City of Linwood, New Jersey

ENVIRONMENTAL RESOURCES INVENTORY

Prepared by Heyer & Gruel, 2003

Updated by Linwood Environmental Commission, July 2011

LINWOOD ENVIRONMENTAL COMMISSION

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City of Linwood Environmental Resources Inventory
July 2011

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City of Linwood Environmental Resources Inventory

This document is intended to serve as Linwood's Environmental Resources Inventory. The project was originally funded by a grant from the New Jersey Department of Environmental Protection.

This ERI was prepared in accordance with NJSA 40:56A -2. Pursuant to New Jersey's Statutes, an Environmental Commission has the power to conduct research into the possible use of open land and may conduct studies and make recommendations to the Planning Board for plans and programs for inclusion in a community's master plan and development regulations.

This document includes both mapping and narrative describing Linwood's environmental characteristics. This ERI is intended to be a starting point and it is understood that the document will be updated and revised periodically as new information becomes available. The ERI is a dynamic document, not a static one.

Anticipated Uses of the ERI

New Jersey is the most densely populated state in the nation. One of the consequences of this distinction is the extreme pressure that is placed on our natural resources. As the population grows, we continue to lose or impact the remaining natural areas of the state.

The Linwood ERI can serve to inform the municipal planning process, and in the refinement of zoning regulations and land use ordinances to further the protection of existing natural areas, the appropriate development of the few remaining vacant, privately-owned land parcels, and the redevelopment of developed lands.

The identification and understanding of natural systems and their inherent and regulatory limitations for development serve to prevent future environmental problems and associated mitigation costs. Thus it is anticipated that this ERI will be used for the following purposes:

- As a factual basis for Municipal Land Use Planning activities in Linwood.
- As a resource for the preparation and maintenance of Linwood's Land Use Plan Element.
- As an environmental resource for reviewing site plan and subdivision applications.
- As a tool for determining zoning regulations and other land use management techniques.
- As a basis for land capability analysis in order to determine the appropriate intensity of development.
- As an indicator of environmentally sensitive areas.
- As an education tool to increase the understanding of natural systems and their limitations.

The principal users of the ERI this document include the Environmental Commission, the Planning and Zoning Board, and land development professionals.

Additionally, it is recommended that the document be made available to the City's schools as a tool for education on environmental issues in general and for the City in particular.

This ERI will also be posted and available to the public on the City of Linwood's web site at: http://www.linwoodcity.org/

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Linwood Aerial View
2007 Infrared Image

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LINWOOD - AN OVERVIEW

The City of Linwood is a developed residential community 3.8 square miles with a 2000 population of 7,172. Located in southeast Atlantic County between the Patcong Creek and Scull Bay, the City has a central, largely developed upland section surrounded by large areas of marshland bordering the creek and bay. The City is located on Scull Bay opposite the barrier island communities of Margate and Longport.

Substantial natural resources exist in both the developed and undeveloped portions of the City. Examination of aerial photography reveals that the City has retained extensive tree cover throughout most of its developed area. The City has also been successful in preserving the majority of its marshland in an undeveloped state. As a result, the City is able to support a substantial population of wildlife as well as people.

The proximity of waterways gives the City much of its character while posing unique challenges for the future. The City has substantial coastal wetlands and a few areas of freshwater wetlands. Much of the City's undeveloped land is located in these wetland areas, which are also flood hazard areas, and the entire City is subject to ocean-related weather events such as hurricanes.

CLIMATE

Located midway between the North Pole and the equator, the climate in New Jersey and Linwood is influenced by hot, cold, dry, and humid airstreams that create highly changeable local weather. We are generally dominated by moist, tropical air, originating in the Gulf of Mexico and carried by prevailing winds from the southwest in the summer months. Winds generally prevail from the west and northwest during winter months, bringing cold, polar air masses from sub arctic Canada.

According to the Office of the State Climatologist, the dominant feature of the atmospheric circulation over North America, including New Jersey, is the broad, undulating flow from west to east across the middle latitudes of the continent. These "prevailing westerlies" shift north and south and vary in strength during the course of the year, exerting a major influence on the weather throughout the State.

Some general observations about the temperature and precipitation in New Jersey include:

- Temperature differences between the northern and southern parts of the state are greatest in the winter and least in summer. All stations have registered readings of 100 degrees F or higher and have records of 0 degrees F or below.

- Average number of freeze free days in the northern highlands is 163, 179 in the central and southern interior, and 217 along the seacoast.

- Average annual precipitation ranges from about 40 inches along the southeast coast to 51 inches in north-central parts of the state. Many areas average between 43 and 47 inches.

- Snow may fall from about October 15 to April 30 in the highlands and from about Novem ber 15 to April 15 in southern counties.

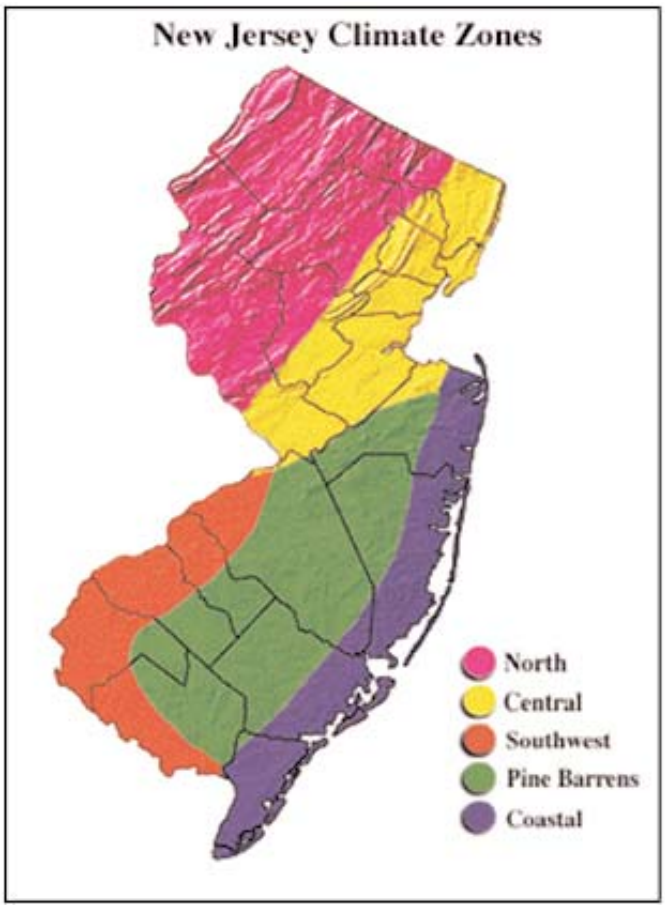
- Most areas receive 25 to 30 thunderstorms per year, with fewer storms near the coast than farther inland. Approximately five tornadoes occur each year, and in general, they tend to be weak.

