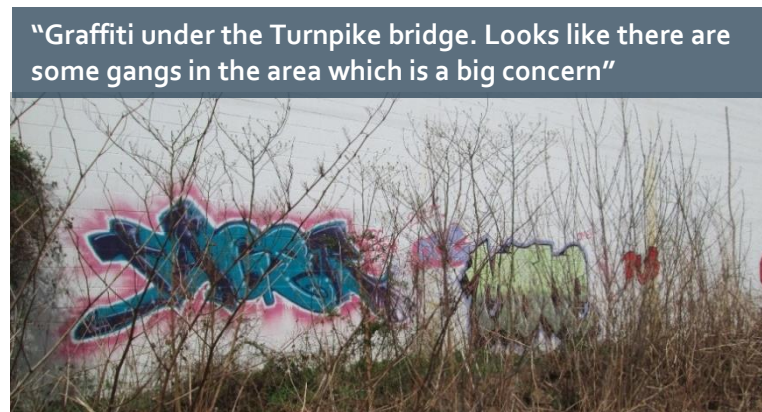
SECURITY

Connection to Health Outcomes



Studies have shown that concerns about lack of personal safety can prevent people from engaging in outdoor physical activity.<sup>xxxv</sup> A fear of crime is often more influenced by individual factors than social and physical factors, making it challenging for providers of an outdoor recreation amenity

to combat. However, a study of crime perceptions along a linear park in Boston found that a narrower corridor with bordering houses and shops was more desirable than a wider, more open corridor. The more people walking on the trail also increased a sense of security.<sup>xxxvi</sup>



A well-used trail deters crime. The more people who use the Greenway for walking, bicycling, etc., the safer the Greenway will be. A study done by Rails to Trails investigated crime rates on 372 trails to find that only 3% of responding trails had experienced criminal incidents.<sup>xxxvii</sup> Specifically, Charles R. Tennant, Chief of Police for Elizabeth Township in Buena Vista, PA notes:

*"The trail has not caused any increase in the amount of crimes reported and the few reported incidents are minor in nature... We have found that the trail brings in so many people that it has actually led to a decrease in problems we formerly encountered such as underage drinking along the river banks. The increased presence of people on the trail has contributed to this problem being reduced"*

Research has found that having good lighting and readable signs about crime prevention are effective tactics for reducing crime.<sup>xxxviii</sup> Also, natural surveillance is a way of keeping the environment well-maintained so that people can be easily be seen and there are few places for unwanted activities.<sup>xxxix</sup> These strategies would also reduce the perception of crime.

### *Vulnerable Populations*

Fear, or lack of perceived safety, is associated with reduced levels of physical activity, especially in women over 65 years and non-white female population.<sup>xl</sup> Elderly and female populations are most vulnerable to crime and to fears of crime



**Community and Stakeholder Input** According to local officials and greenway advocates, there have not been any incidents of physical assault along the greenway since its opening.

Feedback from the outreach process suggests that even without a single reported physical assault or attack, many women and elderly people have personal safety concerns and are fearful that the relative isolation of the greenway makes them vulnerable to physical attack or mugging. Supporting the idea that women are more fearful of crime, our survey results showed that women were significantly less likely to feel safe from crime on the Greenway (53%) than men (83%) (see Table 16). Concerns about crime and security were the most frequently listed comments on the survey, among both users and non-users of the trail, and the highest number of suggestions for improvement had to do with issues of enhancing security.

### Impact Projection

There is no support to project whether the actual number of crimes that occur on the trail might increase with more people on the trail or not. But strong evidence suggests that the

more people that are using a walking trail, and the less isolated people feel, the more the feeling of isolation and the resultant fears of crime are reduced. If elements of the trail are designed for additional “eyes on the trail” through strategic vegetation maintenance and use of security cameras, crime can be deterred.

### Related Recommendation

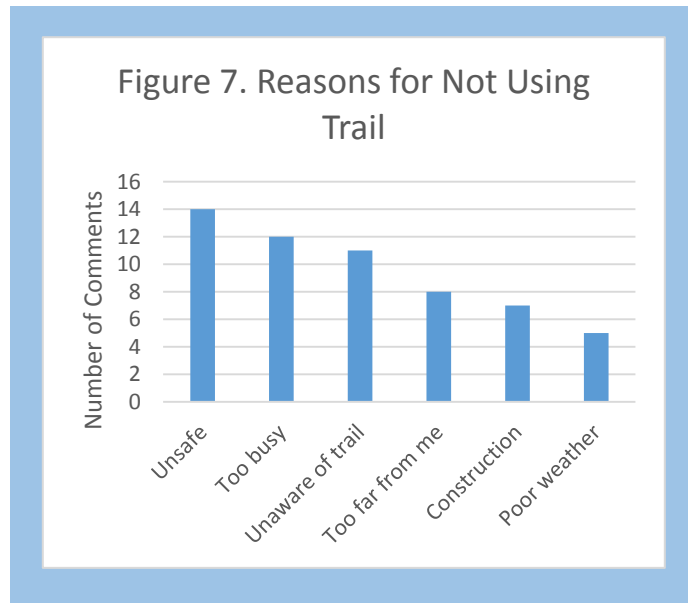
Despite a lack of reported crime, the fear of crime can deter some users from using the trail. Six out of ten survey respondents said they would use the trail more if they felt safer from crime. People also expressed concerns about being unable to quickly report their whereabouts for emergency response. If the Access Plan is successful in bringing more people to the Greenway, the feelings of isolation should decrease and with more “eyes” on the Greenway, any potential risk of criminal activity should also decrease.

**Table 16. Perception of Personal Safety by Gender\***

		Please rate your level of agreement with the following: On the greenway, I feel safe from crime.					
		Strongly agree	Agree	Not sure/No opinion	Disagree	Strongly disagree	Total
Are you male or female?	Male	53 35.81%	69 46.62%	15 10.14%	8 5.41%	3 2.03%	148 100.00%
	Female	25 11.63%	88 40.93%	54 25.12%	41 19.07%	7 3.26%	215 100.00%
Total		78 21.49%	157 43.25%	69 19.01%	49 13.50%	10 2.75%	363 100.00%

\* p-value = 0.00, Chi-Square

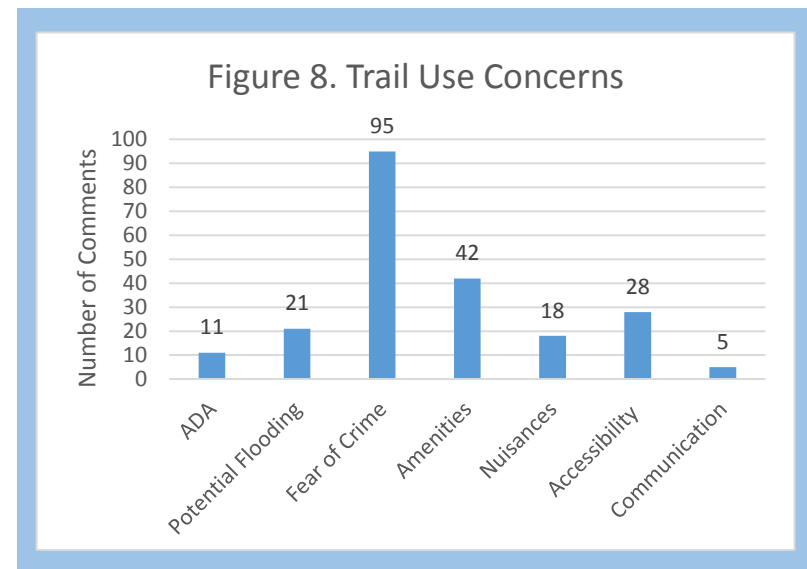




### Improve feeling of security for Greenway users.

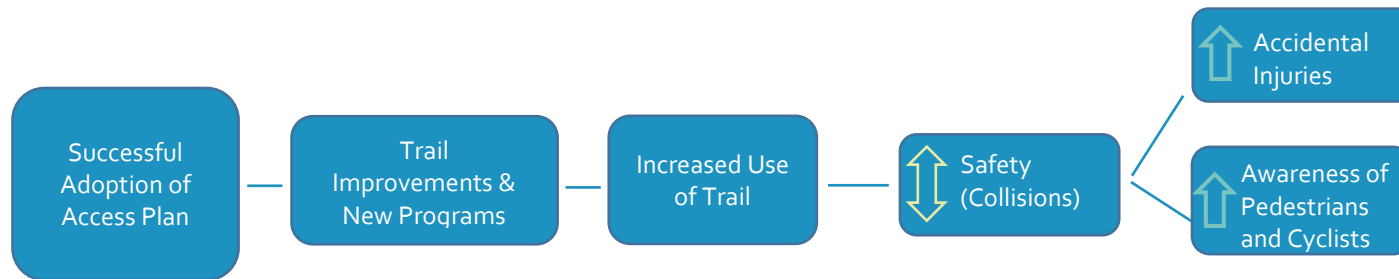
Continued local police patrol and response networks should assure that every effort is being made to minimize or prevent any future incidents. Additional police patrol rounds timed to specific user activity periods (i.e., after school dismissal or during seniors group walks on the trail) may improve the safety perceptions of greenway users. Trail managers could consider additional locations for surveillance cameras and/or “mock” cameras that are marked by signs, and improved lighting at some darker locations (e.g. tunnels), or near more vulnerable populations like the senior centers or schools. In places with dense vegetation, pruning to create openings in

the foliage may help reduce feelings of isolation. The exercise groups encouraged by local civic groups or employers to foster increased physical fitness also have the benefit of bringing safety in numbers. A “greenway watch” program, modeled after successful “neighborhood watch” programs, could also bring additional “eyes” on the trail. Finally, additional “where are you?” signs to indicate proximity to nearby intersections or landmarks would improve both the quality of response to any emergency calls, and trail users’ knowledge of their location and feelings of being prepared.



