



Middlesex County Cultural Landscape and Ecosystems Service Plan

Summary

Prepared by: CUES Rutgers University

Prepared for: Middlesex County Office of Planning, full draft submitted July 19, 2022

PREFACE

The Middlesex County Department of Planning supported the development of a comprehensive Cultural Landscape and Ecosystems Service Plan as part of the Destination 2040 planning process, County's strategic vision.

Although the political and administrative process is still ongoing, we publish the underlying research to disseminate relevant information to the general public and interested members of the environmental community. Further we believe that the developed methodology is a contribution to the ongoing discussion on the role of environmental planning in a home rule state.

Suggested Citation:

Hoefler, Wolfram and Cron, Nina. Cultural Landscape and Ecosystems Service Plan. Summary. 2024. Rutgers, The State University of New Jersey. New Brunswick, NJ: Rutgers University
Retrieved from: <https://cues.rutgers.edu>

Summary document:

This working draft is the summary of the research developed under the guidance of the Middlesex County Office of Planning in close collaboration with the Alan M. Voorhees Transportation Center (VTC) at Rutgers. This draft and the three submitted full sections inventory (1), analysis (2), and implementation (3) will serve as resource documentation for the Plan Nature & Place; one of the nine functional plans Middlesex County's Destination 2040 planning process.

Center for Urban Environmental Sustainability (CUES) Team:

- Wolfram Hoefler Dr.-Ing, AK NW, Director,
- Nina Cron MLA, Project Coordinator
- Jean Epiphan MS, Ecologist, Licensed Tree Expert, ISA Cert. Arborist
- Steven Handel PhD, Senior Ecologist, Hon. MLA
- Vincent Javit MLA, Designer
- Daniel Ilkow MLA, Technical Support
- Student Interns: Tyler Holden, James Lee, William Magnanini, Jacob Oberwanowicz

TABLE OF CONTENTS

TABLE OF CONTENTS	2
INTRODUCTION	4
PROCESS.....	5
CHAPTER STRUCTURE	6
EXISTING ENVIRONMENTAL CONDITIONS	9
ECOLOGICAL HABITATS OF CONCERN	10
PRIORITY FLOOD MITIGATION	12
LAND AT DEVELOPMENT RISK	14
EXISTING ENVIRONMENTAL CONDITIONS FINDINGS	14
PEOPLE AND SPACE	16
CULTURAL LANDSCAPE	18
CHARACTER OF PLACE	19
DOWNTOWN CHARACTER	20
CULTURAL LANDSCAPE FINDINGS	21
LANDSCAPE TYPES	22
VISION	25
ACTION PLAN	26
TYPE-SPECIFIC TACTICS	28
TACTICS ACROSS LANDSCAPE TYPES	30
GREENWAY OPPORTUNITIES	31
CALL TO ACTION	33

INTRODUCTION

Today's demands of sustainability, resiliency, and quality of life challenges require integrative and proactive environmental planning on a larger scale. The leadership of Middlesex County in central New Jersey has decided to generate a comprehensive County-wide ecological assessment combined with an analysis of the County's cultural landscape. This assessment embraces the interrelationships between human well-being and landscape design, providing the data to develop a regional environmental decision-making framework for relevant landscape influencers. Influencers shaping our environment include landowners, municipalities, County administration, NJ State agencies, and NGOs. The **Nature & Place** plan derives one of nine functional plans from Middlesex County's Destination 2040 (D 2040). D 2040 defines strategic initiatives or goals to provide local governments with a flexible decision-making framework for sustainability, resiliency, and equitable planning.

Eight Destination 2040 Strategic Initiatives in alignment with Nature & Place goals pursue to enhance ecological and cultural landscapes:

- Expand the use of green infrastructure approaches for water management.
- Expand the use of green infrastructure to reduce the heat and stormwater impacts of transportation facilities.
- Enhance the capacity of municipalities to advance sustainable and resilient land use and development.
- Preserve wildlife habitats and natural resources.
- Improve the stewardship of environmental resources.
- Revitalize walkable town centers, downtowns, and commercial corridors.
- Develop the Arts Institute of Middlesex County into a hub for all arts, cultural, and historical programming.
- Provide safe, innovative, inclusive, and sustainable parks and recreation services.

The Strategic Initiatives paired with existing inventory elements exemplified the need for place-based, ecologically driven urban and landscape design to serve Middlesex County's resilient future. This plan builds on the findings of the *Open Space and Recreation Plan (Open Spaces.)*, which developed an inventory, assessment, and action plan for the County's 19 parks and 34 preservation areas, including a thorough analysis of priority land acquisition opportunities.

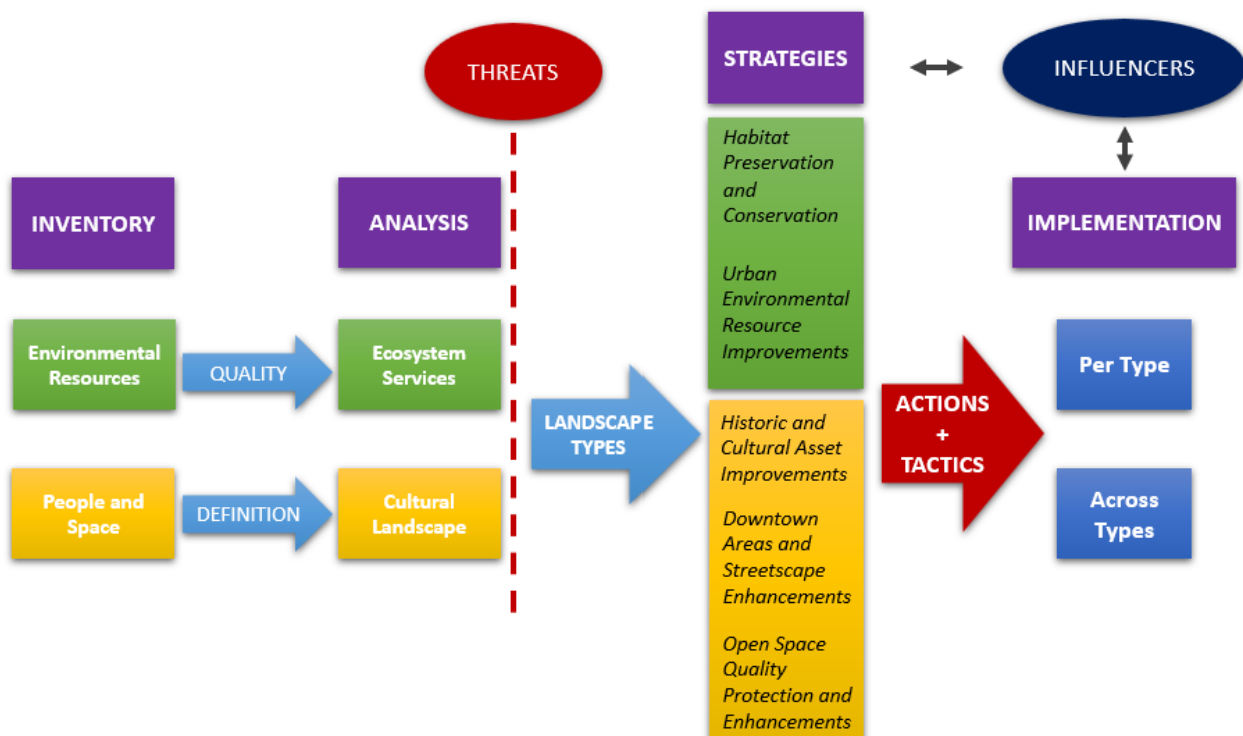
The goal of the **Nature & Place** Functional Plan is to support and foster the higher landscape expectation that residents have expressed by providing tactics to achieve an integrated cultural landscape and ecosystem services-centered vision.

PROCESS

Middlesex County's *Integrated Ecosystem Services and Cultural Landscape Plan* focused on three core elements inventory (1), analysis (2), and implementation (3). Inventory and analysis of Middlesex County's landscapes revealed existing environmental conditions as they inform how people interact with outdoor space and the County's ecological fabric. The *Inventory* (chapter 1) examined the County's existing environmental conditions concerning the demographic situation and examined residents' needs and wishes to inform the quality of the County's environmental resources. This comprehension helped further develop an understanding of cultural landscapes.

The inventory informed the selection of components for the *Analysis* chapter, concluding that the County holds significant potential to enhance the ecological value and support culturally significant areas County-wide but is also facing the threat of overdevelopment. The *Analysis* further assessed these conditions as ecosystem services and cultural landscapes resulting in landscape types specific to Middlesex County and strategies for landscape improvements. The landscape types and strategies derived from the *Analysis* informed the *Action Plan*. The analysis informs the action plan's strategies, actions, and tactics to attain the *Vision* for sustainable, resilient, and accessible landscapes throughout the County.

Figure 1: Project Process Diagram



CHAPTER STRUCTURE

The ***Nature & Place*** plan explores the County’s existing environmental conditions, **Table 1**. The existing conditions relate to the natural landscape and people in space through traditional planning approaches such as geographic information systems (GIS) mapping techniques. The analysis further identifies high, medium, and low-risk areas within Middlesex County’s ecological and cultural landscapes, **Table 2**. This summary highlights how climate change and habitat loss impact the County’s landscape. The selected examples include ecological habitats of concern, priority flood mitigation areas, and land at development risk. The findings exemplify priority locations informing actions on specific landscape stressors, **Table 3**.