- Measurable precipitation falls on approximately 120 days. Fall months are usually the dri est with an average of eight days with measurable precipitation. Other seasons average between 9 and 12 days per month with measurable precipitation.

Although New Jersey is one of the smallest states in the Union, with a land area of 7,836 square miles, it has five distinct climate regions. The geology, distance from the Atlantic Ocean, and prevailing atmospheric flow patterns produce distinct variations in the daily weather between each of the regions. The five regions are shown in the accompanying figure. Linwood is located in the Coastal Climate Zone.

In the Coastal Zone, continental and oceanic influences battle for dominance on daily to weekly bases. In autumn and early winter, when the ocean is warmer than the land surface, the Coastal Zone will experience warmer temperatures than interior regions of the state.

In the spring months, ocean breezes keep temperatures along the coast cooler. Being adjacent to the Atlantic Ocean, with its high heat capacity (compared to land), seasonal temperature fluctuations tend to be more gradual and less prone to extremes.



Sea breezes play a major role in the coastal climate. When the land is warmed by the sun, heated air rises, allowing cooler air at the ocean surface to spread inland. Sea breezes often penetrate 5-10 miles inland, but under more favorable conditions, can affect locations 25-40 miles inland. They are most common in spring and summer.

Coastal storms, often characterized as nor'easters, are most frequent between October and April. These storms track over the coastal plain or up to several hundred miles offshore, bringing strong winds and heavy rains. Rarely does a winter go by without at least one significant coastal storm and some years see upwards of five to ten. Tropical storms and hurricanes are also a special concern along the coast. In some years, they contribute a significant amount to the precipitation totals of the region. Damage during times of high tide can be severe when tropical storms or nor'easters affect the region.

Detailed weather data from a station at the nearby Atlantic City Airport is available from the Office of the New Jersey State Climatologist, which monitors 61 stations in the state. The Linwood/Mainland area experiences a normal maximum temperature of 87.2°F in July and a normal minimum temperature in January of 19.0°F. The extreme temperatures recorded at the Atlantic City Airport station are a low of -10 on January 17, 1977, and a high of 102°F on July 6, 2010.

Precipitation and Storm Events

The normal average annual precipitation for the Coastal climate zone, where Linwood is located, is about 41 inches, less than the statewide normal annual precipitation of 47.87 inches. The region's lack of topography may explain the lower precipitation. However, Linwood's on the Atlantic Coast does make it more susceptible to the heavy rains associated with coastal storms.

The Linwood/Mainland area receives the most precipitation in August, normally 4.32 inches, and the least in June, normally 2.92 inches. Snowfall typically occurs in New Jersey when moist air from the south converges with cold air from the north. In Linwood, snowfall may occur from November to mid-April, but is most likely to occur from December to March. From data gathered between 1948 and 1999, the average monthly snowfall is greatest in February.

Severe storm events, including thunderstorms, tropical storms, blizzards, ice storms, hail storms, and tornadoes occur in the Atlantic County area with varying frequency. Tornadoes are infrequent, and only about five generally weak tornadoes occur in New Jersey each year. Most areas in the state experience about 25 to 30 thunderstorms a year, although they strike coastal areas such as Linwood less often than more inland areas. In recent history, hurricanes are the only severe storm events to have caused significant damage in Linwood.

Source: Office of the New Jersey State Climatologist, Rutgers University

AIR QUALITY

The Atlantic City area has relatively good air quality when compared with other parts of New Jersey, Nonetheless, the area is considered a "non-attainment area" for ozone by the U.S. Environmental Protection Agency. While the area has not exceeded the EPA's one-hour standard for ozone in several years, it did exceed the proposed, but not yet adopted, eight- hour standard 9 times in 2001 and 11 times in 2002 according to the New Jersey Department of Environmental Protection.

Ambient air quality is a measure of the amount of pollutants that are detected in the air at a given time in a given location. It is not a measure of the actual emissions of pollutants, for example from factory smokestacks or vehicle tailpipes. Measurements of ambient air quality are used as indicators because much pollution comes from diffuse, non-point sources such as Ozone is measured at the Nacote Creek station. The Atlantic City metropolitan area is classified as a moderate-level nonattainment area for ozone because of prior exceedances of the one-hour standard. In addition, according to the New Jersey Department of Environmental Protection, the area has experienced exceedances of the proposed eight-hour standard as well.

Particulate Matter
Particulate matter includes dust, dirt, soot, smoke, and liquid droplets emitted by both stationary and non-point sources. Particulates affect breathing and respiratory symptoms, aggravate of existing respiratory and cardiovascular disease, alter the body's defense systems against foreign materials, and can cause damage to lung tissue, carcinogenesis and premature death. The Somers Point monitoring station fell within EPA limits for particulates during each of the last five years.

Sulfur dioxide
Sulfur dioxide results primarily from "stationary sources" such as smokestacks and is a major contributor to acid rain, which is harmful to vegetation and wildlife. The Atlantic City area falls well within the limits for sulfur dioxide,

Atlantic County Air Quality

The following table shows that for each year from 1998 to 2002, air quality levels for these three pollutants in Atlantic County fell within the maximum limits specified by the U.S. Environmental Protection Agency, This table does not include the proposed eight-hour ozone standard because that standard has not yet been adopted, cars and trucks, and it is difficult to measure these emissions directly.

The nearest ambient air quality testing station to the City of Linwood is located in Somers Point, which borders Linwood on the south. Another nearby air quality station is located at Nacote Creek in northern Atlantic County, Air pollutants tested at one or both of these stations include sulfur dioxide (S02), ozone (03), and particulate mailer smaller than 10 micrometers (PMIO).

Atlantic County Air Quality

	SO2 (24hr max) in ppm	SO2 (annual mean) in ppm	O3 (1hr max) in ppm	PM10 (24hr max) in micrograms per cubic meter	PM10 (annual mean) in micrograms per cubic meter
Maximum Value	0.140	0.030	0.120	150	50
2003	0.011	0.003	0.122	60	46
2004	0.012	0.002	0.086	46	19
2005	0.012	0.002	0.103	67	23
2006	0.007	0.002	0.107	60	20
2007	0.025	0.002	0.109	69	21
2008	0.009	0.002	0.083	93	37

Source: US EPA Air Data reports

Ozone

Ozone is created through chemical reactions that occur when volatile organic compounds (VOCs) combine with nitrogen oxides (NOx) in the presence of sunlight. Both NOx and VOCs are emitted by vehicles as well as industrial sources. According to the EPA, ozone damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Ozone affects asthmatics as well as healthy adults and children. Exposure to ozone for several hours at relatively low concentrations has been found to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise.