## SAFETY

## Connection to Health Outcomes



On a trail, there are numerous ways that accidental injuries could occur. On the trail itself, people are moving in different ways and at



different speeds, and some may be stopped. On a 10-ft. wide path, collisions between users could occur, causing falls, cuts, bruises, or broken bones. Bicycles could collide with walkers, or skateboarders could collide with people pushing strollers. An individual using the trail could also suffer an injury from a fall not caused by a collision. Some residents may live near the park, but busy roads or a lack of signs and signals could create physical access barriers to traveling to the Greenway. Providing a safe entrance to the park, ample signage and involving the community in park development are critical to its utilization. Decreasing the route distance to the park and creating safe bike paths and sidewalks increases access to parks. A well-designed bike lane or bike path can be a safe place for people to cycle.<sup>xii</sup> An individual using the trail could also suffer an injury from a fall not caused by a collision. Collisions and resulting injuries are a potential of all travel, however there are ways to minimize potential for crashes through design and education. For example, in a study of 19 US cycling lanes, it was determined that the risk of bicycle-vehicle crashes is lower on separated lanes than

published crashes rates on roadways. Additionally, where the greenway crosses two-lane or four-lane roads, collisions with motor vehicles could occur. Likewise, some residents may live near the Greenway, but busy roads or a lack of signs and signals could create physical access barriers to traveling safely to the Greenway.<sup>xlii</sup>

Though the risk of a collision can never be eliminated, literature shows that the likelihood that a given person walking or bicycling will be struck by a motorist varies inversely with the amount of walking or bicycling normally present in the community. If the increased trail traffic is well-managed, and both trail users and drivers become accustomed to the volume and flow, evidence shows that the proportion of injuries and crashes can actually decrease with more users<sup>xliii</sup>,<sup>xliiv</sup> Providing safe walking and biking routes to the Greenway is critical to increasing utilization.

### *Vulnerable Populations*

Safety concerns are the most disproportionate for the elderly and disabled and for children. Senior pedestrians have slower walking speeds and increased reaction time. This coupled with increased frailty puts older adults at greater risk of pedestrian injury.<sup>xlv</sup> For children ages 5 to 9 years, recreational injuries are most likely to occur on the playground and while riding bicycles. Likewise, for older children, cycling injuries are among the most common.<sup>xlvi</sup> Programming and events that are specific to seniors like chaperoned walks, and those specific to children, like walk to school events, will help to address safety concerns of these groups.



### *Community and Stakeholder Input*

About one in four trail users in our survey expressed concerns about collisions and crashes, both on the trail and accessing the trail from nearby locations. Feedback from public engagement revealed that some residents need to travel on dangerous routes to access the trail.

There has been a significant increase in public concern regarding pedestrian and bike safety issues in Metuchen in 2013-2014. In response, the Borough of Metuchen began a pilot program involving pedestrian safety flags at two intersections. In addition, a citizen advocacy group, Bike Walk Metuchen (part of NJ Bike & Walk Coalition), formed in 2012,

provides a forum for borough residents and officials to consider ways to improve and promote biking and walking in the borough. With these concerns in mind, the Metuchen has adopted a Complete Streets policy that can support pedestrian and bike safety objectives.

### *Impact Projection*

Improving the pedestrian and bicycle infrastructure at intersections and along road segments that lead to the trail will result in more people using the trail. Although there is not a justifiable way to put a number on it, it is highly likely that the rate of crashes and injuries will go down with increased trail use, particularly at intersections, as motor vehicle traffic becomes accustomed to pedestrian crossing patterns and crosswalks are improved. Collisions between users may increase slightly, but will be mitigated by better user education and trail use habits, so the effect is likely to be small

### *Related Recommendation*

*Minimize crashes and injuries along the Greenway.*

Accidental incidents pose injury risks for greenway users. Either en route to the trail or at places where the trail intersects a roadway, street design and crosswalks should be as safe as possible. Along the trail itself, bicyclists, joggers,

people pushing strollers and people in wheelchairs are moving at different speeds and at different levels of attention.

An assessment of the safety of road intersections would help to prioritize locations for crosswalk improvements. Crosswalk safety at intersections near trail access points and protected bicycle facilities should also be considered. Reducing potential collisions and injuries along the greenway path will require education and awareness of proper trail use (following the trail etiquette, staying to the right, yielding to pedestrians, etc.). For cyclists, defensive riding (giving the person warning you are passing, slowing speeds, obeying rules of the road, etc.) goes a long way toward making a trail ride a safe activity. Since the Greenway will attract inexperienced trail users of all ages, trail guidelines are especially important.

## SOCIAL COHESION

### Connection to Health Outcomes



When many members of a community are at the same place enjoying the same resource or activity, it can create a sense of social cohesion.<sup>xlvii</sup> More positive social interaction can create a healthier community and decrease feelings of loneliness and increase lifespan for individuals.<sup>xlviii</sup> A common green space can provide that desirable place to form strong social ties and interact with other residents.<sup>xlix</sup> Activities like walking for exercise with other people have been shown to reduce depression symptoms.<sup>l</sup> In fact, research suggests that open spaces offer opportunities for peace, relaxation, and social activities that, for many, is the primary purpose for visiting, with physical activity as a secondary benefit.<sup>li</sup>

#### *Vulnerable Populations*

Social connectivity may be most important for those who live alone and are more isolated from other community activities due to mobility, time or monetary constraints. These could include lower-income individuals and seniors or disabled

living alone in apartments or homes. In addition, a person's income level greatly affects their available opportunities for physical activity, people with lower incomes have fewer opportunities ranging from access to walkable streets to proximity to schools, parks, and open space.<sup>lii</sup>

#### *Community and Stakeholder Input*

Almost one quarter of survey respondents indicated that they would use the Greenway more if there were more events (see Figure 9). Also, a majority of users reported using the Greenway with one to two other people. Clearly, gathering with others who are walking, jogging or biking along the Greenway is preferred by many users. Strong evidence from literature links increased social interaction with a reduction in loneliness and increase in community cohesion that leads to improved mental health.



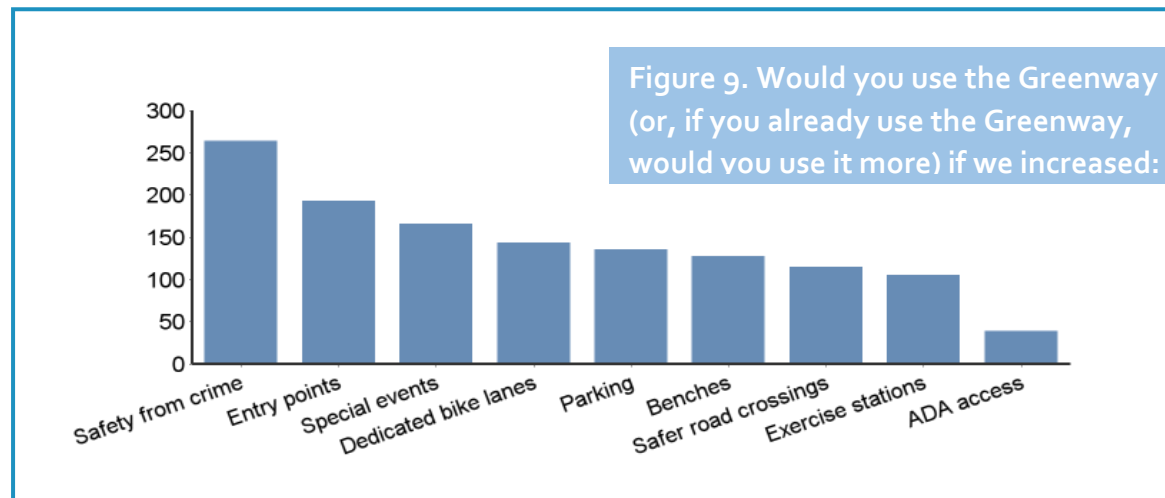
### Impact Projection

There is strong evidence that social events and activities that bring people together doing the same activities will build a more cohesive community, and that this feeling of community will improve both mental and physical health of individuals in the community. With increased use of the Greenway, social cohesion in the three towns and other nearby areas should improve.

### Related Recommendation

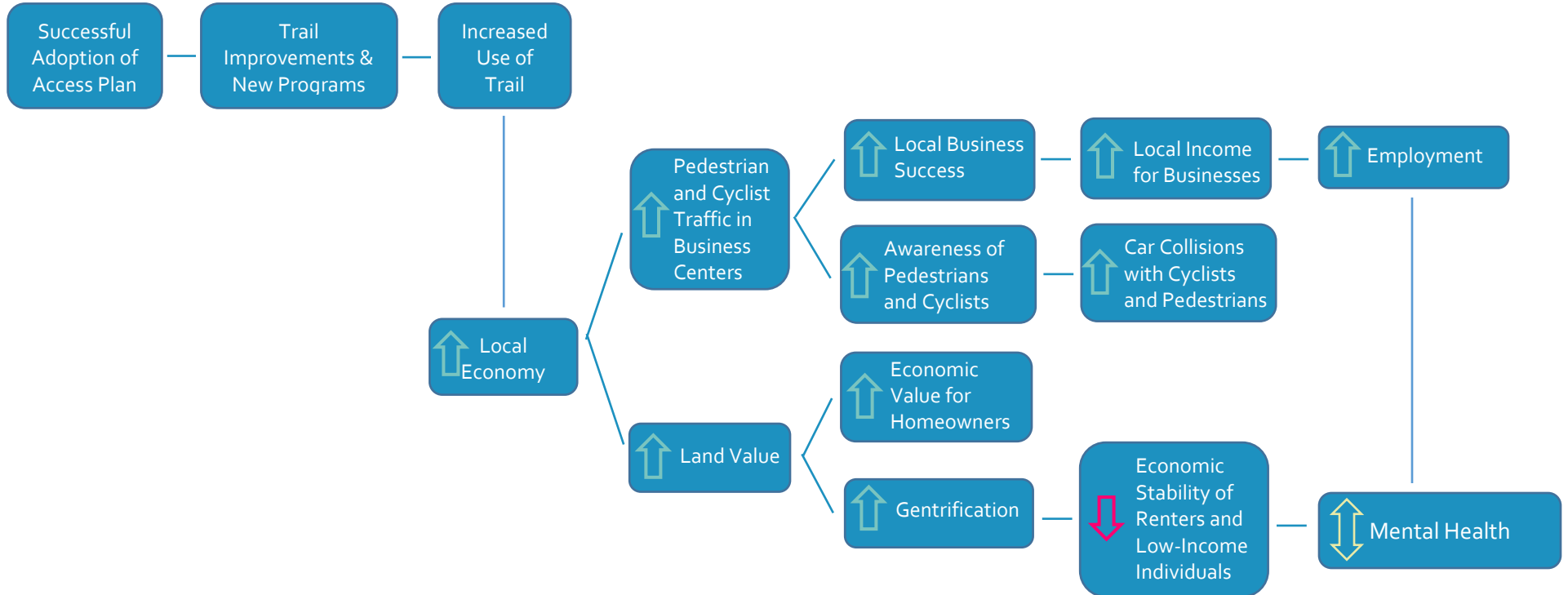
**Encourage local groups to use Greenway for events and exercise.**

Social events help improve the Greenway in many ways. Group events help people who may not feel comfortable using the Greenway alone or may not know where to access the entry points gain a comfort level with using the facility. People are more likely to use the Greenway in the future if they know where and how to access the facility. Group events also create motivation and socialization. Both are proven strategies for sticking to fitness goals.