Table 1: Environmental Conditions Inventory Elements

LAND USE LAND COVER	NATURAL RESOURCES
Topography	Tree Canopy Cover
Urbanization History	Terrestrial Macrohabitats and Physiographic Regions
Land Use Land Cover	Wildlife Habitats of Concern
Wetlands and Waterbodies	Groundwater Recharge
Watershed Management Areas	ENVIRONMENTAL ISSUES
Major Urbanized Land Use	FEMA Flood Risk Zones
Change in Commercial Areas	Projected Sea-Level Rise
Impervious Surfaces	Urban Heat Islands
Parking Lots by Size	
OPEN SPACE AND FARMLAND	DEMOGRAPHICS
Open Space and Natural Land	Population Density
Historic Landscape in Open Space and Preserved Farmland	Racial and Ethnic Minority
Farmland and Farmers’ Markets	Poverty and Median Household Income
PEOPLE AND SPACE	OUTREACH
Rail Network, Transit Villages, and Bus Routes	Nature & Place. Photo Survey
Electric Transmission Line Network	Municipal Engagement Meetings
Historic Properties and Districts	
Arts and Cultural Centers	
Houses of Worship	
Commercial Centers and Designations	

Table 2: Ecosystem Services and Cultural Landscape Analysis Elements

ECOSYSTEM SERVICES	
Ecological Habitats of Concern	
Wetlands and Buffers with Watershed Delineation and Impervious Surfaces	
Priority Flood Mitigation Ranks	
Priority Flood Mitigation Ranks with Parking Lots and Impervious Surfaces	
Tree Canopy Cover and Impervious Surfaces	
Urban Heat Islands and Impervious Surfaces	
CULTURAL LANDSCAPE	
Cultural Landscape Features and Assets	Cultural Landscape Perception
Historical and Cultural Assets	Nature & Place Photo Survey Analysis
Viewshed Analysis	D 2040 Public Outreach Analysis
Character of Place	Municipal Engagement Analysis
Downtown Analysis	Nature and Place Analysis
OPEN SPACE AND RECREATION	
Open Space. Overview	
Priority Acquisition Opportunities	
LANDSCAPE THREATS	
Land at Development Risk	
Land at Development Risk and Base Zoning	
Land at Development Risk and Land Use Land Cover	
LANDSCAPE TYPES AND INFLUENCERS	
Land Use Types	
Cultural Landscape Types	
Landscape Influencers	

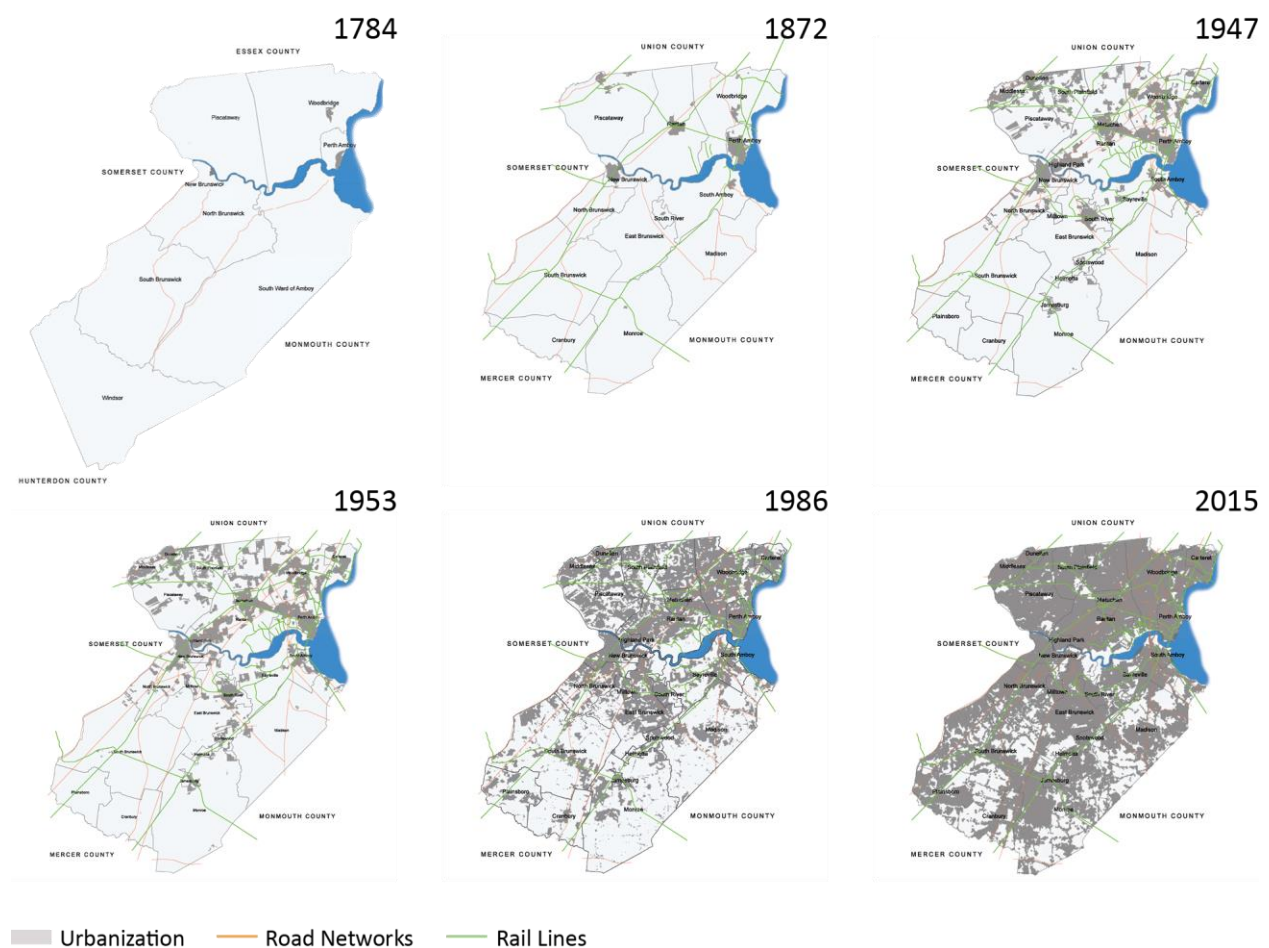
Table 3: Ecosystem Services and Cultural Landscape Action Plan Elements

ECOSYSTEM SERVICES		
Habitat Preservation and Conservation Land Use Restoration and Habitat Enhancements Stewardship		Urban Environmental Resource Improvements Green Infrastructure Energy Efficiency
CULTURAL LANDSCAPE		
Historic and Cultural Asset Improvements Historic Landscapes Viewshed Management	Downtown Areas and Streetscape Enhancements Pedestrian Space Enhancements Pedestrian and Cyclist Safety	Open Space Quality Protection and Enhancements Parks and Recreation Management
ACTION IMPLEMENTATION		
Type-Specific Tactics Tactics Across Landscape Types Greenway Opportunities		

EXISTING ENVIRONMENTAL CONDITIONS

The inventory revealed that sixty percent of the County's landscape consists of urbanized land, especially adjacent to the various waterfronts resulting from industrial progress throughout the 19th and 20th centuries, **Figure 2**. This progress resulted in land use changes transforming rural and natural landscapes into industrial and suburban developments. The County's significant historical events translate into the landscape through historic properties, markers, and districts exemplifying cultural heritage.

Figure 2: Middlesex County's Urbanization History



ECOLOGICAL HABITATS OF CONCERN

Ecological habitats of concern, **Map 1**, encompasses ecologically viable habitats that provide critical resources for indigenous flora and fauna and invaluable ecosystem services. Essential ecosystem services provided by the remaining forty percent of non-urbanized land for Middlesex County residents include natural capital like clean water, clean air, fertile soils, and recreational opportunities.

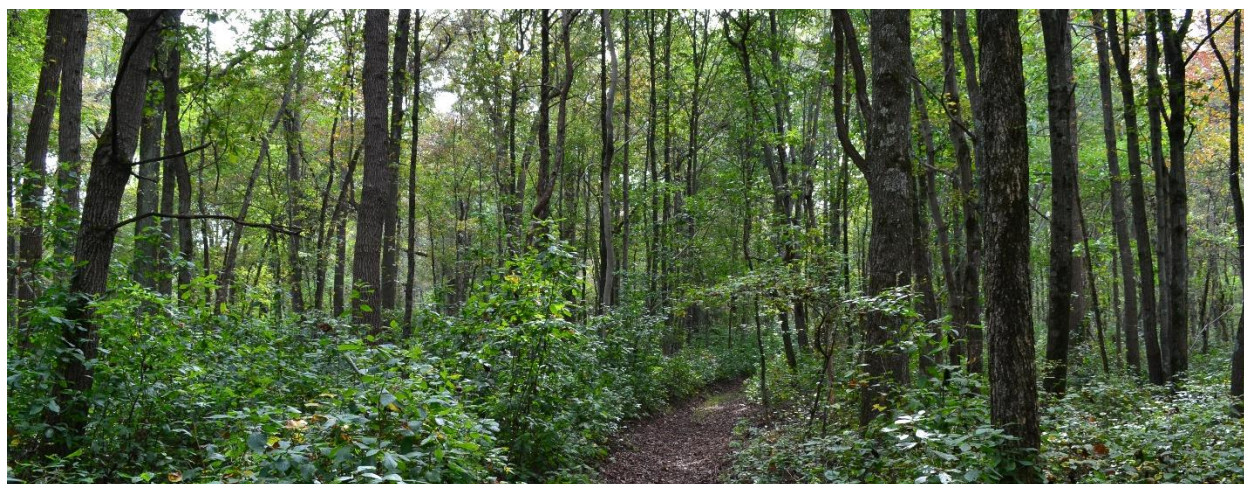
Ecological habitats of concern consist of habitat cores and corridors (NJDEP CHANJ), critical wildlife and endangered species habitats (NJDEP CHANJ), vernal pool habitats (NJDEP), Natural Heritage Priority Conservation Sites (NJDEP Natural Heritage Program), and habitat fragments (National Habitat Fragment Database).

The ecological habitats of concern analysis concluded that Middlesex County's landscape comprises 31,737 protected acres (16 percent) through open space or farmland preservation. This land will never succumb to development beyond recreational or agricultural purposes.