SURFACE WATER

According to the U.S. Bureau of the Census, Linwood has 0.3 square miles, or approximately 200 acres, of surface water within its boundaries. These water bodies include:

- Scull Bay, located east of the City. Scull Bay is part of a network of water bodies that separate the mainland from the barrier islands; Scull Bay separates Linwood from barrier island communities on Absecon Island: Atlantic City, Ventnor, Margate and Longport.

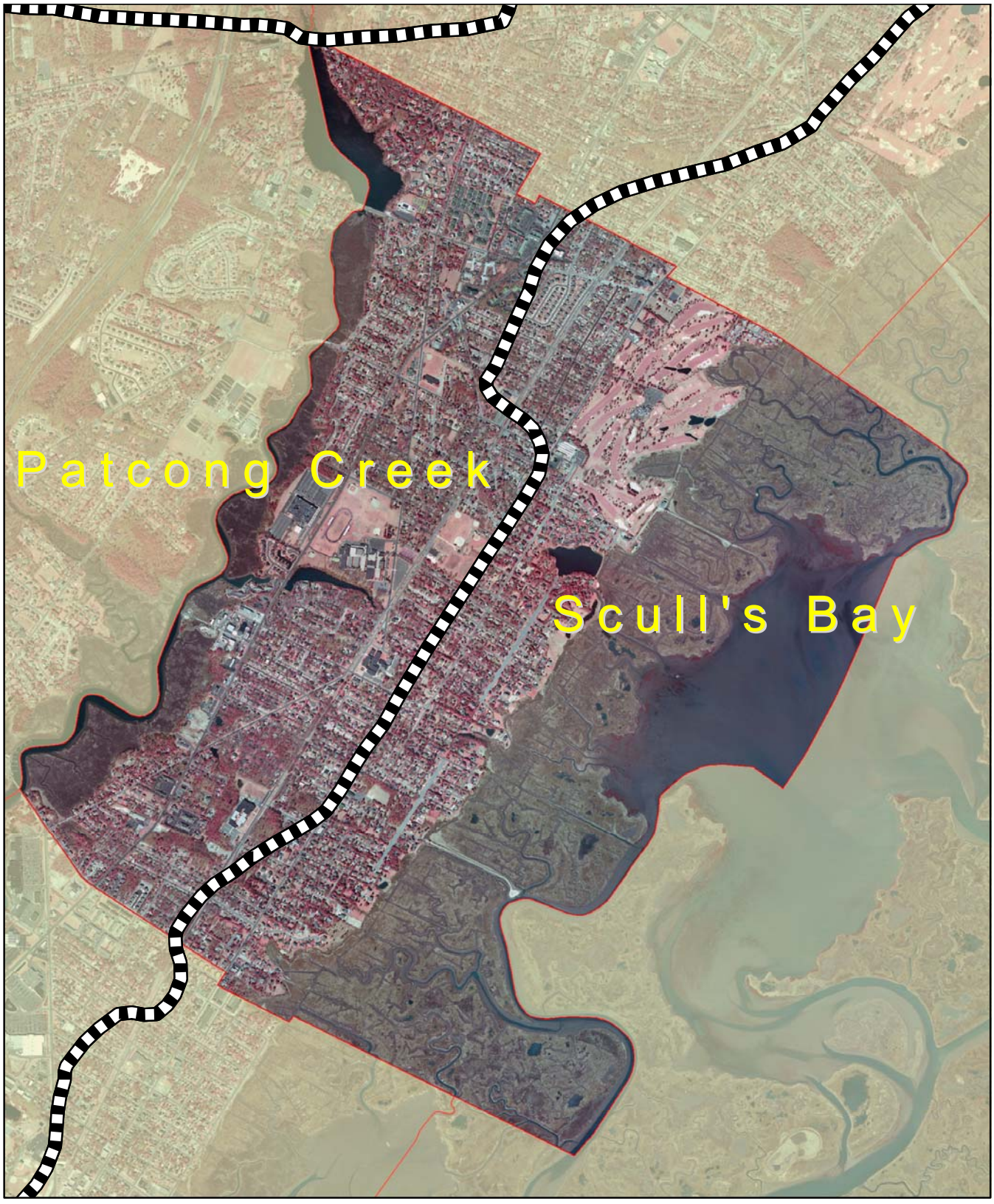
- Patcong Creek, which forms the western boundary of the City. A tidal water body, Patcong Creek flows from northeast to southwest and empties into Great Egg Harbor.

- Mill (Bargaintown) Pond, a 47-acre water body shared with Egg Harbor Township which forms part of Patcong Creek at the City's northwest edge.

- Several smaller ponds, including a 4-acre pond adjacent to Mainland Regional High School and a 6-acre pond located east of Delmar Avenue near the Linwood Country Club.

- Numerous smaller tributaries that snake through the marshlands adjacent to the creek and the bay. The largest of these are Mulberry Thorofare, located east of the Country Club, and Sod Thorofare, which flows into Scull Bay in the southern end of Linwood. Mulberry Thorofare connects Scull Bay to Lakes Bay. Sod Thorofare connects Scull Bay to Great Egg Harbor Bay,

- Mosquito control trenches that have been dug throughout the Scull Bay meadowlands. These represent man-made changes to the marsh environment and are visible as straight lines on aerial photographs.



Linwood Subwatersheds

Watersheds

All surface runoff in Linwood ultimately flows into Great Egg Harbor, either through Patcong Creek or through Scull Bay. The entire City is located within the Great Egg Harbor Watershed Management Area. The City is divided between two sub-watersheds: Patcong Creek and Great Egg Harbor. Drainage from roughly the western half of the City flows west into the creek, while the remainder of the City drains east into the bay.

Great Egg Harbor Bay is mainly fed by the Great Egg Harbor River, which flows through portions of Camden, Gloucester, and southern Atlantic counties and has been designated a National Wild and Scenic River. The Great Egg Harbor Watershed Association is a leading nonprofit advocate for the river.

WATER QUALITY AND QUANTITY

Direct information collected over time on surface water quality and quantity in Linwood is not available, as no existing New Jersey Department of Environmental Protection stream monitoring or biological monitoring sites are located either in Linwood or downstream from Linwood.

A report entitled "Unique Environments in Atlantic County" identifies the general challenges to surface water quality on Patcong Creek in Linwood: *"Single family home construction is occurring on the upland immediately adjacent to the wetlands. Several wetland areas on the eastern side of the creek were filled in prior to 1970 and are expected to be sites of future residential development, [This has happened] Homeowners with property fronting on the creek have constructed docks and piers to moor small boats."*

In general, water bodies in suburban areas are threatened by increased runoff from development. When precipitation falls on buildings, parking lots, roadways, and other impermeable surfaces, ii ultimately flows by force of gravity into area streams—in Linwood's case, either the creek or the bay. Runoff carries silt and pollutants with it, which can alter the rate and quantity of flow in a stream as well as harm its quality. NJDEP monitors streams at stream quality monitoring sites, which directly measure the quality and quantity of the water, and biological monitoring sites, which give an indication of the health of the ecosystem based on the characteristics of the biology found at each point, are visible as straight lines on aerial photographs.