LOCAL ECONOMY

Connection to Health Outcomes



Use of the Middlesex Greenway can affect the local economy in several ways. When people leave their homes to access the Greenway for exercise, strolling, or to get somewhere, they may combine their visit to the Greenway with a purchase of food or drink from a local store as refreshment. Several

studies have showed that increased foot-traffic from installation of bicycle and pedestrian friendly improvements have equated to increased business.<sup>liii</sup> They may also purchase equipment related to their use of the Greenway that they would not have purchased without the opportunity to use it

on the Greenway, such as bicycles, roller blades and accessories. In one study of a much longer trail (Virginia Creeper Trail) that draws users from outside the local region, it was estimated that each visitor to the trail spent between \$23-\$38 per trip.<sup>liv</sup> A non-random survey of 862 Delaware & Lehigh Trail users showed that an annual average of \$425 per user was spent on hard goods such as bicycles and running gear. The same survey indicates that \$33 in soft goods such as food or beverages was purchased per trail user.<sup>lv</sup>

Research has also shown that areas for recreation, such as trails, increase property values for the surrounding residential properties, and ultimately increase tax revenues for the municipalities.<sup>lvi</sup> The increased home prices have been



documented in many studies in many parts of the country.<sup>lvii,lviii</sup> The downside of increasing land values is that if gentrification occurs, some lower income individuals and renters may face housing cost increases that drive them from the area.

### *Vulnerable Populations*

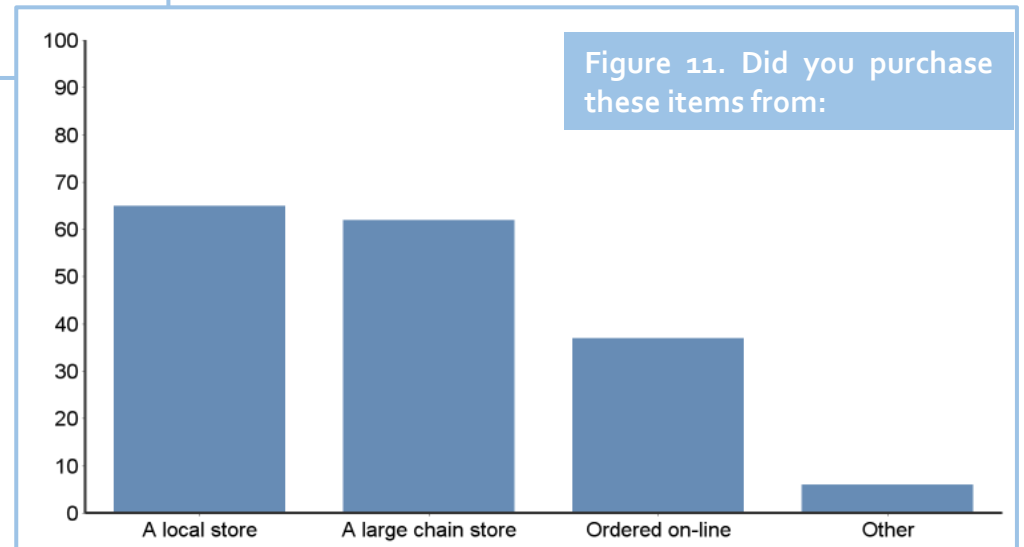
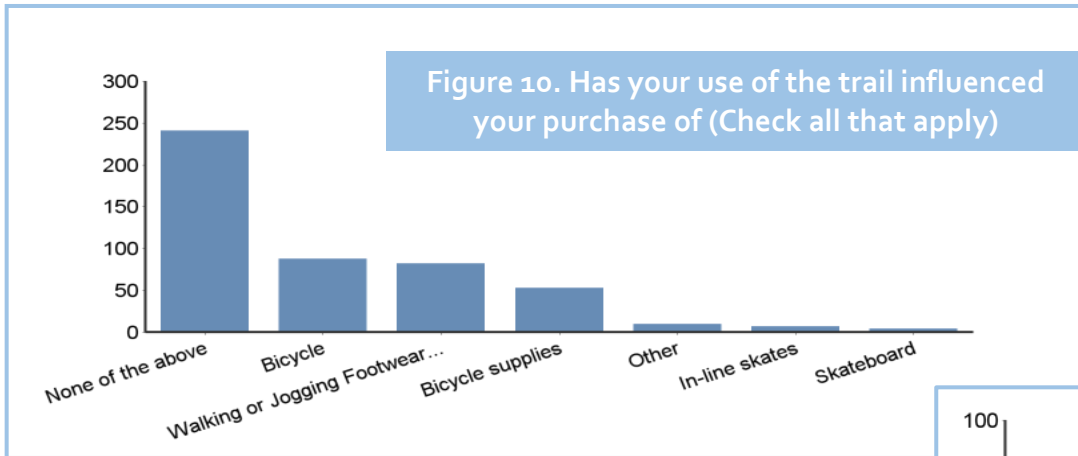
If property values increase more around the Greenway than in the rest of the region, it is possible that higher income households will move into neighborhoods and lower-income families may not be able to higher taxes. Displacement can have a strong effect on health disparities, especially for the poor, women, children, the elderly, and racial minorities.<sup>lix</sup> However, new jobs created in the service sector (shops and restaurants) near the Greenway might disproportionately benefit lower-income individuals and youth.

### *Community and Stakeholder Input*

Both downtown Metuchen and downtown Clara Barton section of Edison have improved their downtowns over the past decade or two with zoning changes, improvements in street-scaping and pedestrian safety measures and other grant-funded work. Businesses tend to be small, unique, and independent. In addition, the Tano Mall shopping center is directly adjacent to the Greenway.

Evidence from the survey suggests that about one third of trail users buy drinks in conjunction with trail use, and 80% of these purchases are from local stores. Further, trail users

reported making 244 purchases of equipment, with about half of the purchases from local stores (see Figures 10 and 11 for details on community and stakeholder survey input).



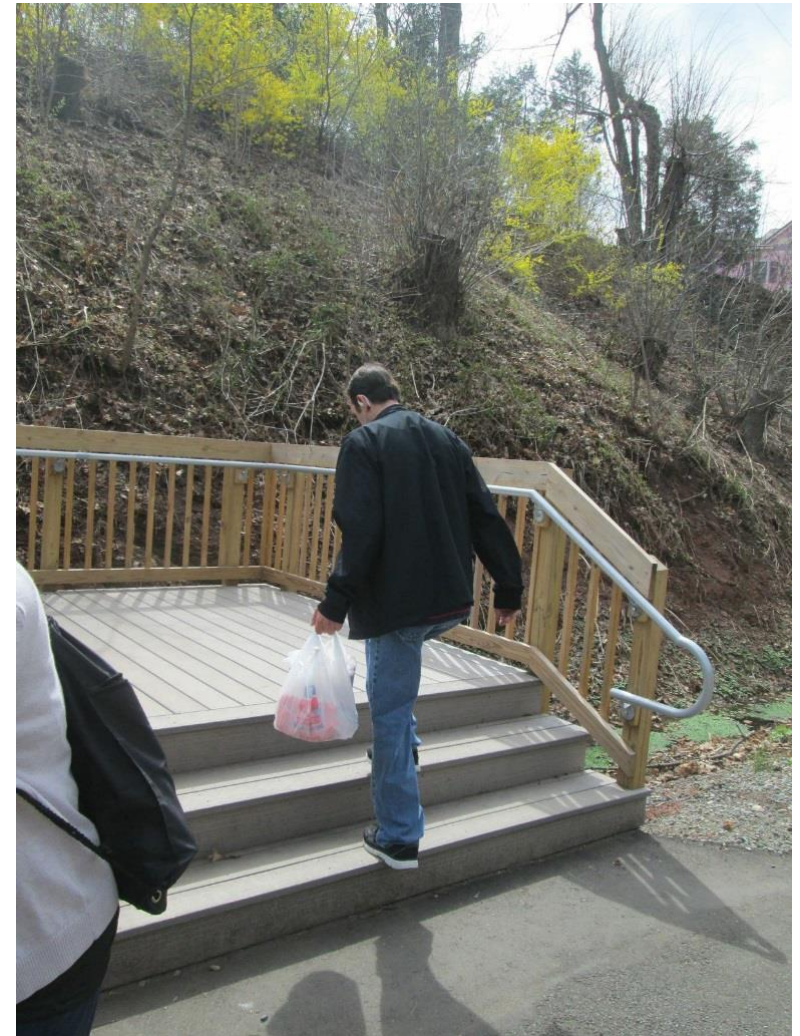
### *Impact Projection*

Some of the increased number of greenway users will purchase food or drink from local businesses as part of their trip and/or from the Greenway. Some may also purchase equipment (bicycle and related accessories, jogging shoes, etc.) from local businesses. A study calculated the economic value of an average trail user ranging \$23-38 per visit.<sup>1</sup> Even if this value is high for a shorter and more localized trail like the Middlesex Greenway and we deflate this number to \$5 per visit, on average, the impact to the local economy can be significant. Our survey respondents reported making an estimated 23,777 trips on the Greenway in a year, which could amount to a boost of \$118,885 to local businesses. Assuming that our survey captured only a fraction of actual current users, and that the future will bring more users, the total annual economic value can reach easily into the millions.

### *Related Recommendation*

Encourage increased purchases from and patronization of local businesses by Greenway users.