However, important unprotected habitats occupy 63 percent of the County's land.

Middlesex County contains approximately 104,629 acres in the high, medium, and low ecological habitat of concern areas (51 percent of total acres). Only 27 percent of the habitats of concern lie within Green Acres Open Space, and NJFPP preserved land. Habitats provide homes for Middlesex County's endangered and threatened wildlife and numerous ecosystem services for humans. Methods to sustain and enhance ecological habitat functions across all land uses become essential because the remaining preserved natural land will no longer be enough to provide essential ecosystem services.

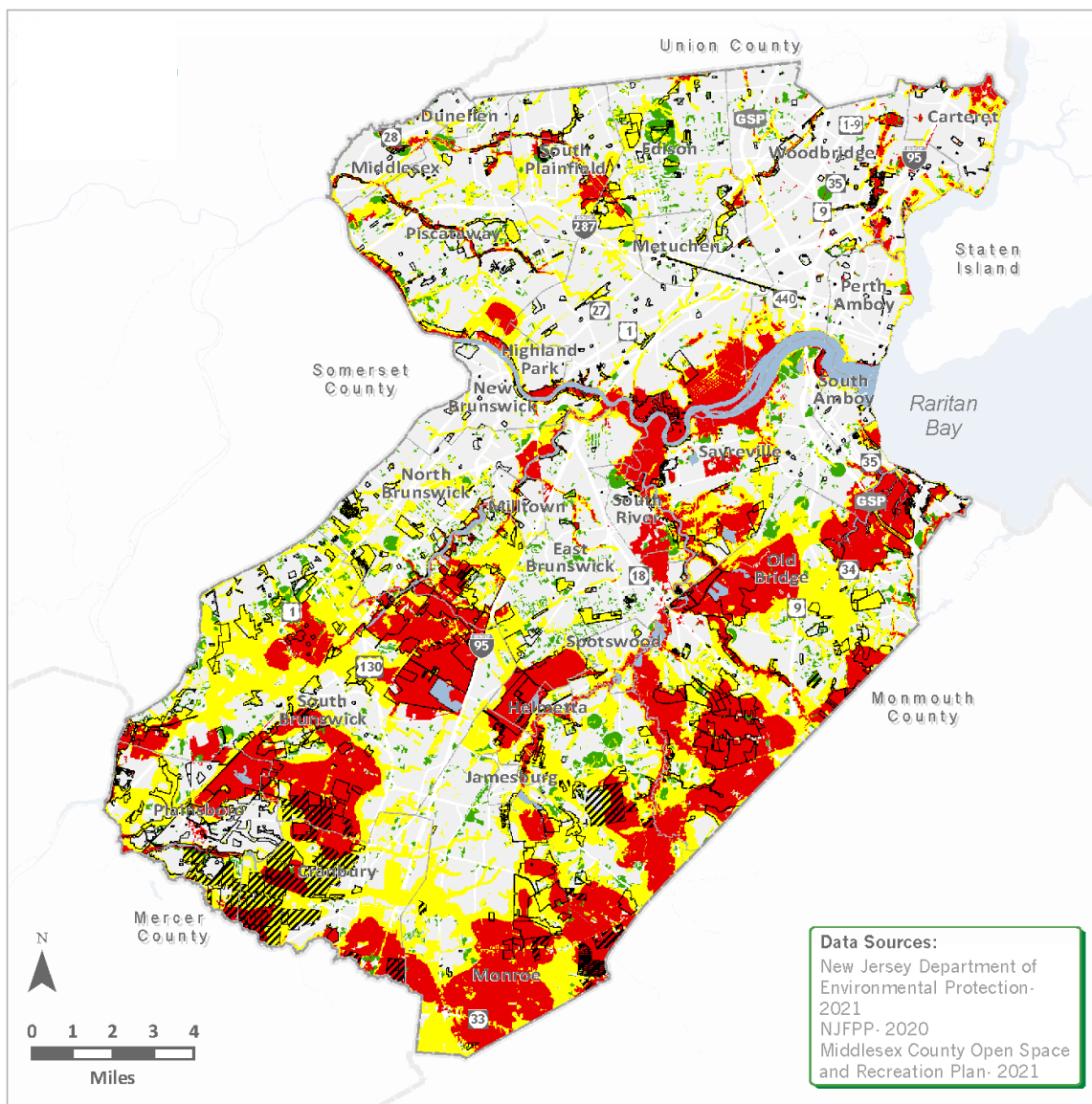
Figure 3: Central Oak-Pine Forest at John A. Phillips Preserve, Old Bridge





Source: CUES, Rutgers University. Photograph. 2020.

Map 1: Ecological Habitats of Concern

Ecological Habitats of Concern







Legend

-  Preserved Open Space Parcels
-  Preserved Farmland Parcels

Ecological Habitats of Concern

Rank: Description

-  3: Habitat cores, Priority conservation sites (only 4 in County), and Critical wildlife habitats (ranks 3,4,5)
-  2: Habitat corridors, Critical wildlife habitat (ranks 2,1), vernal pool habitat
-  1: Habitat fragments, potential vernal pool habitat, all outside ranks above
-  0: None of the habitat areas listed

Prepared: January 12, 2022
 By: CUES, Rutgers University

PRIORITY FLOOD MITIGATION

Middlesex County's flood risk, exacerbated by climate change and increased structural development, continues to intensify and threaten the County's growing communities, **Map 2**. Climate change variables that factor into escalated flooding threats include sea-level rise, amplified storm intensity, and higher frequency. These factors, coupled with widespread development and impervious surfaces, place more people and built capital at risk within the County's four watershed management areas. Amplified stormwater impacts—such as erosion, flooding, and pollution—pose serious threats to water quality and existing natural lands. Wetland and riparian habitats for threatened and endangered species experience increased threats from storm intensity and human impacts.

The comparison of FEMA 100-year and 500-year flood risk zones (FIRM), NOAA 2-foot sea-level rise prediction, and NOAA and FEMA Category 4 hurricane storm surge predictions (SLOSH model) identified 51,083 acres of the County's landscape to lie within flood risk areas. Lower elevations along the County's waterways, including the Arthur Kill, Raritan Bay, Raritan River, and South River, contain the highest flood risk areas. Tidally influenced areas have a greater threat of storm surge flood risks occupying the river waterfronts and coastal communities. Although outside the 100- and 500-year floodplains, SLOSH locations bear an increasing risk from coastal storms as climate change projections and sea-level rise will amplify detrimental flooding effects. Our natural lands can act as stormwater buffers to combat these climate-related flood risk exacerbators with continued care and sustainable intervention.

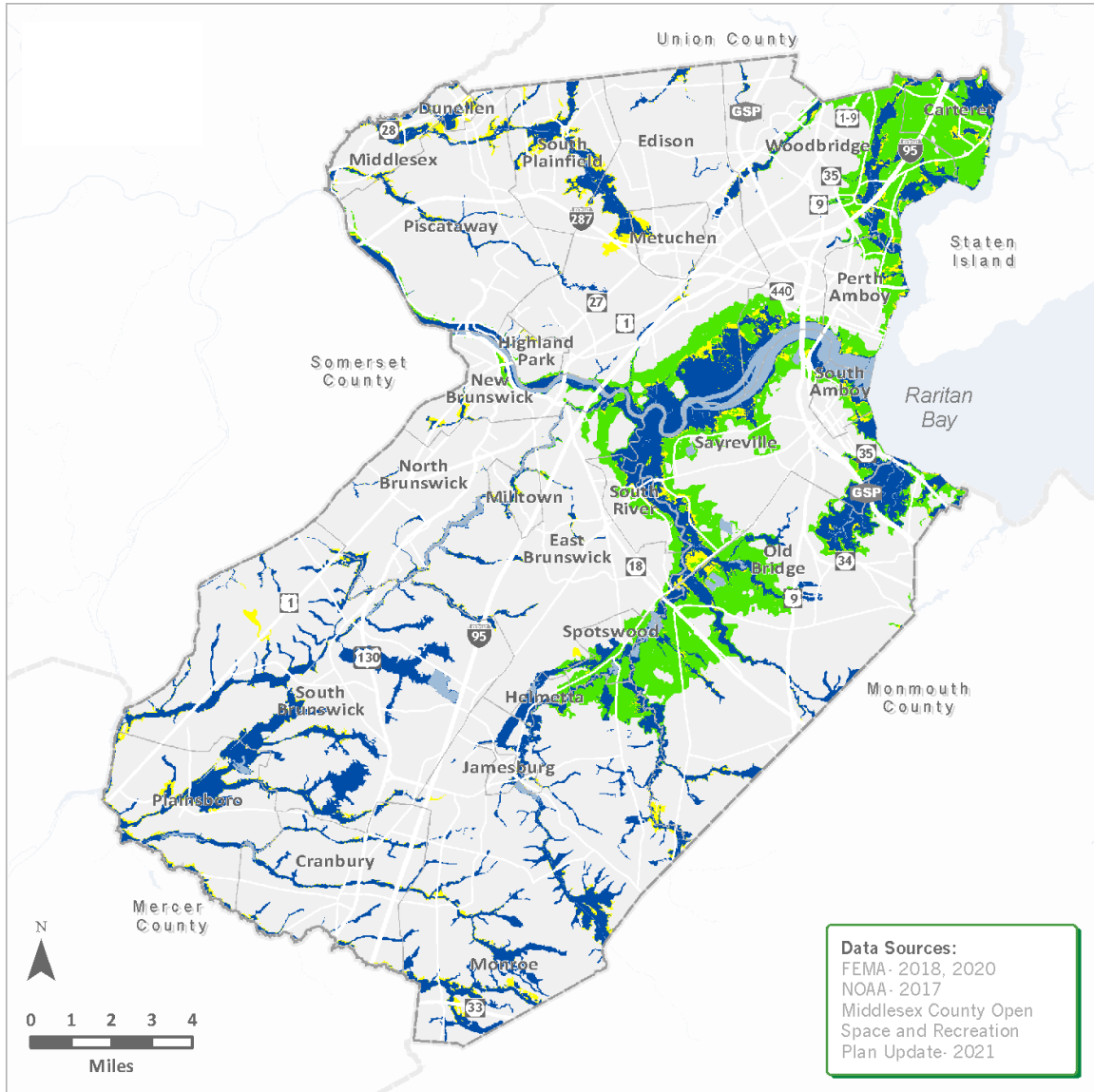
Figure 4: Route 18 Flooding in New Brunswick, 2021



Source: CUES, Rutgers University. Photograph. 2021.