Linwood Generalized Floodprone Areas

Linwood Generalized SSURGO Soil Types

Soils

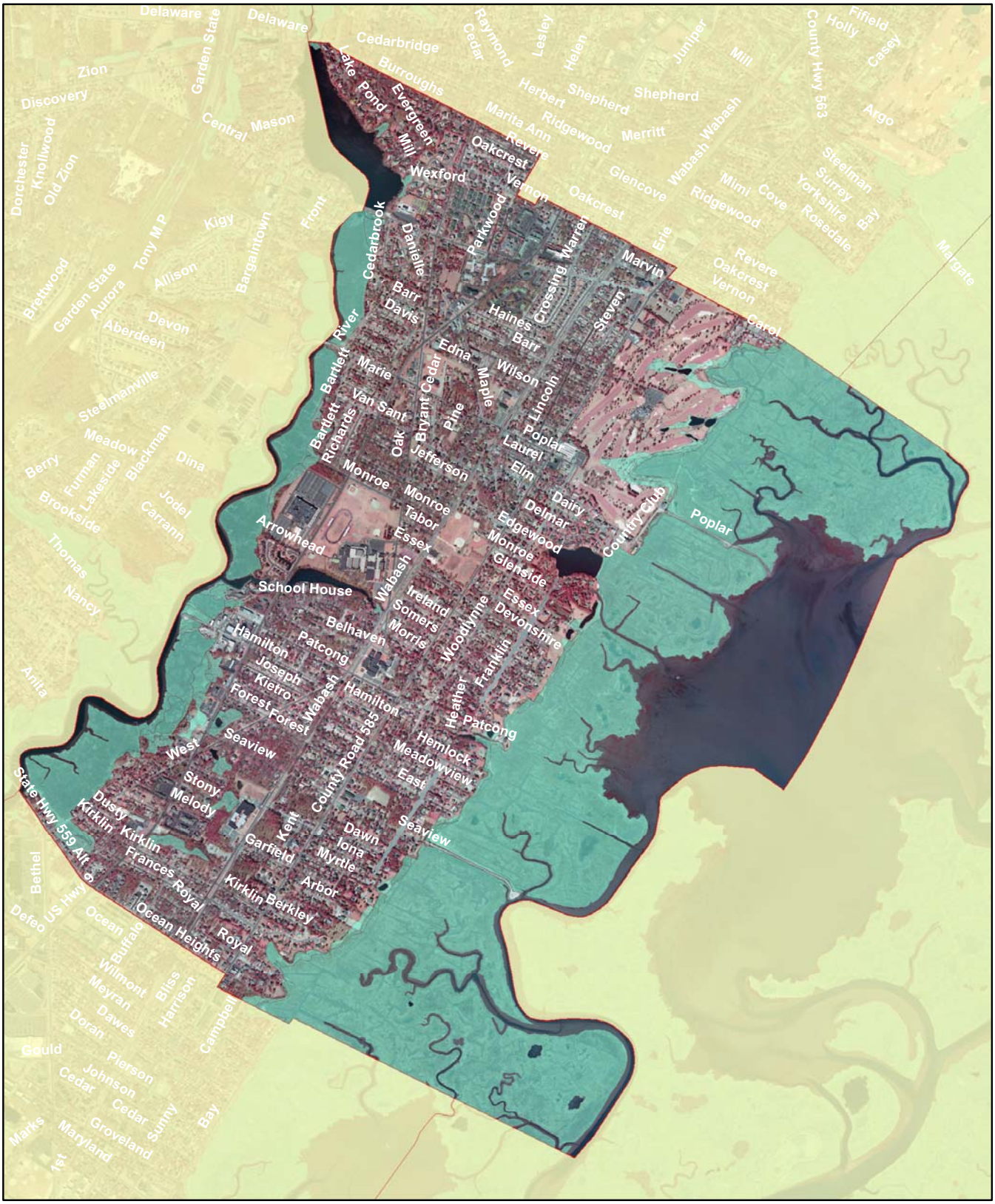
Much of Linwood consists of tidal marsh, with an upland area located between the two marshes. Linwood's upland area has mostly loamy and sandy soils. Loamy soils are found throughout eastern Linwood from the marshland area bordering Scull Bay roughly halfway to Patcong Creek. Large areas of sandy soil are found in the vicinity of the South Jersey Industries property and around City Hall, the Krumm Farm, and the surrounding area. Areas of Sassafras soils are found south of Mainland Regional High School and the extreme northwestern part of the City. Mainland Regional High School and the neighboring Cornerstone Commerce Center site are built on filled soil.

Loamy soils are typically rich and dark with extensive organic matter. They are well suited forgrowing plants. Sassafras soils are classified as deep, well-drained, moderately permeable soils typically found in the coastal plain. These soils are considered prime farmland, Sandy soils are not as rich as loamy and sassafras soils and are less well suited for growing,

Linwood Soils - Constraints for Development

Soil	Description	Dwellings with Basements	Dwellings without Basements	Athletic Fields and Parks
DocB	Downer loamy sand 0-5% slope	Slight	Slight	Moderate
EveB EveKB	Evesboro sands	Slight	Slight	Severe
PssA	Fill land, Psamments	Variable	Variable	Variable
FobB	Fort Mott sand 0-5% slope	Slight	Slight	Severe
GamB GamkB	Galloway loamy sand 0-3% slope Galloway loamy sand, clayey substratum, 0-3% slope	Moderate	Slight	Severe
MumA	Mullica sandy loam	Severe	Severe	Severe
SacA	Sassafras sandy loam 0-2%slope	Slight	Slight	Severe
TrkAv	Transquaking mucky peat	Severe	Severe	Severe

Source: USDA, Soil Survey Geographic (SSURGO) Database



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Linwood Wetland Areas

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WETLANDS, VEGETATION & WILDLIFE

As more and more habitat is lost, people are beginning to appreciate the benefits — and necessity — of maintaining land in its natural state. For example, we now know that wetlands play an important role in lessening the damage from floods and naturally breaking down contaminants in the environment. Forests and grasslands protect the quality of our drinking water, improve the quality of the air we breathe and provide important areas for outdoor recreation. Collectively, these habitats are of critical importance to the diverse assemblage of wildlife found in New Jersey, including more than 70 species classified as threatened or endangered.