This study finds that increased use of the Greenway will lead to more people patronizing local businesses, helping to support and stimulate the local economy and leading to improved health outcomes. Trail promoters, local municipalities and local chambers of commerce can promote this connection by assuring that local hotels and conference centers, including the adjacent Courtyard Hotel and nearby Raritan





Center, distribute information about the Greenway to guests and visitors. Likewise, the Greenway can be promoted through nearby shops and restaurants, who can hand out flyers about the Greenway, or participate in contests or incentives to encourage both Greenway use and business patronage. For instance, a local eatery could offer a free drink to someone who shows a picture of themselves on the Greenway. The creation of "loops," already mentioned as a

recommendation to enhance physical fitness benefits, will also bring more Greenway users through parts of downtowns and directly past local businesses, increasing exposure and foot traffic. Finally, the broader and longer-term economic impacts of the Greenway on the local economy (jobs, income) and on real estate values, cannot be determined until several years after the Access Plan goes into effect. These are areas for monitoring and future analysis.



**Table 17. HIA Analysis – Summary of Findings**

The table below lists the key health factors examined in the study, along with a summary of the projected impacts of increased use of the Greenway for each. The table summarizes the *direction* of the expected impact, the *likelihood* that the impacts will occur, the *level* of any expected impacts, and the distribution of those *impacts* to specific *populations*.

Health Outcome or Health Determinant	Direction	Likelihood	Level of Impact	Impacted Population
Physical Activity	Positive	Likely	High	Trail Users Lower Income Population (with limited access to paid health clubs) Hispanic Population
Exposure to Green Space	Positive and Negative	Likely	Low	Trail Users Children People with Allergies/Asthma
Safety (Crashes)	Unknown	Uncertain	Medium	Trail Users, Drivers on Area Roads
Security – Crime	Unknown	Unlikely	Medium	Trail Users Nearby Homes and Businesses
Security – Perception of Crime	Positive	Possible	Medium	Trail Users Senior Citizens and Women
Social Interaction	Positive	Likely	High	Trail Users Surrounding Municipalities
Local Economy	Positive	Possible	Low	Residents of Surrounding Municipalities

	<u>Direction and Extent</u>		<u>Likelihood</u>		<u>Level of Impact</u>
Positive	Changes that may improve health	Likely	it is likely that impacts will occur	Low	Causes minor impacts
Negative	Changes that may detract from health	Possible	it is possible that impacts will occur	Medium	Causes some substantial impacts
Unknown	Unknown how health will be impacted	Unlikely	it is unlikely that impacts will occur	High	Causes major or serious impacts
		Uncertain	it is unclear if impacts will occur		

## Recommendations with Specific Actions

Below is a list of more specific actions associated with each of the general recommendations discussed above. A Priority Implementation Agenda (PIA) prepared for inclusion in the Access Plan documents strategic actions, timeframes, partners and funding necessary for successful implementation of the HIA. Please see the Health and Safety segments of the Middlesex Greenway PIA attached as Appendix E.

### HEALTHY

#### Physical Activity

##### Enhance usability and expand physical fitness options

###### Specific Actions:

- Improve access and use for bicycles
- Consider rental stations for bikes and rollerblades
- Provide benches and picnic tables in strategic locations
- Encourage use of activity loops for exercise
- Consider installing exercise stations in proximity to trail
- Facilitation connection between Greenway and other parks and trails
- Provide signs indicating access for restrooms and refreshments

##### Enhance trail cleanliness and maintenance

###### Specific Actions:

- Install additional garbage and recycling cans, and dog refuse bags
- Install "no littering" signs
- Partner with local groups on cleanup program, such as adopt a trail
- Facilitate easy ways to report graffiti

##### Increase use and benefit by vulnerable subpopulations

###### Specific Actions:

- Involved local health providers to prescribe greenway use for weight reduction/health improvement
- Increase number of ADA-accessible ramps
- Implement chaperone program for seniors and disabled
- Increase access and awareness of Greenway by NJ Transit bus riders
- Translate promotional and educational materials and signs, where appropriate, into Spanish
- Encourage safe use of Greenway for school students

#### Environment Exposures

##### Minimize exposure to environmental hazards, pests, and noxious weeds

###### Specific Actions:

- Improve drainage to reduce standing water

Notify greenway users of mosquito treatments  
 Institute periodic animal patrols for stray or nuisance animals  
 Add signage/education about ticks  
 Monitor exposure to poison ivy and other noxious weeds in close proximity to trail

## SAFE

### Security

Improve feeling of security for Greenway users

#### Specific Actions:

Improve signage along Greenway for emergency preparedness  
 Improve lighting and fences in strategic locations like bridges and schools.  
 Consider strategic vegetation maintenance and management to promote eyes on the greenway.  
 Foster walking groups through local civic groups and employers to bring safety in numbers  
 Consider 'trail watch' program similar to neighborhood watch  
 Increase police patrols at certain times of day/days of week

### Safety

Minimize crashes and injuries along the Greenway

#### Specific Actions:

Consider crosswalk improvements at locations where the trail intersects with a roadway  
 Identify potentially dangerous crosswalks near trail access points  
 Install greenway etiquette/safe use signs (e.g. yield to pedestrians, pass with care, keep right)  
 Where, if possible, consider widening greenway.

## VIBRANT

### Social Cohesion

Encourage local groups to use Greenway for events and exercise

#### Specific Actions:

Encourage local organizations to program events along the Greenway

### Local Economy

Encourage increased local economic benefits

#### Specific Actions:

Foster enhanced usage and promotion of the greenway by hotels and conference centers  
 Develop and encourage use of bike and pedestrian-friendly activity loops that connect the Greenway to downtowns and local businesses.  
 Promote the Greenway to area businesses/local chambers.  
 Encourage partnerships, contests or incentives that support local business.  
 Complete an analysis on the real estate and economic impact of the Greenway.



## Reporting

The success of the HIA will depend in part on communicating and disseminating the findings of the analysis and the ultimate recommendations. Toward this end, the research team prepared a set of nested reporting documents that includes this narrative final report with technical documentation; a set of briefing slides targeted for public presentation; and a high-level executive summary designed in an infographics style.

As part of the reporting process, the research team disseminated a draft HIA report and offered decision-makers, stakeholders and the public a meaningful opportunity to critically review evidence, methods, findings, conclusions, and recommendations prior to finalizing the HIA report. The final HIA report, presentation slide deck and executive summary will be made publicly accessible.

The research team conducted both a process and impact evaluation. The process evaluation gauged the quality of the HIA process and technical analyses according to established practice standards, the original work plan for the HIA and the goals for the HIA identified during the screening and scoping phases. The impact evaluation assessed the HIA's impact on decision-making. In addition, the research team recommends a follow-up HIA monitoring plan to track decision outcomes and assess changes in health status and health determinants as decisions are implemented. The monitoring plan suggests goals for short- and long-term monitoring; recommended indicators that can be used to track progress; suggests which

parties can/should be responsible for carrying out the monitoring plan; proposes a mechanism for reporting monitoring results to decision-makers, HIA stakeholders and the public (e.g., bi-annual health report); and identifies resources that may be available to carry out the monitoring plan.

## Evaluation and Monitoring Plan

### *Process Evaluation*

The process of conducting this HIA proceeded very smoothly. The team of two senior researchers (working at 25% effort over five months) and a graduate student (250 hours) worked closely with the Access Plan (LDP) project team, sharing ideas, data and resources where possible. The project steering committee provided a ready-made forum for stakeholder review of every step of the process. Planned HIA outputs were exceeded because of the extra resources available to the HIA team through this relationship.

Some members of vulnerable groups were integrated into the process, while others were not as accessible to the team. Input from school children was integrated through middle school students who attended project committee meetings. Senior citizens and some disabled people were represented by attendance at our Health/Safety roundtable and in the dedicated outreach to a senior living facility. The team was less able to reach members of ethnic communities, although

The online survey was translated into Spanish, and 7% of survey respondents were Hispanic, and 9% were Asian. Our assessment was not able to clearly identify differential distribution of impacts across every different population because of lack of any existing data or ability to collect new data, but recommendations do include some actions to address impacts on vulnerable populations.

### *Impact/Outcome Evaluation*

Because of the unique relationship of this HIA project as an integrated part of the Greenway Access Plan, a good deal of the assessment and resulting recommendations are already built into the Plan presented to the County for adoption. Decision-makers at the County level will be selecting design and programming modifications incrementally through time, so the recommendations of the HIA will help to shape these decisions so that as more people use the Greenway, public health and safety are maximized. It is impossible to know which recommendations will be implemented, but putting forth possible funding sources and partners in our implementation strategy chart should help to promote and facilitate actions to be taken. The monitoring plan (below), if followed by the County and Edison Greenways, will then assess whether the anticipated positive effects on health, wellbeing and equity were enhanced and the negative effects minimized.

### *Monitoring Plan*

The indicators shown in Table 1 identify appropriate health outcomes related to increased Greenway use. This table can

be considered the basis for a monitoring plan to track changes in health outcomes over time. Official data sources could be scanned for changes in some of the indicators (disease, crime, social and behavioral indicators), while others such as use profiles and perceptions could be monitored through repeating a resident or Greenway user survey at periodic intervals. Local economy measures can tracked through a local business survey. This monitoring could be undertaken by the County and local health departments, Edison Greenways, or other local nonprofits.

It was beyond the scope of this HIA to examine all health aspects of increased use of the Greenway, or to go into great depth on the aspects selected to study. Additional study would help to broaden knowledge and provide more basis for understanding the full range of impacts. Some ideas for further study include:

- Study locations/types of pedestrian/bicyclist accidents
- Survey area residents on existing park use and demand for recreational resources
- Survey area residents on barriers to use of Greenway and potential amenities, conditions, and programs that would encourage use
- Study of use of Greenway for increased access to health food access (farmer's markets)
- Increased study of differential impacts to Hispanic population located primarily in neighborhood east of current trail.