Map 2: Priority Flood Mitigation Ranks

Priority Flood Mitigation Ranks



Priority Flood Mitigation Rank Zones

Rank: Description

- 3: Within 100-year FEMA Flood Risk Zone
- 2: Within 100 and 500-year FEMA Flood Risk Zone; Plus 2-foot Sea Level Rise (NOAA)
- 1: SLOSH (Storm surge prediction model FEMA/NOAA) Category 4 storm surge extent
- 0: Outside flood model extent
- Water

*Prepared: October 21, 2021
By: CUES, Rutgers University*

LAND AT DEVELOPMENT RISK

Natural land in Middlesex County encompasses various land use covers, including vacant land, wetlands, agricultural, and forested land. Most natural lands exist outside of preserved open space and farmland preservation designations. These lands hold high development risk because they possess current development zoning and lack state-level protections.

The County contains roughly 50,000 acres of natural land at development risk, **Map 3**. The most at-risk natural areas reside adjacent to highway development outside wetland delineation boundaries. These natural lands hold zoning for approved development, **Figure 5**. Half of the County's total acres at development risk include protected wetlands by the state NJDEP, while 17,500 occupy unprotected upland forests without protection. Unpreserved agricultural land accounts for 6,000 acres of land at development risk. Upland forests and agricultural land are more susceptible to development due to the lack of state-level regulation.

Figure 5: Forested Lands for Sale



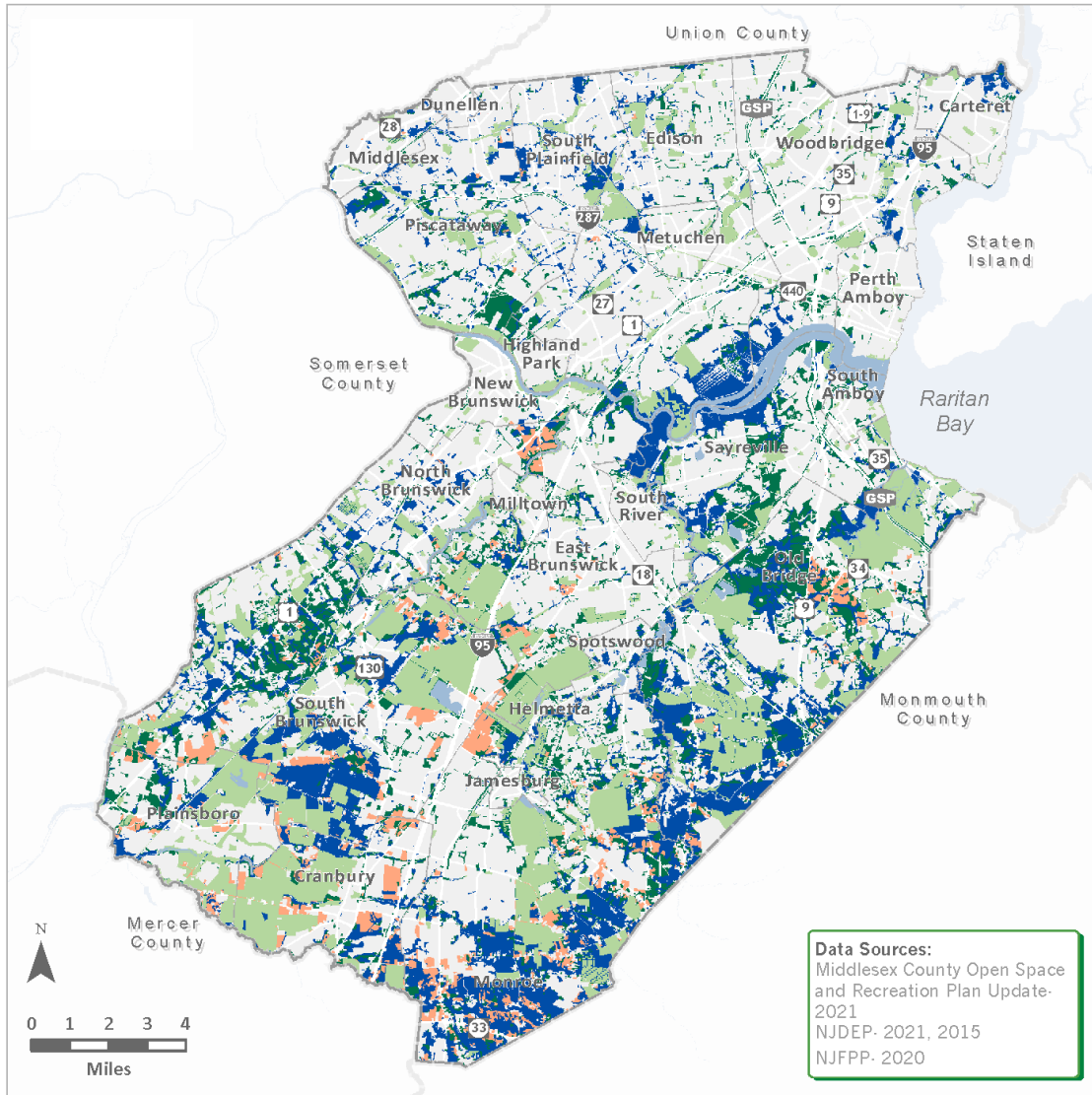
Source: CUES, Rutgers University. Photograph. 2021.

EXISTING ENVIRONMENTAL CONDITIONS FINDINGS

The analysis of existing conditions in the full ***Nature and Place*** document (**table 2**) identifies potential threats and opportunities through traditional planning weighted overlay mapping. The existing conditions revealed that viable ecological habitats exist outside of protected outdoor spaces, flood mitigation priorities encompass the County's east coast, rivers, and tributaries, and natural land with a severe development threat leading to habitat loss still exists. The overlays prove that regional-scale efforts will best encompass landscape strategies across the entire County and inform actions to lessen these impacts and threats.

Map 3: Land at Development Risk and Land Use Land Cover

Land at Development Risk and Land Use Land Cover



Land Use Land Cover Categories within Land at Development Risk Ranks 1-3

- Agriculture
- Barren Land
- Forest
- Urban
- Water
- Wetlands
- Open Space and Preserved Farmland

Prepared: February 9, 2022
By: CUES, Rutgers University

PEOPLE AND SPACE

Human interaction encompasses the main source of culture. This cultural production often happens at cultural institutions but also in everyday environments, creating memories linked to diverse locations. This cultural process' primary factor transforms ordinary spaces into meaningful places. The discussion of *People and Space* reveals that local culture connects to historic sites and landmarks rather than ordinary places, including the neighborhood park, a downtown, or the local mall. Transportation networks, commercial districts, and historic landscapes connect people and the County's heritage. Middlesex County's everyday spaces reflect cultural representation, forming the suburban landscape. This understanding goes beyond currently established cultural landscape definitions.

The National Park Service, Cultural Landscape Foundation, and European Union's traditional definitions of cultural landscapes compared with the County's suburban context established a cultural landscape understanding specific to Middlesex County's needs. Public outreach through an online photo survey and municipal stakeholder outreach informed actions and tactics through community desires and revealed the human connection to outdoor spaces.