In 1994, the New Jersey Division of Fish and Wildlife's Endangered and Non-game Species Program adopted a landscape level approach to imperiled species conservation by developing the Landscape Project. Through geographic information system (GIS) technology, the Landscape Project uses species location data and land-use/land-cover as well as species life history information to produce maps that depict critical wildlife habitat throughout the state. The goal of the project is to protect New Jersey's biological diversity by maintaining and enhancing imperiled wildlife populations within healthy, functioning ecosystems. The Landscape Project is a pro-active, ecosystem-level approach for the long-term protection of imperiled species and their important habitats in New Jersey.

The Landscape Project identifies five critical habitat areas within the State: forests, beaches, wetland forests, emergent wetlands, and grasslands. Three of these habitat areas are located within Linwood; forests, wetland forests, and emergent wetlands. The State has identified the number of state- and federally listed threatened and endangered species located in each patch of habitat. Linwood's forests and wetland forests largely consist of small patches of five or fewer acres in the upland, mostly developed area of the City. However, some of these patches harbor state and federal endangered species. These forested patches are concentrated in the southwestern quadrant of the City, Several areas west of New Road (State Route 9) include a federally protected species, In addition, relatively large areas of critical habitat are located on the South Jersey industries property and surrounding areas,

The City contains two large areas of emergent wetlands habitat, better known as meadowland or marshland. These tracts are the 210-acre emergent wetlands area located adjacent to Patcong Creek, which is partly located in Egg Harbor Township, and the 1,720-acre emergent wetlands area located adjacent to Scull Bay, which is mostly within Linwood but includes parts of Somers Point and Northfield. These two areas contain two state endangered bird species (least tern and black skimmer) and two state-listed threatened species (black-crowned night heron and yellow-crowned night heron.)

Although the Landscape Project does not indicate bald eagle habitat is present in Linwood, they have become common sights along Patcong Creek and the coastal marshes in the past few years. Linwood residents have enjoyed viewing these raptors particularly along the Patcong, and several immature eagles have been sighted with their parents. Many residents believe that there may be a nesting pair of eagles along the Patcong, although this is not confirmed. The return of bald eagles to the area is likely due to improved water quality that has lead to better food sources, and stricter state and local regulations that have limited the filling of wetlands and the destruction of forest cover. Development adjacent to wetlands areas threatens species by increasing the runoff of silt and pollutants into the wetlands. In addition, mosquito control trenches have altered the emergent wetlands ecosystems by promoting increased drainage.

These tables present a list of potential threatened or endangered species for emergent wetlands and forested wetlands in New Jersey. A number of these species may inhabit the identified habitats in Linwood.

REPTILES		
Federal T or E		
Bog Turtle	X	
State Endangered		
Salamander, Blue spotted		X
Salamander, Tiger		X
Frog, Pine Barrens Tree		X
Frog, Southern Gray Tree		X
Rattlesnake, Timber		X

Source: NJ DEP, Division of Fish & Wildlife

BIRDS		
Common Name	**Emergent Wetlands**	**Forested Wetlands**
Federal T or E		
Eagle foraging areas	X	X
Eagle nest buffer	X	X
State Endangered		
Bittern, American	X	
Skimmer, black	X	
Sparrow, Henslow's	X	
Tern, least	X	
Goshawk, northern		X
Harrier, northern	X	
Falcon, peregrine	X	
Grebe, pied-billed	X	
Hawk, red-shouldered		X
Tern, roseate	X	
Wren, sedge	X	
Owl, short-eared	X	
State Threatened		
Owl, barred		X
Night-heron, black-crowned	X	
Rail, black	X	
Hawk, Cooper's		X
Osprey	X	
Knot, red	X	
Night-heron, yellow-crowned	X	

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Linwood Habitats of Threatened and Endangered Species

CONTAMINATED SITES

The New Jersey DEP maintains a database of known contaminated sites. This database was reviewed for properties in Linwood. Detailed information describing each case history at a site, including active cases, is available through the Data Miner reporting tool on the NJ DEP web site.

The data snapshots reflect only the data available on the date the files were prepared. According to the NJ DEP, there are 10 active sites with known on-site sources of contamination, and 30 closed sites that have been remediated within Linwood. The lists are as follows:

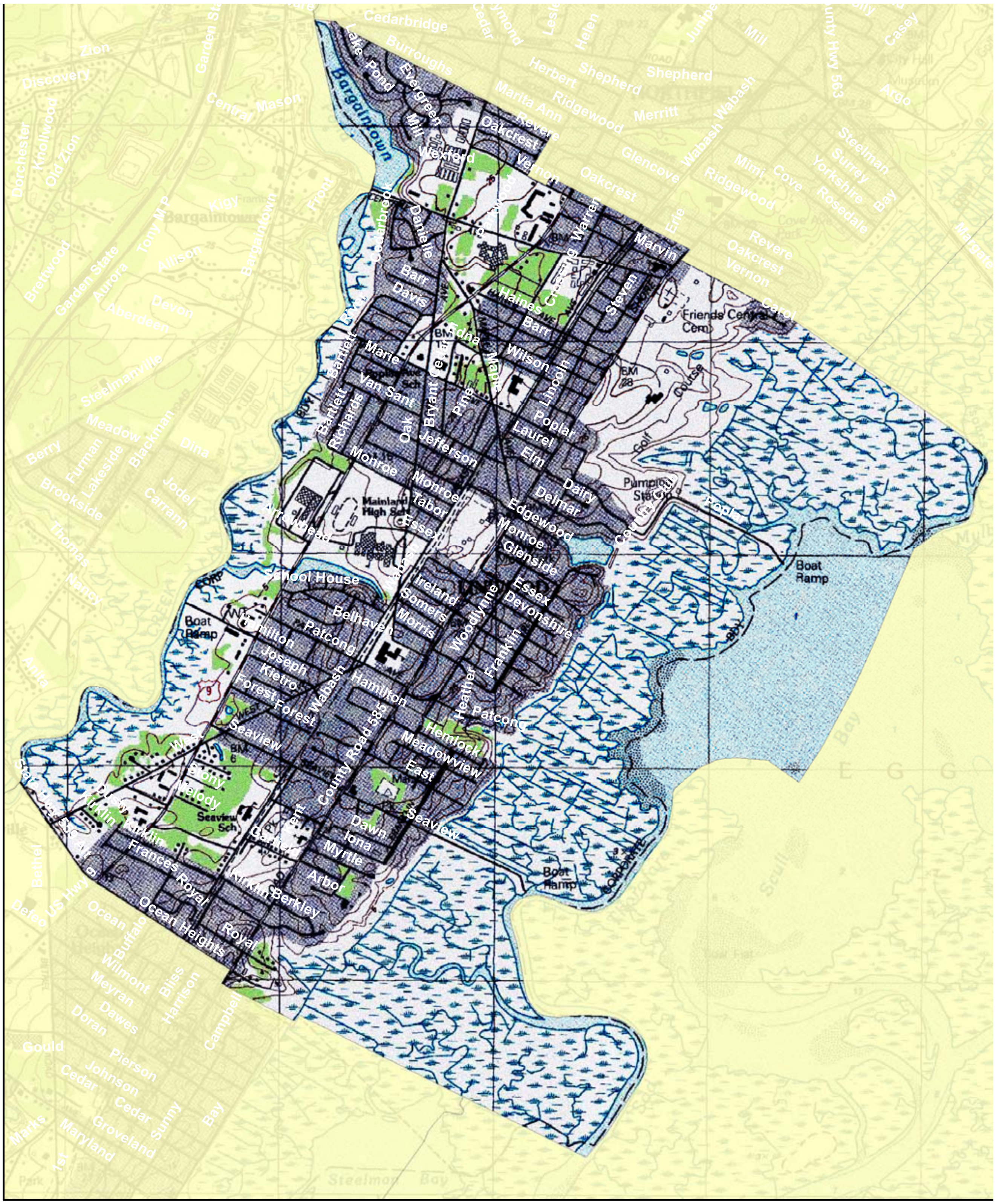
ACTIVE SITES WITH CONFIRMED CONTAMINATION