## APPENDIX A: STEERING COMMITTEE LIST

<b>Name</b>	<b>Affiliation</b>
Sean Massey	Bike Walk Metuchen
Thomas Rockefeller	Bike Walk Metuchen
Athena Sarafides	DEP
Debbie Kingsland	DOT
Mike Kruimer	East Coast Greenway
Chris Mazauskas	Edison
Jay Elliot	Edison
Melissa Perilstein	Edison
Thomas Lankey	Edison
Bob Takash	Edison Greenways
Walter Stochel	Edison Greenways
Dana Patterson	Edison Wetlands Association
Johnny Quispe	Edison Wetlands Association
William Neary	Keep Middlesex Moving
Jay Muldoon	Metuchen
Allison Inserro	Metuchen
Tom Vahalla	Metuchen
Mirah Becker	Middlesex County
Richard Lear	Middlesex County Department of Parks & Recreation
Denise Nickel	Middlesex County Improvement Authority
John Dowd	Middlesex County Office of Health Services
Twyla Paige	Middlesex County Office of Health Services
Bruce McCracken	Middlesex County Office of Planning

<b>Name</b>	<b>Affiliation</b>
Laurie Sobel	Middlesex County Office of Planning
Nick Tufaro	Middlesex County Office of Planning
Anthony Gamblichonghi	Middlesex County Office of Planning - Transportation
George Ververides	Middlesex County Planning Board
Joseph D. Cascio	NJ Convention & Exposition Center
Janet Heroux	NJDOH
Tom Clark	NJT
Megan Kelly	NJTPA
Zenobia Fields	NJTPA
Alan Miller	OPA
Gerry Scharfenberger	OPA
Kate Meade	OPA
Elizabeth Sewell	Rutgers Bloustein
Jeanne Herb	Rutgers Bloustein
Jon Carnegie	Rutgers Bloustein
Karen Lowrie	Rutgers Bloustein
Leigh Ann Von Hagen	Rutgers Bloustein
Chris Smith	Student
Melanie McNeil	Student
Rohan Hublikar	Student
Simran Shamith	Student
Scott Lewis	The YMCA of Metuchen, Edison, Woodbridge and South Amboy
Caroline Ehrlich	Woodbridge
Gregg Ficarra	Woodbridge
John McCormac	Woodbridge
Monica M. Smith	Woodbridge ABC Committee



## APPENDIX B: SCREENING CHECKLIST

	Yes/No/ Unknown	Supporting Facts/Rationale
<b>Value of and need for HIA</b>		
Does the decision have the potential to effect, directly or indirectly (positively or negatively), health outcomes via environmental or social determinants of health?	Yes	The decision includes impacts on physical and mental health, safety, and economics
Could these impacts create or exacerbate health or social disparities?	Unknown	The impacts have a possible impact on minority, low-income and elderly populations.
Are the proposal's impacts to health potentially significant in terms of the number of people impacted and/or the magnitude, breadth, and immediacy of impacts?	Yes	It may affect the health of 200,000 residents of the three municipalities, immediate and long term
Are the health impacts unknown, uncertain, or controversial?	Unknown/Not controversial	Not yet measured
Could HIA recommendations potentially improve the impact that the plan, policy, or program has on health?	Yes	Many opportunities to consider health impacts
<b>Feasibility of conducting HIA</b>		
Are leadership, resources, and technical capacity available to conduct analyses?	Yes	NJHIC, with TNJ and project team
Do data and research methods exist to analyze health impacts of concern associated with this decision?	Yes, some	Review and analysis of literature, reports, studies and stakeholder input
Which stakeholders have the interest and capacity to participate in an HIA (scoping, research, communication)?	Yes	Local Demonstration Project team and steering committee
<b>Receptiveness of the decision-making process</b>		
Is there a pending decision regarding the project, plan, or policy?	Yes	Integration of plan by Middlesex County
Has a final decision about the proposal been made?	No	Ongoing future decisions after plan adoption
Are there policy/legal requirements mandating the consideration of direct and/or indirect health impacts?	No	Implementation will be voluntary
Is there sufficient time and is it feasible to analyze the project before a decision is made?	Yes	Will scale the analysis to match a 5-month timeframe and available resources
Are stakeholders requesting an HIA to inform the decision-making process?	Yes	Stakeholders welcome the consideration of health on their decision making process, and have included advancement of health as a project goal.
Is the decision-making process open to HIA and/or recommendations for changes to design, mitigations, and alternatives?	Yes	Middlesex County (owner) and Edison Greenways (nonprofit promoter) are both open to recommendations and suggested changes.

## APPENDIX C: ROUNDTABLE QUESTIONS AND NOTES

### Middlesex Greenway Health and Safety Round Table

April 11, 2014  
10:30am – 12:00pm

Clara Barton First Aid Squad  
Meeting Room  
1079 Amboy Avenue  
Edison, NJ

ATTENDEES		
Name	Organization	City of Residence
JP Therrien	Metuchen PD	Edison/Methuchen
John Dowd	Middlesex Co. Office of Health Services	Middlesex/New Brunswick
Bob Takash	Edison Greenways Group	Edison/Retired
Megan Kelly	NJTPA	Lyndhurst/Newark
Allison Inserro	Metuchen	Metuchen
Victoria Roberts	Fords	
Rick Lear	MC Parks	Cranbury/Piscataway
Alan Miller	NJ BAC Office for Planning Advocacy	Cherry Hill/Trenton
Gerry Sharfenberger	NJ Office for Planning Advocacy	Middletown/Trenton
Mike Ussak	Clara Barton First Aid Squad	Edison/Retired
Esther Nemitz	Neighborhood Preservation Committee, Edison Open Space Committee	Edison/Retired

**What are the most common activities on the trail?** Most common activity is walking, biking, dog walking.

Students said they walk. Families coming from the trail to the farmers market – they stop at the market, eat, and go back to the trail.

Participant said he wouldn't let his 14-year old daughter walk home alone, regardless of where, but feels comfortable if she is in a group.

**Are motor vehicles allowed on the trail?** ATVs, etc. are not allowed. Motorized wheelchairs are allowed, the trail is ADA compliant. This is an issue not only with the greenway but with all other trails.

As you walk through the trails you see beer cans and litter – evidence of kids coming out at night and drinking. Maybe this is not a problem, but there is a lot of litter. Litter and graffiti is mainly under the underpass of the turnpike where people congregate. DOT has a plan to prevent graffiti – possibly use a specific pattern or texture that does not allow paint to stick. There aren't picnic tables but there are pillars.

**Is graffiti a teen issue?** Graffiti is a problem from teens only, not homeless. A lot of the litter may be from construction. They are going to put cameras and lights under the walkway (under the lake Ave bridge). Edison was in discussion with the Turnpike Authority - they are going to put in chainlink fencing that will wrap around the fence that surrounds the turnpike. They want to clean up, paint and then fence. Edison township and police want to partner to get a vandal proof nighttime vision camera linked to Edison police. There is funding available and will happen eventually. Police caught graffiti artists, publicized them and they weren't even from the area. King George Post Road, Lake Ave and turnpike.

**Have there been violent incidents on the trail?** There was a burglary at 10am at a bank after opening while the security guards were making their pickup. The violators had a shootout right there in the bank; the man went to county avenue bridge. There have been 2 incidents of lewdness. Women together witnessed a man stepping out of the woods – sounds like the same description.

**Is there a perception of isolation?** If something is called in, the EMS may find it a little difficult to respond to the incident. The police may not know where the incident is and may not be able to respond to the incident. There are quarter mile markers but they are not frequent enough. People may need to just be aware of their location as it relates to the surrounding street network. You may be able to track via cell phone. There was an incident on the Henry Hudson trail. The cycling death was possibly due to the fact that the police couldn't find him.

**Has the community culture changed since the trail opened?**

We do have seniors take the walkway, it is very close to the Olsen towers. People don't feel safe there. Maybe install cameras – seniors don't have the muscle mass of youth. The seniors would feel safer in town because it isn't as secluded. They enjoy the walk.

Since the trail opened there has been a growing amount of concern over ped/bike issues. Metuchen has issues, being a donut hole town, causes traffic congestion as people pass through. Pedestrian flags, decoy peds, huge police signs to prevent cars from going through crosswalks. When manpower allows, a bike police are sent out on the walk at any time during the day, rush hour primarily. In the mornings, officers are tied up with school crossings. The Metuchen fire department has a small EMS ATV that can respond to crashes/issues on the trail.

**Are employed in the area using it during lunch breaks?** Heard that along May St in Edison there are med facilities and offices; the nurses are walking along the street rather than on the trail. Maybe they need to be informed of the trail whether by word of mouth, printing signs, etc.

**Is there anything that may be added to the trail to increase physical activity? How many access points are ADA accessible?** If you want to rollerblade, you need a place to sit. There are also ramps. Middlesex county parks and recreation site has a map of all of the access points, etc.

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If there were benches, the seniors would sit and rest. Seniors could take longer walks if they had benches to rest on. Signage can be added about the native plants. There are Historical placards – 5 – the corridor was an industrial corridor through PA to NJ coal docks. Corridor is very historical. There is no other literature to discuss history – only placards.

**What are your thoughts on how to get employers to encourage employees to use the trail?**

Through wellness programs?

Pierson Ave – Board of Education and Tanno mall. Weight Watchers, Drs in the area can give prescription to walk the trail.

**What are street crossing concerns?**

There is always a concern that a car or truck will not stop. On Parsonage there are speed bumps - it would be nice to see that in other areas. On Liddle Ave, there is visibility concern. On Pierson, the bump was requested by the township, and then removed by the township. Liddle may have been a space issue; it seems too small, like an alley. Maybe put flashing lights or other traffic calming measures – or maybe a sign in the middle of the road.

Liddle ave - there is a business there and there are large trucks that go up and down the road. It is a private road, not town owned. 100 units of housing down the greenway – even though they were originally encouraged to use a different access road but they will use the shortest way possible.

The most common complaint from families is the safety in accessing the greenway – particularly on Pierson Ave. The issue is getting to and from the trail safely.

Middlesex County has jurisdiction on the 5 road intersection and there is a design plan to add a turning lane a little clearer for turning. There is a countdown light on the trail that lights up. There is also a median refuge. If everyone does what they are supposed to do at this intersection, nothing bad happens. Illegal u turns etc are safety concern. (Pedestrian bridge)

**Are there any areas in particular that are issues for access?** Pierson Avenue Trailhead by the hardware store is slated for commercial development and will turn into a nightmare. Amboy Avenue to Green Street can also be tricky.

**People would walk or bike to the trail if only...**

If we had bike rental at the trail.

If the Woodbridge section is improved – extend the trail to pocket park change of contour from the ramp to the sidewalks. Looking into a vacant lot across from the park to add parking.

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In order to bike to the trail in Metuchen you have to bike down some heavily commercial avenues. Initially we will have to deal with people driving there, but once we get people using it we will have leverage for improved access. There are some limited parking areas – Town Hall, Dudash Park.