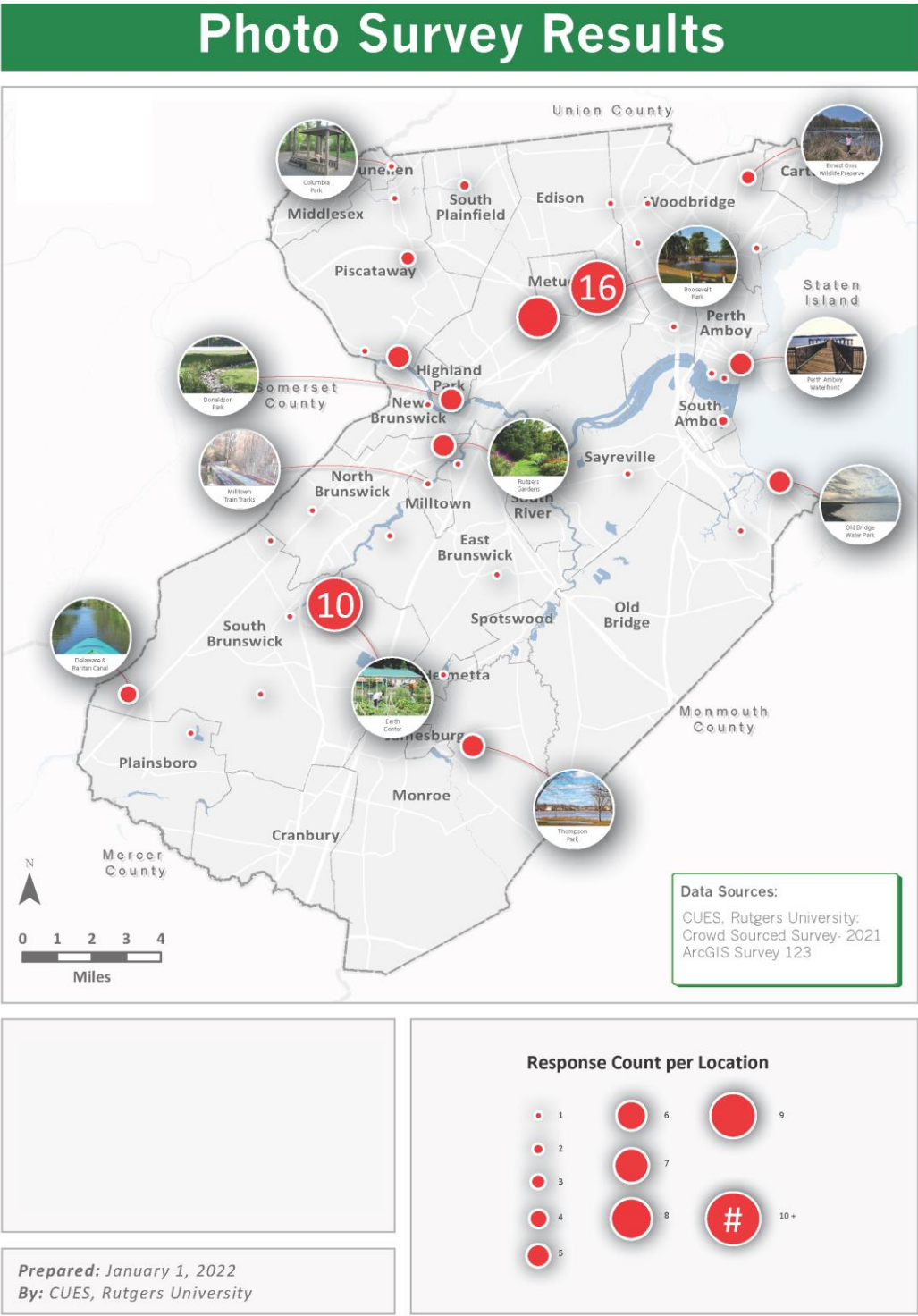
The public crowd-sourced ***Nature & Place.*** online photo survey gathered information displaying the rich narrative that links residents to the County's physical landscapes. The online survey asked participants to upload a photo of their favorite outdoor place, submit a location, and answer questions about demographics and place connection, ***Map 4.*** Key findings revealed that places are culturally significant because they link narratives through self-identity in a place, provide a space for memory creation, and are places for people to experience nature. These narratives establish intangible values in outdoor spaces. Viewsheds and waterfronts were among the most named favorite outdoor places. People spoke about experiences with loved ones tied to a specific location, ***Figure 6.*** During the height of the COVID-19 Pandemic (2021), outdoor places also helped people, allowing for safe outdoor space use in times of uncertainty.

Figure 6: Sunset Viewsheds Submitted to The Photo Survey



Images from left to right. Old Bridge waterfront sunset; Sayreville Kennedy Park sunset; sunset over Helmetta Pond.

Map 4: Photo Survey Results



CULTURAL LANDSCAPE

The linked narratives portrayed by residents informed an evolved definition of cultural landscape suitable for the suburban context. This evolving process added to the traditional cultural landscape definition focusing on cultural features and assets informed by the National Park Services' 13 cultural landscape characteristics, such as historic landscapes, viewsheds, downtown architecture, and physical characteristics of a place.

Viewsheds physically connect humans to the landscape through visual analysis. Still, the visual interpretation forms the viewer's perception of the landscape in a positive or negative light answering the question: Is this a place I want to be?

The cultural landscape analysis extends beyond landscape features into visual landscape perception identified through community outreach, concluding that people want better access and quality downtown areas, safe outdoor experiences, and connections to nature.

Because the (re-)creation of shared narratives by residents happens at special events or casual, regular interactions, the cultural landscape analysis acknowledges that culture happens every day at every place. ***Therefore, a definition of the suburban cultural landscape of Middlesex County includes historic properties, natural features, and living ornaments, along with indicators of everyday human interaction of a diverse population:***

As defined in this plan, a cultural landscape is an outdoor space of any scale experienced by people. The value of a cultural landscape develops from a historically significant event or era, religious correlation, or emotional response that evokes memory, identity, or spiritual connection to a place. The cultural landscape can be natural in form or entirely built. Still, it is always an outdoor space directly or indirectly experienced by people tied to a perceived intangible and subjective value based on cultural preference.

CHARACTER OF PLACE

Middlesex County's *Character of Place* analysis revealed the unique landscape characteristics falling under the broad residential, commercial, industrial, barren, agriculture, open space, and mixed-use categories. Characteristics exemplify the urban, suburban, and rural areas with specific landscape types, including high-low-density residential, urban and rural agriculture, warehouses, refineries, strip malls, standalone commercial buildings, shopping plazas, natural parks, social parks, downtown areas, and more.

Figure 7: Middlesex County Character Photo Collage

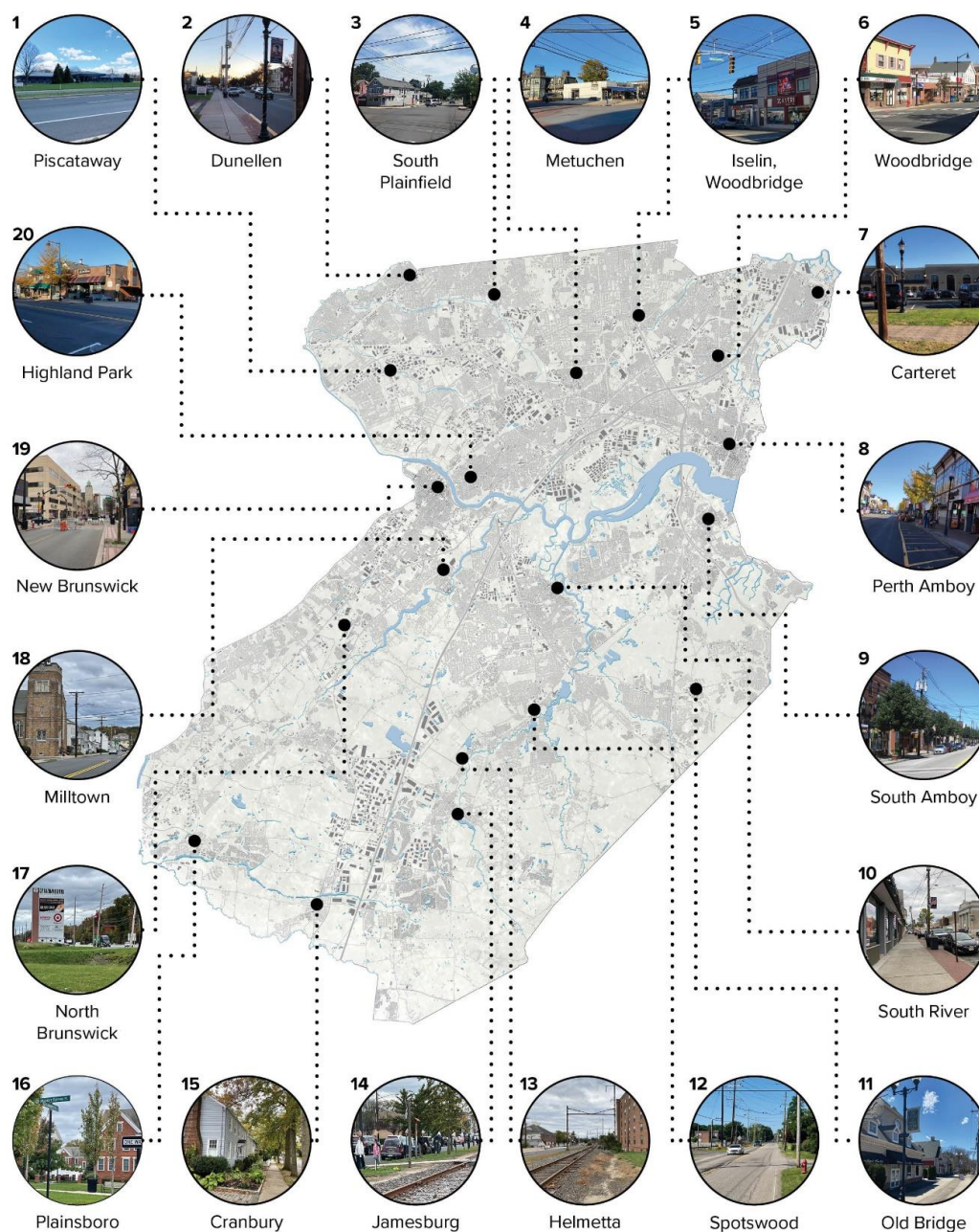


Source: CUES, Rutgers University. Site Visit Photographs in Middlesex County. 2021-2022.

DOWNTOWN CHARACTER

Middlesex County contains 20 municipal downtown locations analyzed through this place connected to open spaces and six historic downtowns, **Figure 8**. Population density informed three downtown types: Urban City Center (2), Suburban Town Center (16), and Rural Village Center (2). The analysis highlights the importance of a downtown coalition working to improve the downtown experience, such as in Highland Park and Metuchen's non-profit organizations working to enhance the downtown experience for County inhabitants.

Figure 8: Downtown Characters



CULTURAL LANDSCAPE FINDINGS

Key findings reveal that Middlesex County's cultural landscape features and assets range in character, defining various sections across the County such as downtown character, place types, viewsheds, and historic areas. Culturally accepted design standards accompany historic districts and properties by preserving their historical and cultural aesthetics. Arts and cultural centers such as museums and historic, revolutionary battle trails marked throughout the County's landscape narrate the area's history. Downtowns include everyday spaces people want to be, providing an opportunity to connect people and the County's heritage. Tactics such as signage, phone applications, events, and access connect people to these spaces and instill an intangible cultural value to help protect and enhance outdoor spaces.

Figure 9: Downtown Street use in New Brunswick, Summer 2021.



Source: CUES, Rutgers University. Photograph. 2021.