Site ID	PI Number	PI Name	Address	Home Owner
70709	G000033479	1825 TO 1890 NEW ROAD	1825 1890 NEW RD	No
12587	006708	CUMBERLAND FARMS #122670	600 NEW RD	No
413960	006708	CUMBERLAND FARMS #122670	NEW RD & OAKLAND AVE	No
12579	518791	LINWOOD NORTHFIELD GROUND WATER CONTAMINATION	NEW RD & MARVIN AVE	No
12587	518791	LINWOOD NORTHFIELD GROUND WATER CONTAMINATION	600 NEW RD	No
16997	518791	LINWOOD NORTHFIELD GROUND WATER CONTAMINATION	2401 NEW RD	No
413960	518791	LINWOOD NORTHFIELD GROUND WATER CONTAMINATION	NEW RD & OAKLAND AVE	No
12578	005560	LINWOOD SERVICE STATION	1711 NEW RD	No
12579	003220	SHELL SERVICE STATION	NEW RD & MARVIN AVE	No
64090	G000008843	SOUTH JERSEY INDUSTRIES	NEW RD & WABASH AVE	No
10	**Site Count**			

CLOSED SITES WITH REMEDIATED CONTAMINATION

Site ID	PI Number	PI Name	Address	Home Owner
158363	208394	100 GARFIELD AVENUE	100 GARFIELD AVE	Yes
70792	G000037421	104 ARLINGTON AVE	104 ARLINGTON AVE	No
178535	233984	104 IONA AVENUE	104 IONA AVE	Yes
221573	289397	107 ARBOR COURT	107 ARBOR CT	Yes
381480	475840	109 E PATCONG AVENUE	109 E PATCONG AVE	Yes
167425	220100	111 DEVONSHIRE AVENUE	111 E DEVONSHIRE AVE	Yes
64772	G000023523	1150 WOODE LYNNE BOULEVARD	1150 WOODLYNNE BLVD	Yes
371802	460135	117 DELMAR AVENUE	117 DELMAR AVE	Yes
168210	221095	121 EDGEWOOD AVENUE	121 E EDGEWOOD AVE	Yes
202731	266598	1221 WABASH AVENUE	1221 WABASH AVE	Yes
225416	294215	2023 WOODLYNNE BLVD	2023 WOODLYNNE BLVD	Yes
217246	283699	211 WEST EDGEWOOD AVENUE	211 EDGEWOOD AVE	Yes
70836	G000040570	213 KIRKLAND AVE	213 KIRKLIN AVE	No
184532	241390	2277 BURROUGHS AVENUE	2277 BURROUGHS RD	Yes
70931	G000045013	22 SOMERS AVENUE WEST	22 SOMERS AVE	No
186583	245258	312 BARR AVENUE	312 BARR AVE	Yes
340419	420873	315 SHORE ROAD	315 SHORE RD	Yes
92799	130856	321 VAN SANT AVENUE	321 VAN SANT AVE	Yes
147009	194343	501 KIRKLIN AVENUE	501 KIRKLIN AVE	Yes
65803	G000032098	503 KIRKLIN AVENUE	503 KIRKLIN AVE	No
185732	244259	505 KIRKLIN AVENUE	505 KIRKLIN AVE	Yes
153622	202706	507 KIRKLIN AVENUE	507 KIRKLIN AVE	Yes
342277	423321	5 HIGHLAND COURT	5 HIGHLAND CT	Yes
52636	019849	BRIGHTON FARMS	POPLAR AVE & SHORE RD	No
70804	G000037864	CENTRAL SQUARE MALL	CENTRAL AVE & NEW RD	No
51002	015124	DEE LUMBER CO	CENTRAL AVE & WABASH AVE	No
12580	025269	LINWOOD PUMP STATION	POPLAR AVE & WOODELYNNE BLVD	No
38651	010830	OCEAN HEIGHTS AUTO SALVAGE	3037 OCEAN HEIGHTS AVE	No
12588	005844	PRUDENTIAL INSURANCE CO	1201 NEW RD	No
38361	020503	STEVE'S DEEPWATER MARINA	5012 OCEAN HEIGHTS AVE	No
30				

Source: NJ DEP, Site Remediation Program



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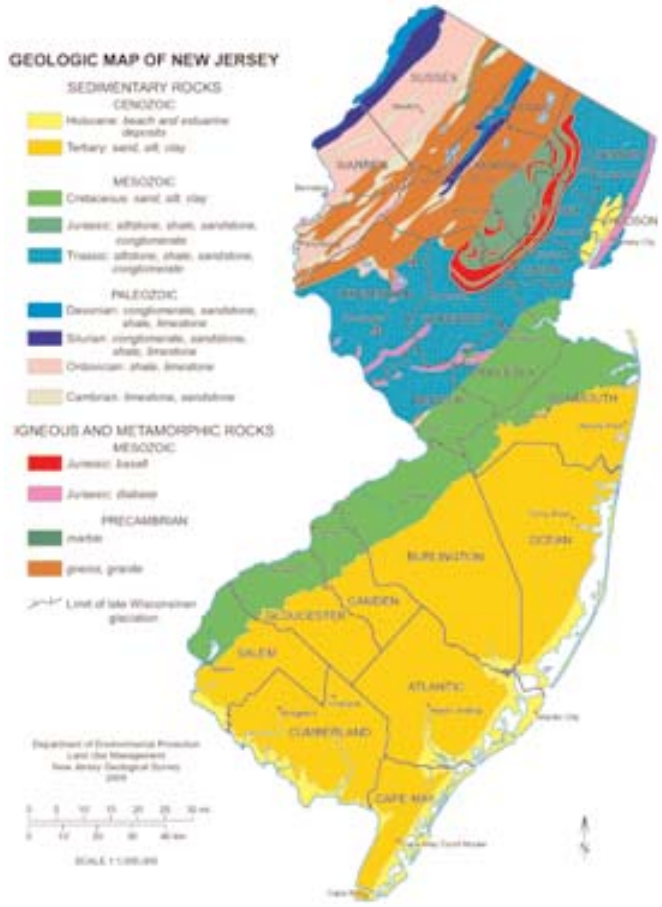
Linwood USGS Topographic Map