**NJ transit bus route: can people take these buses or go by train to get to the trail?** In some areas they promote connections to the trail from bus. Europeans visiting the area discovered the trail from Marriott.

#### **What are other concerns?**

Wildlife is a concern on the trail – because it produces ticks.

There have been rabies incidents in Metuchen. Board of Health inspector noticed a litter of stray cats. Another friend saw a cat or raccoon acting very strangely but Edison animal control wouldn't do anything unless it was more severe.

As for health and wellness benefits, hopefully this project will blossom into the population seeing the light. Rails to Trails website has a link about the health benefits of trails. When you have a multi-use trail, it benefits the communities.

**Would it be helpful if EMS is alerted when seniors are walking the trail? Or notify the public?** Yes. Police could also train volunteers and when an opportunity arises they send out the volunteer staff.

#### **How is the trail maintained?**

County staff from three different County parks maintain it. People call Edison Greenways to alert them to hazards and they contacts the Parks and Rec guy. An area to notify of issues with safety/litter is not highlighted on the website. Parks and Rec number is noted on entry posts.

Mosquitoes can be a problem. The greenway is a drainage basin for many towns, more stagnant water means more places for mosquitoes to breed. Since the trail has gone up, the County mosquito commission staff can go treat the stagnant water with more ease. Mosquito issue has been improved.

As for dumping in the area, before the greenway was put in there it was used for a lot of garbage dumping – TVs, mattress, sofa. Now it has gone down. People are taking more ownership because it is part of their community.

Turnpike Underpasses will get lighting to keep it visible as a deterrent to criminal activity.

**Has there been a bump in house price?** A couple of real estate advertisements mention the trail. Maybe the tax assessor is able to note an increase in property value? **Is there an issue with people walking through the trail in their backyard?** No.

## APPENDIX D: MULTIPLE CHOICE SURVEY QUESTIONS

### Middlesex Greenway Utilization and Perception Survey

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**1. Have you ever used the Middlesex Greenway?**

Yes {skip to "If yes" section below}

No

**If no:**

**1a. Where would you normally look for information about a trail or greenway? (Check all that apply)**

Internet search

Facebook

Twitter

public notices

town website

friends

signage

other -----

**1b. Are you likely to try using the Middlesex Greenway trail in the coming year?**

Definitely not       Probably Not     Maybe       Probably       Definitely

**1c. Why or why not? (open ended)**

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**SKIP TO \*\* below**

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*If yes - please tell us about your use and perceptions of the Greenway trail:*

**2) How did you become aware of the Greenway?**

- Internet search  
 Facebook  
 Twitter  
 public notices  
 town website  
 friends  
 signage  
 other -----

**3) How often do you normally use the Greenway (in season)?**

- More than once a day    Once a Day    2-3 Times a week    2-3 Times a Month  
 A few times a year

**4) For what purposes do you normally use the Greenway?: (Check all that apply)**

- Strolling**             Most often    Sometimes    Rarely         Never  
**Fitness**              Most often    Sometimes    Rarely         Never  
**Social Engagement – Meeting or visiting people**  
 Most often    Sometimes    Rarely         Never  
**Picnicking**          Most often    Sometimes    Rarely         Never  
**Getting to work**     Most often    Sometimes    Rarely         Never  
**Getting to public transit**    Most often    Sometimes    Rarely    Never  
**Getting to school**    Most often    Sometimes    Rarely    Never  
**Getting to shopping or errands**    Most often    Sometimes    Rarely    Never  
**Getting to parks**     Most often    Sometimes    Rarely         Never  
**Other** \_\_\_\_\_

**5) What do you do or use on the trail? (check all that apply)**

- Walk**                  Most often    Sometimes    Rarely         Never  
**Push a stroller**     Most often    Sometimes    Rarely         Never  
**Walk a dog**          Most often    Sometimes    Rarely         Never  
**Jog**                    Most often    Sometimes    Rarely         Never

- Roller blade**       Most often    Sometimes    Rarely       Never  
**Skateboard**       Most often    Sometimes    Rarely       Never  
**Bicycle**           Most often    Sometimes    Rarely       Never  
**Other wheeled vehicle (wheelchair, etc.)**  
 Most often       Sometimes    Rarely       Never  
**Other** \_\_\_\_\_  Most often    Sometimes    Rarely

**6) What day and time do you normally use the trail?**

- Weekday morning**    Most often    Sometimes    Rarely       Never  
**Weekday afternoon**  Most often    Sometimes    Rarely       Never  
**Weekday evening**    Most often    Sometimes    Rarely       Never  
**Weekend morning**    Most often    Sometimes    Rarely       Never  
**Weekend afternoon**  Most often    Sometimes    Rarely       Never  
**Weekend evening**    Most often    Sometimes    Rarely       Never

**7) Do you usually use the greenway by yourself or with others?**

- By myself       With 1-2 other people       In a larger group

**8) When you use the trail, how long are you normally on it?**

- Less than half an hour     half an hour to 1 hour       1-2 hours     More than 2 hours

**9) How much do you think your use of the Middlesex Greenway has increased your level of physical activity compared to before the trail was in place?**

- A great deal       Somewhat       Not much       Not at all

**10) Please rate your level of agreement with the following?:**

**10a) On the Greenway, I feel safe from crime.**

- Strongly agree     Agree       Not sure/No opinion    Disagree       Strongly Disagree

**10b) I believe that a 6<sup>th</sup> grader (age 11-12) could use the trail alone.**

- Strongly agree     Agree       Not sure/No opinion    Disagree       Strongly Disagree

**10c) It is easy to find the Greenway.**

- Strongly agree     Agree       Not sure/No opinion    Disagree       Strongly Disagree

**10d) On the Greenway, walker-biker collisions are a concern to me.**

- Strongly agree     Agree       Not sure/No opinion    Disagree       Strongly Disagree

**10e) Crossing streets while along the trail is a safety concern for me.**



Strongly agree     Agree     Not sure/No opinion     Disagree     Strongly Disagree

**10f) Exposure to allergens (pollen, ragweed) is a concern to me on the trail.**

Strongly agree     Agree     Not sure/No opinion     Disagree     Strongly Disagree

**10g) Exposure to air pollution is a concern to me on the trail.**

Strongly agree     Agree     Not sure/No opinion     Disagree     Strongly Disagree

**10h) Exposure to animals or ticks is a concern to me on the trail.**

Strongly agree     Agree     Not sure/No opinion     Disagree     Strongly Disagree

**10i) The condition of the trail (paving, width, flooding) is generally good.**

Strongly agree     Agree     Not sure/No opinion     Disagree     Strongly Disagree

**10j) There is adequate lighting on the trail.**

Strongly agree     Agree     Not sure/No opinion     Disagree     Strongly Disagree

**11) Has your use of the trail influenced your purchase of:**

- Bicycle
- Bicycle supplies
- Inline skates
- Walking or Jogging Footwear or Clothing
- Skateboard
- Other: \_\_\_\_\_

**11a) If so, did you purchase these items from:**

- A large chain store
- A local store
- Ordered online
- Other -----

**12) In conjunction with your use of the trail, do you purchase any of the following?**

- |              |                                |                                    |                                 |                                |
|--------------|--------------------------------|------------------------------------|---------------------------------|--------------------------------|
| Beverages    | <input type="checkbox"/> Often | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |
| Candy/snacks | <input type="checkbox"/> Often | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |
| Sandwiches   | <input type="checkbox"/> Often | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |
| Ice cream    | <input type="checkbox"/> Often | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |
| Meals        | <input type="checkbox"/> Often | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |

Other \_\_\_\_\_  Often  Sometimes  Rarely  Never

**\*\*SKIP TO HERE FROM PAGE 1 IF ANSWERED "NO":**

**13) Would you use the Greenway (or if you use it, use it more) if:**

- 13a)**  there were more special events?
- 13b)**  there were more entry points?
- 13c)**  there were better/more parking near the trail?
- 13d)**  it had more benches
- 13e)**  it had exercise stations
- 13f)**  it had improved safety against crime (lighting, patrols, etc.)?
- 13g)**  it had safer road crossings?
- 13h)**  it had dedicated bike lanes to reduce bike-walker collisions?
- 13j)**  it had better disability (ADA) access?

**14) What other concerns do you have about using the trail? (open ended)**

**15) What other opportunities for improving the trail do you recommend? (open ended)**

***Please tell us about your health:***

**16) In general, my health is:**

Excellent  Very good  Good  Fair  Poor

**17) I suffer from environmental (ragweed, pollen, etc.) allergies:**

All the time  Often  Sometimes  Never

**18) Has your doctor advised you to increase your physical activity?**

Yes  No

**19) Have you EVER been told by a doctor or other health professional that you had...? (please check those that apply)**

- A heart condition
- Diabetes
- Asthma or other respiratory illness
- High blood pressure
- Obesity

**20) During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, sports, or walking for exercise?**

- Yes                       No

**21) If yes, how many times did you take part in this activity during the past month?**

- Once                       Twice                       3-4 Times                       More than 4 times

***Please tell us about yourself:***

**22) What town do you live in?** \_\_\_\_\_

**23) What is the street intersection nearest your home?**  
\_\_\_\_\_ and \_\_\_\_\_

**24) What is your age as of today?**  
\_\_\_\_\_ age

**25) Are you male or female?**  
 male  
 female

**26) Please indicate how many people in your household, including yourself, are in each of the following age categories. [Fill in number]**

---

- \_\_\_\_ Under 4 years
- \_\_\_\_ 5 to 11 years
- \_\_\_\_ 12 to 16 years
- \_\_\_\_ 17 to 19 years
- \_\_\_\_ 20 to 55 years
- \_\_\_\_ 55 years or older

**27) What is the highest level of education you've completed?**

- Less than high school graduate
- High school graduate (or GED)
- Some college (or technical vocational school/professional business school)
- Two-year college degree (AA: Associate in Arts)
- Four-year college degree (BA or BS: Bachelor of Arts/ Science degree)
- Graduate work, but no advanced degree
- Graduate degree (Masters, PhD., Lawyer, Medical Doctor)

**28) Which ONE of these descriptions of race and ethnic backgrounds most applies to you:**

- White Hispanic
- White not Hispanic
- Black Hispanic
- Black not Hispanic
- Asian
- Native American
- Other