LANDSCAPE TYPES

The use of a property by the owner defines the land's features. In Middlesex County, these are most commonly homes, stores, offices, warehouses, landfills, farms, or parks. To avoid conflicts between uses and identify economic development opportunities (*Invest Smart.*), planners translate these characteristics into land use categories, including residential, commercial, industrial, agricultural, barren, and open space. Considering the challenges of climate change, like flooding and extreme urban heat, one important tool includes advocacy for changing land use possibilities through acquisition programs. Therefore, *Nature and Place.* identifies priorities for buying land through the Green Acres or Blue Acres programs, which is essential but insufficient.

Consequently, this plan utilizes the planner's land use categories (New Jersey Tax Assessors' tax-parcel classifications and NJDEP's land use zoning) transformed into a more detailed system of Landscape Types. In addition to land use, these types include spatial characteristics of buildings, land cover, and ecosystem services functions, allowing for a more detailed exploration of opportunities to enhance sustainability and resiliency within each type. Those potentials go hand in hand with providing opportunities for meaningful social interaction, enhancing the cultural landscape, and thus improving residents' quality of life. Examples of cultural landscape types include warehouses, strip malls, and high to low-density housing units, *Figure 11, and Map 3.5.*

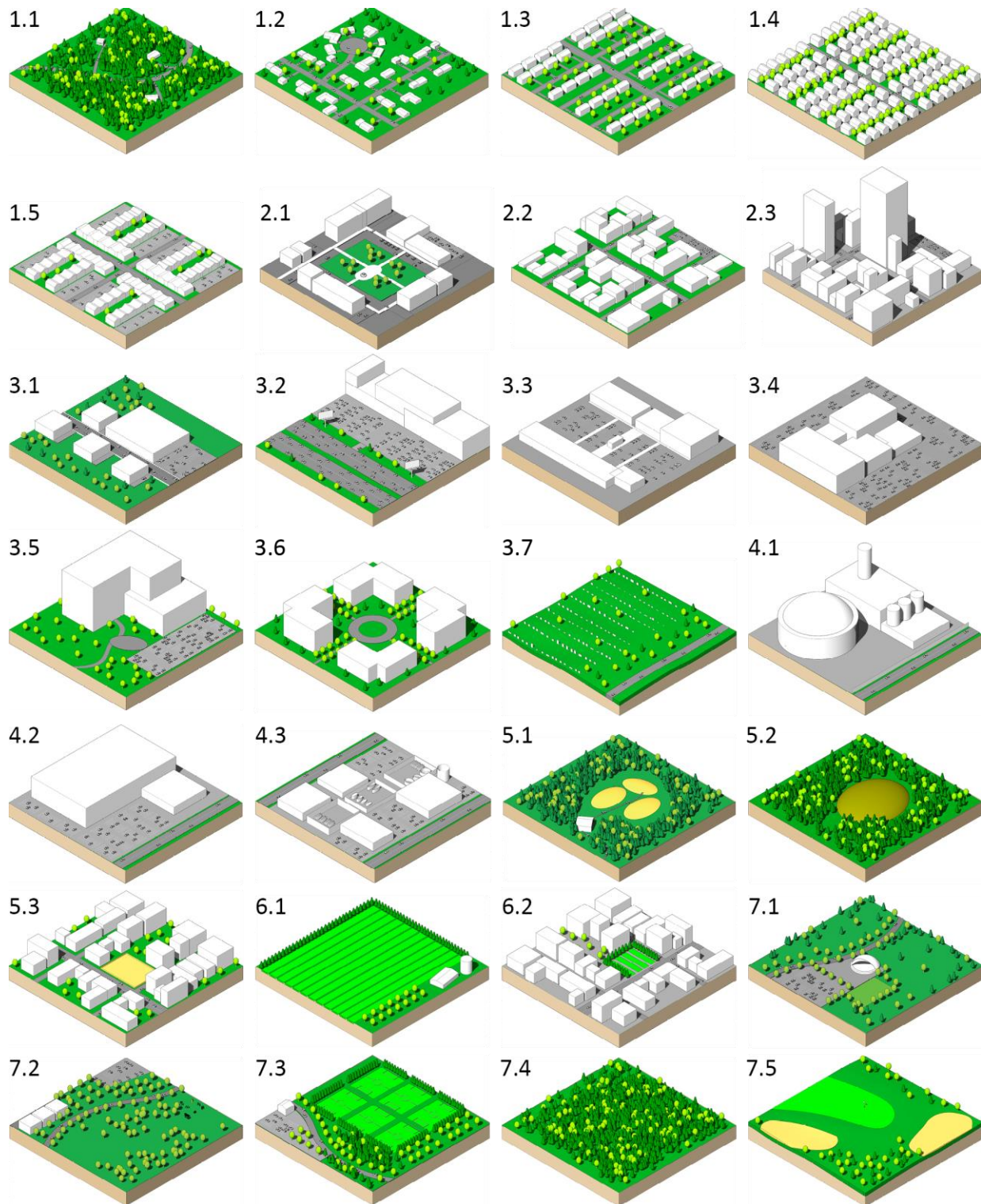
Figure 10: Urban, Suburban, and Rural Residential Dwellings



Source: CUES, Rutgers University. Photograph. 2020.

Of course, the property owner has the final say about the land's use. However, other influencers are at play, including municipalities, State and Federal governments, businesses, and non-profit organizations. *The goal is to utilize the landscape characteristics unique to each type to aid influencers in implementing prescribed actions and tactics.*

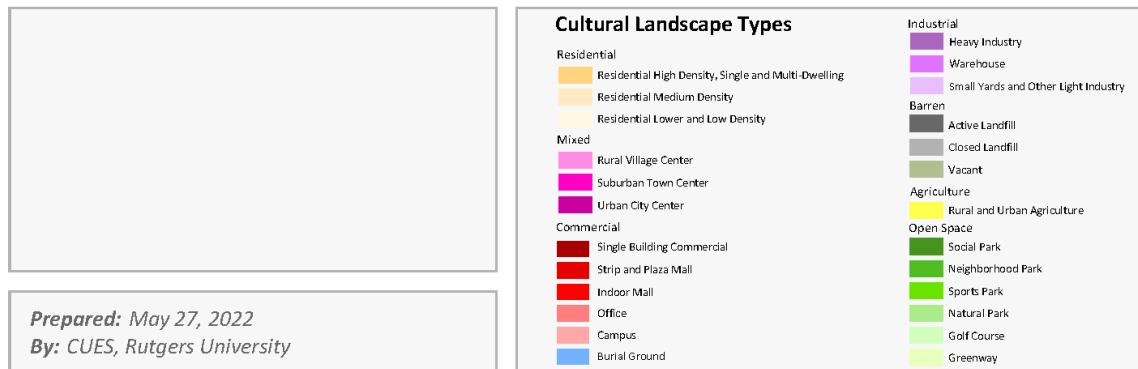
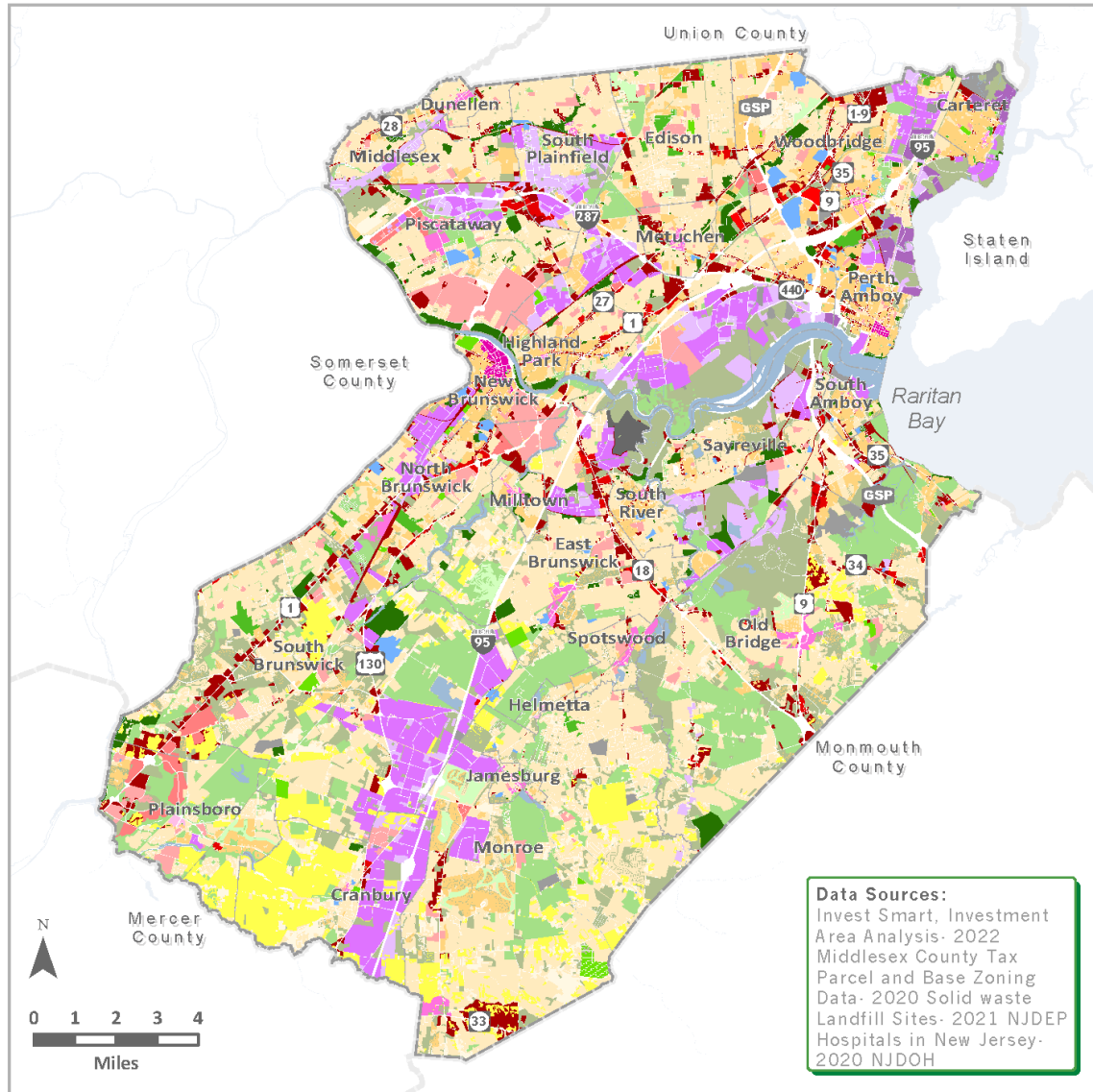
Figure 11: Cultural Landscape Types