GEOLOGY/PHYSIOGRAPHY

The geology of New Jersey consists of four distinct physiographic provinces. They are the Atlantic Coastal Plain Province, the Piedmont Province, the Highlands Province, and the Ridge and Valley Province. The City of Linwood is located entirety within the Coastal Plain. The largest province in the state, it encompasses the southeast part of the state below the fall zone from Trenton to Woodbridge.



The Outer Coastal Plain is characterized by a broad lowland formed on unconsolidated and semi-consolidated marine and alluvial (water deposited) sediments, mainly sand, silts, and clays with minor amounts of gravel. These sediments have been deposited since the Cretaceous Period. These sediments continue off-shore until the continental shelf edge in the Atlantic Ocean. Topography is relatively flat with a few hills of erosion resistant sediments containing gravel or iron-sedimented sands. The sedimentary rocks underlying Linwood are among New Jersey's youngest, dating from the Holocene portion of the Cenozoic Era, The depth to bedrock formation below Linwood is between 4600' and 4800' below the surface,

The province is divided further into three sub-provinces. Linwood is within the Lowland section which is flat with often inundated areas of tidal marshes, back bays, and barrier islands. This section generally follows the coastline, Delaware Bay, and Delaware River. The intermediate upland sections consist of inland raised areas and are best suited for farming and other agriculture.

Source: New Jersey Geological Survey

TOPOGRAPHY

Linwood's topography is generally characteristic of the region. The city is free from extensive areas of steep slopes, Linwood's elevations range from sea level along Scull Bay and Patcong Creek, to a high point of approximately 30 to 35 feet in elevation located near the northern border of Linwood with Northfield, In general, Linwood's "high ground' is located along the former rail alignment along Wabash Avenue and the bikeway.

LAND USE

Introduction

The City of Linwood is a largely developed residential community, 3.8 square miles in area, consisting of a central developed upland area, with undeveloped marshland bordering Scull Bay on the east and Patcong Creek on the west. The developable area of the City is almost fully built-out, and little vacant land remains outside the meadows and marshland.

The City's land use pattern within the upland area is defined by three major corridors that run through the City from north to south. On the east is Shore Road, a two-line collector street maintained by Atlantic County (County Road 585) that forms the core of historic Linwood, with many historic homes and a few small- scale non-residential uses. Shore Rood also connects the City to the neighboring communities of Somers Point and Northfield. The central corridor is a former interurban railroad line, the Shore Fast Line, which has been converted into a bicycle and walking path. The western corridor is New Road (State Route 9) an arterial road which also connects to neighboring communities and is characterized by larger freestanding commercial developments such as the Cornerstone Commerce Center, the Linwood Professional Plaza and similar office parks, and several retail centers.

The New Road and Shore Road corridors divide the City into three distinct parts. The area east of Shore Road is almost entirely residential and is characterized by larger homes on somewhat larger lots than in most other areas of the City. This area also includes the Linwood Country Club. The section between New Road and Shore Road is the heart of the community and includes many residences as well as most of the City's community facilities, including Linwood City Hall, the Linwood Public Library, and the City's three public schools. West of New Road is the Linwood Convalescent Center—the City's major employer—and a mix of new and older housing developments.