**29) What is your total annual household income?**

- Less than \$25,000
  - \$25,000 to \$50,000
  - \$50,000 to \$100,000
-

- \$100,000 to \$150,000
- \$150,000 or more

**30) What type of residence do you live in? Is it a...**

- A one-family house detached from any house
- A one-family house attached to one or more houses
- A building with 2 to 4 apartments
- A building with 5 to 19 apartments
- A building with 20 or more apartments
- Other, specify \_\_\_\_\_

**THANK YOU FOR PARTICIPATING IN THIS SURVEY**

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## **APPENDIX E: HEALTH AND SAFETY SEGMENTS OF THE PRIORITY IMPLEMENTATION AGENDA**

**HEALTHY GREENWAY**

Strategies	Actions	Timeframe	Lead Partner	Actors
<b>Enhance usability and expand physical fitness options ●●●</b>				
<b>Resources/Sources of Funding:</b> NJDOT Local Municipal Aid, Federal Transportation Alternatives Program, Federal Recreational Trails, NJTPA, Private Partner Sponsors, Corporate Giving, NJDEP Green Acres, BIDs/SIDs, Middlesex County Open Space Trust Fund, NJDOH Small Community Grants, NJDOT Pedestrian & Bicycle Planning Funds, Volunteers				
Improve access and use for bicycles	Improve/widen bike side-ramps with anti-skid surfaces, where possible, alongside stairs	Medium	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Improvement Authority, Local Chambers, Municipal Public Works, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group, NJ TRANSIT, Keep Middlesex Moving
	Provide/improve secure bicycle parking	Medium	MC Parks & Recreation	
	Consider bike repair and air fill kiosks	Medium	Edison Greenway	
	Install new access ramps at strategic access points where feasible	Long	MC Parks & Recreation	
Consider rental stations for bikes and rollerblades	Assess which local businesses are interested.	Short	Local Chambers (BID, Economic Development)	Middlesex County Parks and Recreation, Middlesex County Economic Development, Local Chambers, Local Economic Development, Bike Walk Metuchen, Keep Middlesex Moving, Woodbridge ABC Committee, Edison Greenways Group, Marriott Hotel
	Identify times/locations for temporary rental station, or active promotion of rental locations	Medium	Local Chambers (BID, Economic Development)	
Provide benches and picnic tables in strategic locations	Identify strategic locations	Short	Edison Greenways Group	Middlesex County Parks and Recreation, Local Chambers, Keep Middlesex Moving, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group
	Research and evaluate bench options - costs, types, and ways to minimize loitering (e.g. CPTED)	Medium	Edison Greenways Group	
	Install benches (considering sponsorship program)	Medium	MC Parks & Recreation	
Encourage use of activity loops for exercise	Select safe bike and pedestrian activity loops	Short	Edison Greenways Group	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Public Safety and Health, Municipal Parks and Planning Depts., Keep Middlesex Moving, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group
	Promote selected activity loops for exercise	Medium	Edison Greenways Group	

## HEALTHY GREENWAY

Strategies	Actions	Timeframe	Lead Partner	Actors
Encourage local groups to use greenway for exercise	Develop short pamphlet on greenway features and exercise options and benefits	Short	Edison Greenways Group	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Public Safety and Health, Municipal Health and Senior Services Depts., Keep Middlesex Moving, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group
	Distribute and promote use of greenway with local organizations.	Short	Edison Greenways Group	
Link greenway to exercise stations	Identify strategic locations (e.g. Dudash Park)	Short	Edison Greenways Group	Middlesex County Parks and Recreation, Middlesex County Planning, Local Chambers, Municipal Public Works, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group, NJ TRANSIT, Edison Parks and Recreation, Local sports clubs that use nearby parks
	Research and evaluate options - costs, types	Medium	Edison Greenways Group	
	Install stations (considering sponsorship program)	Long	Edison Greenways Group	
Facilitate connections between greenway and other parks and trails	Inventory all nearby park and trail resources	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Planning, Municipal Parks and Planning Depts., Keep Middlesex Moving, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group
	Assess ability to provide safe connection	Short	MC Planning	
	Build or facilitate connecting path or trail	Long	MC Planning	
Provide signs indicating access to restrooms and refreshments	Identify restroom and refreshment facilities within 1/4 mile of greenway	Short	Edison Greenways Group	Middlesex County Parks and Recreation, Local Chambers, Municipal Planning and Public Works, Bike Walk Metuchen, Edison Greenways Group
	Create and install signage to direct users to these facilities	Medium	MC Parks & Recreation	
<b>Increase use and benefit by vulnerable subpopulations</b>				
<b>Resources/Sources of Funding:</b> NJDOT Local Municipal Aid, Federal Transportation Alternatives Program, NJTPA, Pascale Sykes Foundation, NJDOT Safe Routes to School, Private Partner Sponsors, Hospital Foundation, Volunteers				
Involve local health providers to prescribe greenway use for weight reduction/health improvement	Contact local physicians to discuss	Short	Local Health Departments, MC Public Safety and Health, local health-related non-profit	Middlesex County Parks and Recreation, Local Health Depts., Middlesex County Public Safety and Health

**HEALTHY GREENWAY**

Strategies	Actions	Timeframe	Lead Partner	Actors
Increase the number of ADA-accessible ramps	Identify strategic locations to add ramps at access points	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Municipal Public Works, Municipal Senior Services, Bike Walk Metuchen, Woodbridge ABC Committee, Edison Greenways Group, NJ TRANSIT
	Research and evaluate options - costs, types	Medium	MC Parks & Recreation	
	Install ramps	Long	MC Parks & Recreation	
Create chaperone program for seniors and disabled	Identify potential chaperones and work with senior living and rehabilitation centers on timing and location	Short	Senior Center	Middlesex County Parks and Recreation, Middlesex County Human Services, Municipal Senior Services, Municipal Police Depts., Edison Greenways Group, Senior Centers
	Implement program	Medium	Senior Center	
Increase access and awareness of greenway by public transportation riders	Investigate nearby stops for ability to facilitate signs or markings to greenway	Medium	Edison Greenways Group	NJ TRANSIT, Municipal Planning Depts.
	Install signage or markings and promote "transit to greenway" usage	Medium	NJ TRANSIT	
Encourage safe use of the greenway for school students	Implement walk and bike to school events	Medium	Keep Middlesex Moving	Boards of Ed., Teachers' Associations, Middlesex County Parks and Recreation, Middlesex County Planning, PTOs/PTAs, Keep Middlesex Moving, Local Scout Troops
	Encourage other safe and/or supervised school uses and activities	Short	Keep Middlesex Moving	
	Consider natural interpretive signs (tree and wildflower ID, etc.)	Medium	MC Parks & Recreation	
<b>Enhance trail cleanliness and maintenance</b>				
<b>Resources/Sources of Funding:</b> Middlesex County Improvement Authority, NJDEP Community Forestry Program, Geraldine R. Dodge Foundation, Private Partner Sponsors, Business Owners, Middlesex County Open Space Trust Fund, Volunteers				
Install additional garbage and recycling cans, and dog refuse bags	Identify strategic locations for cans and bag dispensers	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Improvement Authority, Municipal Public Works, Local Health Depts., Edison Greenways, NJ TRANSIT
	Research and evaluate options - costs, types	Medium	MC Parks & Recreation	
	Install cans (consider sponsorship program)	Medium	Edison Greenways Group	
Install "no littering" signs	Add to existing signage or install new signs at strategic locations	Medium	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Improvement Authority, Middlesex County Planning

## HEALTHY GREENWAY

Strategies	Actions	Timeframe	Lead Partner	Actors
Partner with local groups on a cleanup program, such as adopt-a-trail	Canvas local groups or businesses for interest	Short	Edison Greenways Group	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Improvement Authority, Edison Greenways Group, Local Chambers, Rutgers University, Local Scout Troops
	Research best practices on adopt-a-trail programs	Short	Edison Greenways Group	
	Organize and implement program	Long	MC Parks & Recreation, Edison Greenways Group	
Facilitate easy ways to report graffiti	Provide contact number or email on signs, pamphlets and website	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Public Safety and Health, Local Police Depts., Municipal Public Works, Edison Greenways Group
<b>Minimize exposure to noxious weeds and animal and insect pests</b>				
<b>Resources/Sources of Funding:</b> Middlesex County Mosquito Extermination Commission, Middlesex County Public Safety and Health, Municipal Health Departments				
Improve drainage to reduce standing water	Identify locations with standing water after rain	Short	MC Parks & Recreation, MC Planning	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Improvement Authority, Middlesex County Mosquito Extermination Commission, Local Public Works
	Study possible improvements in drainage and flow	Medium	MC Parks & Recreation, MC Planning	
	Implement improvements	Long	MC Parks & Recreation	
Notify greenway users of mosquito treatments	Provide announcement through Facebook, Twitter, local public announcements	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Public Safety and Health, Middlesex County Mosquito Extermination Commission
Institute periodic animal patrols for stray or nuisance animals	Select appropriate times/intervals and allocate patrols	Medium	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Public Safety and Health, Local Animal Control
Add signage/education about ticks	Develop appropriate information about tick awareness and bite prevention	Short	MC Public Safety & Health	Middlesex County Parks and Recreation, Middlesex County Public Safety and Health, Local Health and Animal Control
	Distribute information (online info, put onto a sign)	Medium	MC Parks & Recreation	
Notify greenway users of management plan for poison ivy and other noxious weeds	Develop appropriate information about avoiding contact with noxious plants and distribute information	Short	MC Public Safety & Health	Middlesex County Parks and Recreation, Middlesex County Public Safety and Health
	Monitor for presence of noxious weeds and reduce exposure, where possible	Medium	MC Parks & Recreation	



**SAFE  
GREENWAY**

Strategies	Actions	Timeframe	Lead Partner	Actors
<b>Improve feelings of security for greenway users</b> ●●●				
<b>Resources/Sources of Funding:</b> Private Partner Sponsors, Local Businesses, Corporate Giving, PSE&G, NJ Turnpike Authority, Middlesex County Open Space Trust Fund, NJDOH Small Community Grant				
Consider additional locations for surveillance cameras	Prioritize locations for additional cameras (tunnels, more isolated areas)	Short	Middlesex County	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Public Safety and Health, Local Emergency and Rescue Depts., Local Police/Public Safety Departments, Edison Greenways Group
	Explore options for purchasing more cameras, including responsibility for monitoring, or possible mock cameras	Medium	Edison Greenways Group	
Improve signage along greenway for emergency preparedness	Include clear emergency contact information on signage	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Public Safety and Health, Local Emergency and Rescue Depts., Edison Greenways Group
	Indicate location along greenway in relation to nearby roads and sites for assurance in reporting emergencies	Medium	Edison Greenways Group	
Improve lighting and fences in strategic locations like bridges and schools	Identify locations in need of additional lighting	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Planning, Local Planning and Engineering, Edison Greenways Group, NJ Turnpike Authority, Local Police/Public Safety Departments
	Install lighting options, including bluelight posts	Medium	MC Parks & Recreation	
Consider strategic vegetation maintenance and management to promote eyes on the greenway	Identify locations where vegetation might be pruned or removed to reduce feeling of isolation	Medium	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Public Safety and Health, Local Planning and Parks/Recreation, Edison Greenways Group
	Manage vegetation for multiple objectives	Medium	MC Parks & Recreation	
Foster walking groups through local civic groups and employers to bring safety in numbers	Identify key local groups that could form walking groups and provide greenway information to them	Short	Edison Greenways Group	Edison Greenways Group, Local Health Depts., Local Residents and Businesses
	Create a "trail watch" program	Medium	Edison Greenways Group	
Increase police patrols at certain times of day/days of week	Identify appropriate and feasible times and allocate personnel for patrol	Medium	Local PDs	Middlesex County Parks and Recreation, Local Police/Public Safety Depts.