Single, Low-Density Rural 1.1, Single, Lower-Density Suburban 1.2, Single, Medium-Density Suburban 1.3, Single, High-Density Suburban 1.4, Multi-Dwelling, High-Density Suburban 1.5, Rural Village Center 2.1, Suburban Town Center 2.2, Urban City Center 2.3, Single Neighborhood Building 3.1, Strip Mall 3.2, Plaza Shopping Center 3.3, Indoor Mall 3.4, Office Park 3.5, Campus 3.6, Burial Ground 3.7, Heavy Industry 4.1, Warehouse 4.2, Small Yard Or Other Light Industry 4.3, Active Landfill 5.1, Closed Landfill 5.2, Vacant 5.3, Rural Farmland 6.1, Urban Agriculture 6.2, Social Parks 7.1, Neighborhood Parks 7.2, Sports Parks 7.3, Nature Parks 7.4, Golf Courses 7.5

Map 3.5: Cultural Landscape Types

Cultural Landscape Types



VISION

The *Vision* for Middlesex County's landscape is that all land, including improvements, will support an integrated, culturally significant, and ecologically thriving environment through ecological habitat enhancements and quality outdoor places for people to foster identity, memory, and cultural meaning.

The County will lead efforts to enhance ecological habitat and ecosystem services across the diverse urban, suburban, and rural conditions, including urban environment enhancements, natural habitat quality protection, and improvements to reduce urban heat island effects, flood risk, and habitat degradation.

Landscape enhancements will support a positive landscape perception expanding the spectrum of the County's cultural landscape to include all landscapes experienced by people. Improvements will still expand on traditional cultural landscapes to bolster diverse historical events County-wide and protect the County's viewsheds. The County-wide *Greenway Opportunities* network will connect people of diverse groups and fragmented wildlife habitats.

Figure 12: Ecosystem Services Strategies in a Residential Landscape



Source: CUES, Rutgers University. Photographic Rendering. 2022.

ACTION PLAN

The goal of the ***Nature & Place*** Functional Plan is to support and foster the higher landscape expectation that residents have expressed by providing tactics to achieve the integrated cultural landscape and ecosystem services-centered vision. Environmental assessment can no longer only focus on pristine quality habitats, separate places for people, and natural spaces. Assessments must consider the role of every acre and each specific land use, contributing to the holistic system and quality of Middlesex County's landscape experience.

The extensive *Environmental Conditions Inventory* and *Ecosystem Services and Cultural Landscape Analysis* shows that Middlesex County's landscapes display wide diversity from north to south and east to west identified through the various 28 landscape types.

To enhance Middlesex County's landscape's function, aesthetics, and accessibility, implementation efforts must extend to the regional scale and include site scale-specific interventions. The individual landscape types function cohesively to form corridors and natural connections supporting people through ecosystem services and wildlife through quality, uninterrupted habitats. These types further form the contiguous cultural landscape, fostering emotional responses that evoke a place's memory, identity, or spiritual connection.

This plan provides flexible and dynamic decision-making tools to strengthen existing efforts and enable municipalities to make environmentally and culturally conscious additions to their planning regimes, supporting the unity of the County's landscape. The landscape actions respect, support, and aim to facilitate conversation among the landscape's leading influencers.

This plan produces tangible outcomes within the existing context of home rule through a process-oriented, flexible environmental decision-making framework. Landscape urbanism principles inspire this approach in which landscape becomes the organizing principle for land use decisions and *landscape thinking*, which values a dynamic process producing flexible outcomes.

Figure 13 outlines the action plan's strategies, actions, and tactics that center on outdoor spaces as driving facilities to support the cultural significance and ecological quality of Middlesex County to promote the County as a prime place people want to live, work, and play. Tactics in the action plan consider landscape type-specific approaches that vary based on conditions and across type interventions that apply across the entire County.

Figure 13: Action Plan Structure

	STRATEGIES	ACTIONS	TACTICS <i>PER TYPE AND ACROSS TYPES</i>
ECOSYSTEM SERVICES	<i>Habitat Preservation and Conservation</i>	Land Use	Acquisition / Conservation Zoning / Cluster Zoning for Conservation / Easements / Partnership Agreements / Farmland Preservation / Alternative Use: Land for Agriculture
		Restoration And Habitat Enhancements	Biodiverse Planting / Shade Trees / Lawn Alternatives / Invasive Species Management / Wetland, Buffer, and Waterbody Protection / Deer Management and Fencing
		Stewardship	Ecological Stewardship Programs and Incentives / Habitat Value and Legal Requirement Education / Community Stewardship Groups
	<i>Urban Environmental Resource Improvements</i>	Green Infrastructure	Green Facades / Bioswales / Rain Garden and Bioretention Basin / Street and Parking Lot Trees / Green Roofs / Stream Daylighting / Permeable Parking Surfaces
		Energy Efficiency	Cool Roof / Solar Panels on Building Rooftops / Solar Panel Canopies in Parking Lots / Solar Fields / Electric Vehicle Charging Stations (EV)

CULTURAL LANDSCAPE	<i>Historic and Cultural Asset Improvements</i>	Historic Landscapes	Historical Signage / Historic Landscapes and Features Representing Diverse Groups
		Viewshed Management	Viewshed Inventory and Analysis / Vegetation Management / Development Standards / Viewshed Access
	<i>Downtown Areas and Streetscape Enhancements</i>	Pedestrian Space Enhancements	Street and Plaza Activation / Signage and Wayfinding / Community Arts Advocate / Art Installations / Digital Technologies to Celebrate the Local Character / Streetscape Amenity Enhancements
		Pedestrian And Cyclist Safety	Pedestrian and Bicycle Accessibility / Dedicated Bicycle Lanes
	<i>Open Space Quality Protection and Enhancements</i>	Parks And Recreation Management	Park Management Regimes / Permeable Pavement in County Park Parking Lots / Sustainable Park Amenity Enhancements

TYPE-SPECIFIC TACTICS

Type-specific tactics pair cultural landscape types identified in the *Ecosystem Services and Cultural Landscape Analysis* with *Type-Specific tactics* for physical implementation. **Figure 14** illustrates type-specific tactics explored in the action plan, while **Figure 15** provides a sample visual for one (Warehouse) of the 28 tactics applicable to a specific type. The across-type Greenway Opportunity links all landscape types.

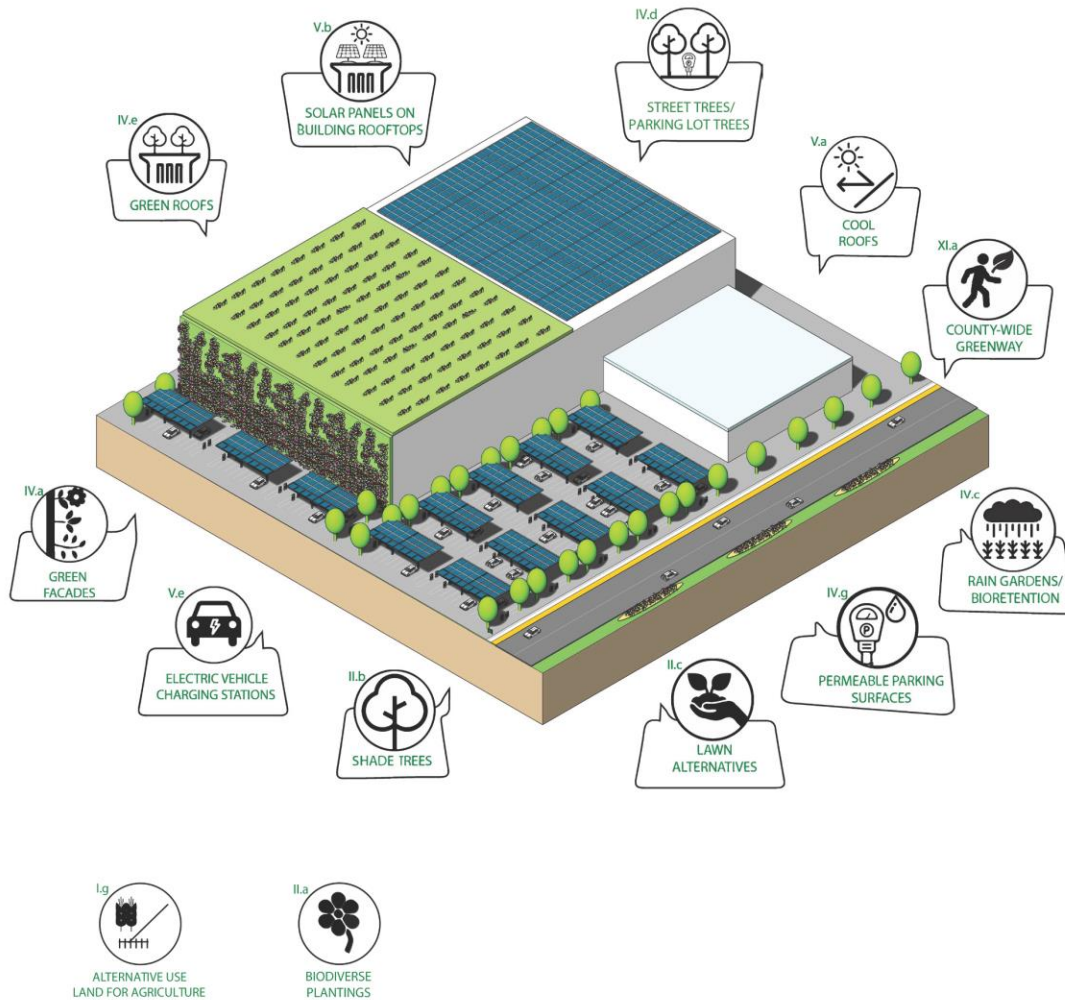
Figure 14: Type-Specific Tactics



Figure 15: Industrial Warehouse Sample Type-Specific Tactic Sheet

4.2 Warehouse

Industrial



Quick Facts:

Warehouse buildings account for over 4,000 acres of the County's landscape (2%) and over 3,000 parking lot acres (1.5%). Reducing impervious surfaces by 5% (350 acres) can reduce 9.5 million gallons of water runoff for 1-inch of rain!