**SAFE  
GREENWAY**

Strategies	Actions	Timeframe	Lead Partner	Actors
<b>Minimize crashes and injuries for pedestrians and bicyclists accessing or using the greenway</b>				
<b>Resources/Sources of Funding:</b> NJDOT Municipal & County Aid, Middlesex County Planning, Middlesex County Open Space Trust Fund, Recreational Trails Program, Federal Transportation Alternatives Program				
Improve crosswalks at road intersections	Identify most dangerous intersection crossings	Medium	MC Planning	Middlesex County Parks and Recreation, Middlesex County Planning, Middlesex County Planning, NJDOT, Edison Greenways Group, Municipal Engineering and Planning
	Research and evaluate options to improve safety - costs, types	Long	MC Planning	
	Make improvements	Long	MC Planning	
Improve crosswalk safety near trail access points	Identify most dangerous crosswalks near trail access points (e.g. Amboy Ave and Pierson Ave)	Medium	MC Planning	Middlesex County Parks and Recreation, Middlesex County Planning, NJDOT, Edison Greenways Group, Municipal Engineering and Planning, Middlesex County Planning
	Research and evaluate options to improve safety - costs, types (e.g. reduced crossing length, improved signaling)	Long	MC Planning	
	Make improvements	Long	MC Planning	
Install greenway etiquette/ safe use signs (e.g. yield to pedestrians, pass with care, keep right)	Develop list of etiquette/educational use signs	Medium	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Planning, Municipal Public Works, Local Health Depts., Edison Greenways Group
	Install at strategic locations	Medium	MC Parks & Recreation	
Where feasible, widen greenway	Monitor and assess locations with potential for widening	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Planning, Edison Greenways Group
	Widen and stripe lanes where feasible	Long	MC Parks & Recreation	
Identify areas with high drop-off from paved trail to ground and seek to reduce drop-off height	Monitor and assess locations with more than normal drop-off heights	Short	MC Parks & Recreation	Middlesex County Parks and Recreation, Middlesex County Planning, Edison Greenways Group
	Mitigate with sloping pavement or other material to lessen drop-off	Medium	MC Parks & Recreation	

## References

<sup>i</sup> It should be noted that the data for the mile radius figures were calculated differently from the half mile figures. The mile figures include total number of population, all census blocks or tracts that lie inside of the mile radius (even if a majority of the geographic unit is located outside the radius). The .5 mile intersect data takes the portion of the population as indicated by the area covered in the half mile boundaries

<sup>ii</sup> Kaiser Family Foundation: <http://kff.org/other/state-indicator/adult-overweightobesity-rate-by-re/>

Table 6. Middlesex County Health Statistics: SOURCING

	Middlesex
Mental Health <sup>1, [1]</sup>	Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, ["Thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" 2009-2010].
Inadequate Social Support <sup>[1]</sup>	University of Wisconsin Population Health Institute. County Health Rankings 2012. Accessible at <a href="http://www.countyhealthrankings.org">www.countyhealthrankings.org</a> .
Access to Exercise Opportunities <sup>[1], [1]</sup>	U.S. Decennial Census Tigerfiles. 2013 TIGER/Line Shapefiles prepared by the U.S. Census Bureau, 2013
Access to Healthy Foods <sup>[1]</sup>	U.S. Decennial Census Tigerfiles. 2013 TIGER/Line Shapefiles prepared by the U.S. Census Bureau, 2013
Childhood (2 - 5) Overweight and Obesity <sup>[1]</sup>	National Survey of Children's Health. NSCH 2011-2012. Child and Adolescent Health measurement Initiative, Data Resource Center for Child and Adolescent Health. Available at: <a href="http://www.nschdata.org">http://www.nschdata.org</a>
Adult Obesity <sup>[1]</sup>	Centers for Disease Control and Prevention. CDC Diabetes <a href="http://www.cdc.gov/diabetes/">http://www.cdc.gov/diabetes/</a> 2004-2010.
Physical Inactivity <sup>[1], [1]</sup>	Centers for Disease Control and Prevention. CDC Diabetes <a href="http://www.cdc.gov/diabetes/">http://www.cdc.gov/diabetes/</a> 2004-2010.
Overweight and Obesity Grades 9 - 12 <sup>[1]</sup>	National Survey of Children's Health. NSCH 2011-2012. Child and Adolescent Health measurement Initiative, Data Resource Center for Child and Adolescent Health. Available at: <a href="http://www.nschdata.org">http://www.nschdata.org</a>
Diabetes <sup>[1]</sup>	Centers for Disease Control and Prevention: National Diabetes Surveillance System. Available online at: <a href="http://www.cdc.gov/diabetes/statistics">http://www.cdc.gov/diabetes/statistics</a> . Retrieved 7/24/2014.
Heart Attack <sup>[1]</sup>	Office of Health Care Quality and Assessment, New Jersey Department of Health 2000. Trenton, NJ. Available at: <a href="http://www4.state.nj.us">www4.state.nj.us</a>
Asthma - Adults (Current)	IBID
Asthma - Children	IBID
Hypertension	IBID

<sup>ii</sup> Centers for Disease Control and Prevention: National Diabetes Surveillance System. Available online at: <http://www.cdc.gov/diabetes/statistics>. Retrieved 7/24/2014.

<sup>ii</sup> Office of Health Care Quality and Assessment, New Jersey Department of Health 2000. Trenton, NJ. Available at: [www4.state.nj.us](http://www4.state.nj.us)

<sup>iii</sup> Weight of the Nation, 2012

<sup>iv</sup> Centers for Disease Control and Prevention (CDC). (2012b). More People Walk to Better Health. Retrieved June 26, 2012, from the CDC website: [http://www.cdc.gov/VitalSigns/Walking/index.html?s\\_cid=ostltsdyk\\_govd\\_265](http://www.cdc.gov/VitalSigns/Walking/index.html?s_cid=ostltsdyk_govd_265)

<sup>v</sup> Dunlop D, Song J, Hootman J, et al. Sedentary Time in U.S. Older Adults Associated With Disability in Activities of Daily Living Independent of Physical Activity. Journal Of Physical Activity & Health [serial online]. February 5, 2014; Available from: MEDLINE, Ipswich, MA. Accessed July 14, 2014.

<sup>vi</sup> Epstein L, Raja S, Roemmich J, et al. The Built Environment Moderates Effects of Family-Based Childhood Obesity Treatment over 2 Years. Annals Of Behavioral Medicine [serial online]. October 2012;44(2):248-258. Available from: Academic Search Premier, Ipswich, MA. Accessed July 14, 2014.

<sup>vii</sup> Center for Disease Control and Prevention (CDC). (2001). Increasing physical activity: A report on recommendations of the Task Force on Community Preventive Services. Retrieved June 26, 2012, from the CDC website: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5018a1.htm>

- <sup>viii</sup> Cohen D, Sehgal A, Williamson S, Golinelli D, Lurie N, McKenzie T. Contribution of Public Parks to Physical Activity. *American Journal Of Public Health* [serial online]. March 2007;97(3):509-514. Available from: Business Source Premier, Ipswich, MA. Accessed July 14, 2014.
- <sup>ix</sup> Brownson R, Baker E, Housemann R, Brennan L, Bacak S. Environmental and Policy Determinants of Physical Activity in the United States. *American Journal Of Public Health* [serial online]. December 2001;91(12):1995-2003. Available from: Academic Search Premier, Ipswich, MA. Accessed July 14, 2014.
- <sup>x</sup> Huston S, Evenson K, Bors P, Gizlice Z. Neighborhood environment, access to places for activity, and leisure-time physical activity in a diverse North Carolina population. *American Journal Of Health Promotion* [serial online]. September 2003;18(1):58-69. Available from: CINAHL with Full Text, Ipswich, MA. Accessed July 14, 2014.
- <sup>xi</sup> Jackson, R., & Kochtitzky, C. (2009, January 1). Creating A Healthy Environment: The Impact of the Built Environment on Public Health. Retrieved July 14, 2014, from <http://www.sprawlwatch.org/health.pdf>
- <sup>xii</sup> South Carolina Institute of Medicine and Public health (IMPH). (2013). A Health Impact Assessment (HIA) of Park, Trail, and Green Space Planning in the West Side of Greenville, South Carolina. Retrieved March 12, 2014 [www.imph.org](http://www.imph.org),
- <sup>xiii</sup> Finkelstein E, Trogdon J, Cohen J, Dietz W. Annual medical spending attributable to obesity: Payer-and service-specific estimates. *Health Affairs* [serial online]. September 1, 2009;28(5):w822-w831. Available from: Scopus®, Ipswich, MA. Accessed July 14, 2014.
- <sup>xiv</sup> United Health Foundation, 2009.
- <sup>xv</sup> Asabere, P. K., & Huffman, F. E. (2009). The Relative Impacts of Trails and Greenbelts on Home Price. *Journal Of Real Estate Finance And Economics*, 38(4), 408-419. doi:<http://dx.doi.org/10.1007/s11146-007-9089-8>
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