See *Action Plan* (chapter 3) for all 28 Type-Specific Tactic sheets.

TACTICS ACROSS LANDSCAPE TYPES

In most scenarios, the across-type tactics do not contain physical interventions but develop specific processes to enable desired outcomes. These tactics include plan establishment, community groups, and tools for conservation, awareness, and education, **Table 4**.



ACROSS TYPES

These tactics work with landscape urbanist ideals to plan for suburban areas and cities with the environment at the core of a decision-making framework. The following section concludes the tactics across landscape types with the *Greenway Opportunities* network linking cultural significance and ecological goals through natural and human-made corridors.

Table 4: Programming, Educational, and Planning Tactics

Tactic ID	Title
I.a	ACQUISITION
I.b	CONSERVATION ZONING
I.c	CLUSTER ZONING FOR CONSERVATION
I.d	EASEMENTS (CONSERVATION AGREEMENT)
I.e	PARTNERSHIP AGREEMENTS
II.e	WETLAND (AND BUFFER) AND WATERBODY PROTECTION
III.a	ECOLOGICAL STEWARDSHIP PROGRAMS AND INCENTIVES
III.b	EDUCATION OF HABITAT VALUE AND LEGAL REQUIREMENTS
III.c	COMMUNITY STEWARDSHIP GROUPS
IV.g	STREAM DAYLIGHTING
VI.b	HISTORICAL LANDSCAPES AND FEATURES REPRESENTING DIVERSE GROUPS
VII.a	VIEWSHED ANALYSIS
VIII.c	ARTS ADVOCATE
VIII.e	DIGITAL TECHNOLOGIES TO CELEBRATE THE LOCAL CHARACTER

Figure x: Conservation Tactics



Source: CUES, Rutgers University. Photograph. 2021.

GREENWAY OPPORTUNITIES

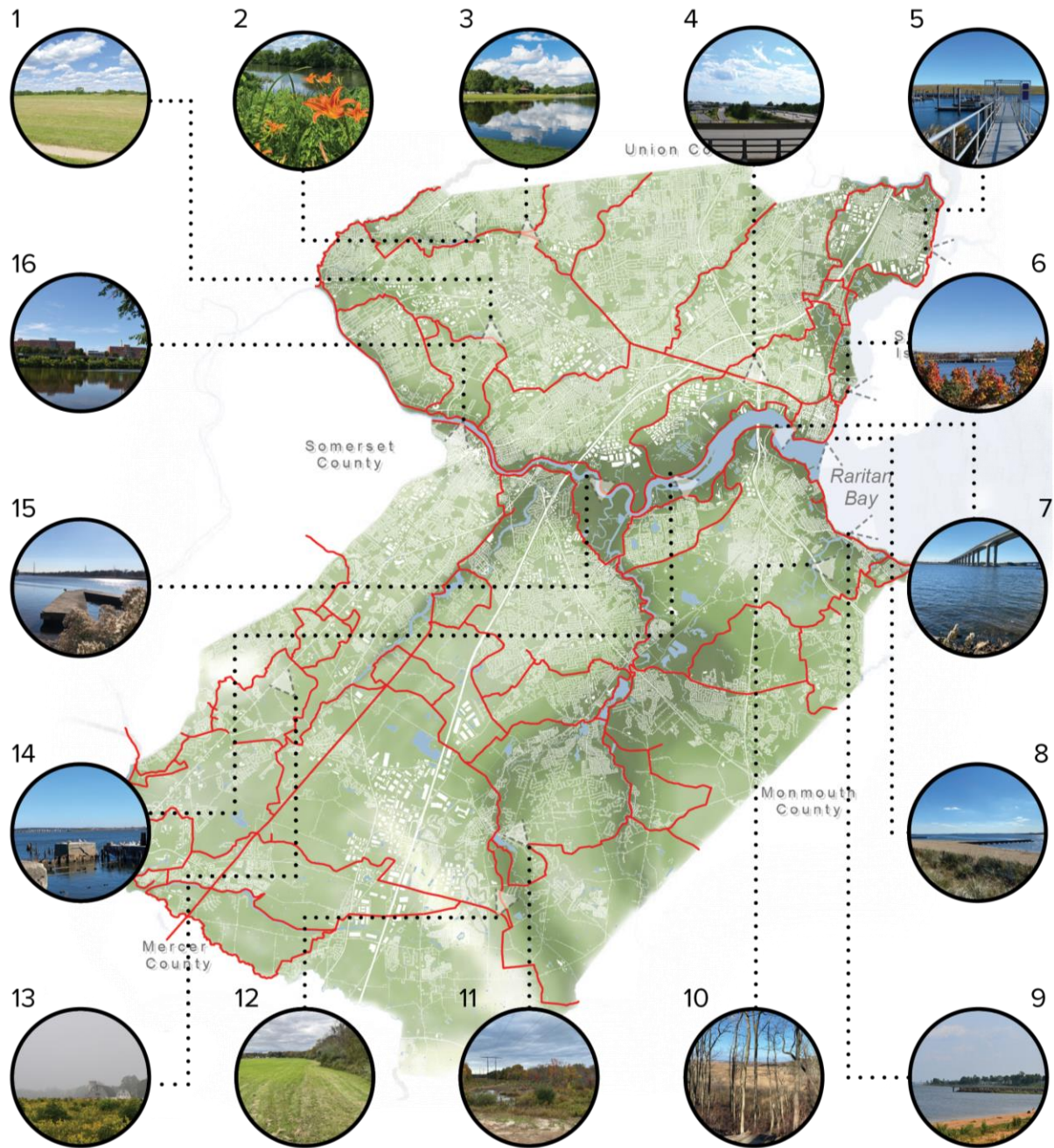
The proposed County-wide greenway network consists of linear natural or human-made corridors that provide ecological habitat and/or recreational qualities linked by a continuous path system. The Middlesex County *Greenway Opportunities* proposal connects County-wide natural areas and parks through natural corridors, potential on-road connections, and right-of-way routes. The Greenway links cultural and ecological landscapes and connects people to their natural surroundings along its many paths. Forty-one *Greenway Opportunity* segments guide the implementation process encompassing over 300 miles of potential trails. The *Greenway Opportunities* align with the identified viewsheds in the viewshed analysis showing the greenway's potential to support viewshed protection and accessibility, **Figure 17**.

Figure 16: PSE&G Right-of-way at Tamarack Hollow Conservation Area



Source: CUES, Rutgers University. Photograph. 2020

Figure 17: Greenway Opportunities and County Viewsheds



All Greenway Opportunities in red.

Refer to the *Analysis Chapter Viewshed Analysis* for full viewshed descriptions.

Items: (1) Farmstead, Piscataway (2) New Market Pond, Piscataway (3) Spring Lake County Park, South Plainfield (4) 440 Bridge, Woodbridge (5) Arthur Kill Waterfront, Carteret (6) Perth Amboy Waterfront (7) Victory Bridge, Perth Amboy (8) Perth Amboy Waterfront (9) Old Bridge Waterfront (10) Cheesequake State Park, Old Bridge (11) Wetland, Monroe (12) Field, Monroe (13) Heathcote Farms, South Brunswick (14) Raritan River, Woodbridge (15) Raritan River, Edison (16) Raritan River, New Brunswick.

CALL TO ACTION

The collection of actions and tactics proposed in this plan supports a collaboration across all landscapes and influencers to strive for a unified and integrated cultural and ecological landscape vision. Middlesex County's vision aims for a landscape encompassing all outdoor spaces to support an integrated, culturally significant, and ecologically thriving environment through ecological habitat enhancements and quality outdoor places for people to foster identity, memory, and cultural meaning.

The implementation strategies, actions, and tactics consider the important role of the County as a lead for direct implementation and as a moderator to steer other landscape influencers, including municipalities, State and Federal government, private landowners, and non-profit organizations. This landscape action plan must consider the entirety of the County's landscape because all acres can potentially detract from or enhance the County's landscape quality and resident experience.

Map 6 illustrates the potential to enhance Middlesex County's landscapes through priority intervention locations. The locations consider primary and secondary green infrastructure locations informed by flood risk and urban heat islands. Areas to focus on streetscape enhancements include downtown areas supported by various state programs. Wetland enhancement and protection focuses on wetland landscapes outside parks and areas with impervious surfaces. Large buildings and parking lots provide ideal locations for impervious surface reduction, stormwater runoff capturing, and shade tree cover. The *Greenway Opportunity* network links these intervention spaces to provide broader access for all County members to outdoor spaces.

Supporting a high-quality environment begins with the County's residents, leaders, and landscape influencers expressing higher expectations from all outdoor places. Through education, environmentally conscious planning, and swift action Middlesex County holds the potential to lead environmental advocacy for high-quality ecological and cultural landscapes.

Map 6: Integrated Cultural Landscape and Ecosystem Services Vision

Integrated Cultural Landscape and Ecosystem Services Vision