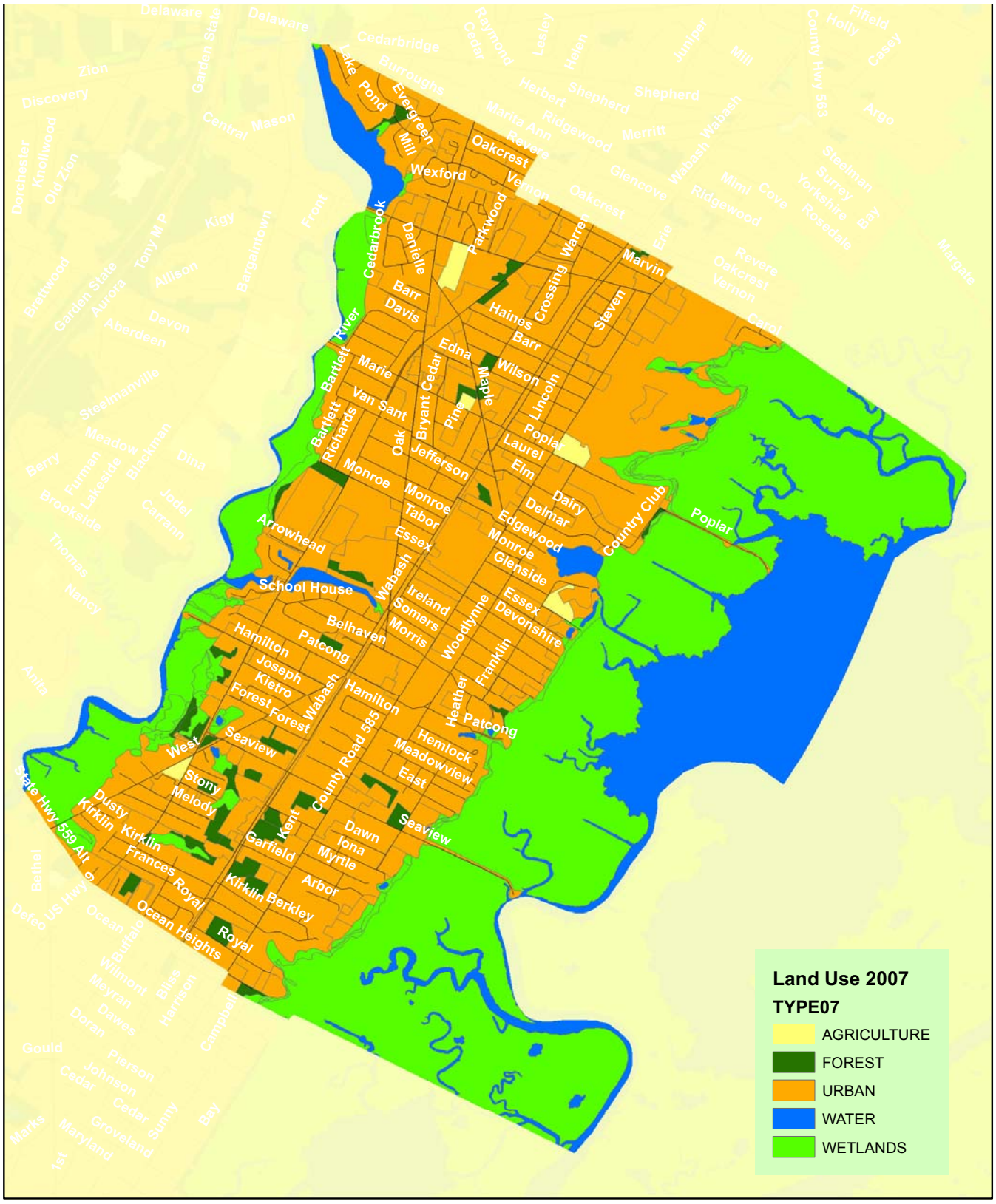
Existing Land Use

Residential

The City of Linwood is predominantly a developed, single family residential community with lots ranging from approximately 5,000 to 30,000 square feet in area within a street network consisting of a modified gridiron that was developed from the 19th century to the mid-20th century. Most residential areas consist exclusively of single-family homes. Some two family developments from the mid-to late 20th century have been developed near the City's borders with Somers Point and Northfield.

Single-Family Residential Areas

East of Shore Road: The portion of the community east of Shore Road consists largely of single-family residences on medium sized to relatively large lots (over 10,000 to over 30,000 sq. ft, in area). The area is characterized by physical and visual access to the meadows bordering Scull Bay, and some homes have expansive views of the bay and marsh.



Linwood Land Use and Land Cover 2007

Historic District: The Historic District along Shore Road and surrounding streets includes historic single-family dwellings on lots of varying sizes dating to the late 19th and early 20th centuries. More information on the Historic District is contained in the Historic Preservation Element of the Linwood Master Plan.

From Shore Road to New Road: The area between Shore Road and New Road consists mainly of early to mid-20th century single-family residential dwellings on lots ranging from under 10,000 square feet to approximately 30,000 square feet. In general, dwellings in this area are somewhat smaller than those located east of Shore Road, though there are some sections of larger dwellings and lots,

West of New Road: The area west of New Road and Oak Avenue includes some newer residential subdivisions from the late 20th century which are characterized by curving streets and cul-de-sacs. It also includes older residential areas between Monroe Avenue and Barr Avenue, In general, this area includes newer homes than the area east of New Road, The area includes relatively new residential developments in the PR (Planned Residential) zone, described below, as well as older housing developments.

Two-Family Residential Areas: Several areas on Linwood's northern and southern boundaries are developed with two-family residential developments. These developments serve an important function as a source of smaller dwelling units for those who do not need a detached single-family residence. Some undeveloped land remains in these areas, which are zoned Dwelling C, described below. These land uses arc stable and well established.

Commercial and Retail

The City of Linwood contains two corridors with commercial and retail uses: New Road and Shore Road. Both also accommodate significant residential uses. New Road is a modern, auto-oriented commercial and residential corridor, while Shore Road is an older residential thoroughfare punctuated by nodes of small-scale commercial and retail development.

New Road: New Road is the City's primary commercial corridor and forms part of a larger commercial corridor extending through several communities in southern Atlantic County. As State Route 9, the stretch of New Road in Linwood is notable because it has retained considerable tree cover as development has occurred, and most development has remained relatively small-scale. New Road includes several office buildings, small office complexes, and small shopping centers. Several high-quality office developments have been constructed on New Road in recent years.

New Road also continues to include residential uses between Oak Avenue and Cornerstone Commerce Center and between Patcong and Seaview avenues. Often, market conditions result in the conversion of residential structures

on arterial streets to uses such as personal service businesses and professional offices. This area is currently zoned for residential use only. The possibility of rezoning the residential area of New Road was examined by the Planning Board, but it was determined that no changes are currently needed, as the residential uses in this area remain viable.

Shore Road: While predominately a residential street, Shore Road has a few commercial uses such as personal service establishments and offices located mainly at intersections with collector streets such as Poplar Avenue, Maple Avenue, and Seaview Avenue. Some of these commercial areas are non-conforming uses located in residential zones, but they have only a limited impact on the surrounding area due to their small size. Notable commercial uses include a cluster of small retail shops at Maple Avenue and Shore Road. The Linwood Country Club with its 18-hole golf course borders the eastside of Shore Road in northern Linwood.

Meadowland

The developed portion of Linwood is bordered on the east and west by large areas of marshland which themselves border Scull Bay and Patcong Creek. While these areas have been altered in the past, they are almost entirely undeveloped. Particularly on the Linwood's east side, much of the meadowland has been purchased by the City for the purposes of conservation. Human activity in the meadowland is largely confined to three boat docks, which are reached by unpaved roadways.

PARKS AND RECREATION

Introduction

The City of Linwood is committed to providing its residents with increased open space and recreation opportunities. The City currently operates four open space areas, an extensive bike path through the center of the community, and three boat docks on Patcong Creek and Scull Bay. The City has recently purchased property from Atlantic City Electric located across the street from Belhaven Middle School which is now the site of the Linwood Arboretum and a 5.7 area parcel from South Jersey Industries adjacent to Seaview Elementary School. The City is also pursuing the purchase of the open space to the north and west of Cornerstone Business Center. There are currently no County or State park facilities within the City.

Inventory

The City currently operates a park system with approximately 26 acres, in addition to a bicycle path system that includes nearly 33 acres. The City's Recreation Board operates recreation programs at these facilities in addition to those operated by a variety of other private and public or ganizations. The following table and map show existing developed park facilities in the City.

Existing Linwood Parks and Public Open Space

Facility Name	Block	Lot	Acres	Facilities
All Wars Memorial Park	73	11	15.6	Playing fields, passive recreation
Hartshorn Park	13	2	3.2	Passive recreation
Crestlea Park (at Linwood Library)	130	1	1.9	Playground
George K. Frances Bikeway	500	8	28.9	Paved Bikepath
Bike Path Extension	500	9.10	4.1	Paved Bikepath
Krumm Farm	149	4.01	10	Paths, agriculture (vineyard)
Linwood Arboretum	54	1	0.6	Arboretum, educational center, passive recreation
South Jersey Industries property	6	25,28	5.7	

Source: City of Linwood Recreation and Open Space Inventory

There are also recreation fields on the Poplar Avenue school site across from Linwood City Hall. In recognition of the need for a significant expansion in developed parkland, the City has purchased two additional park facilities.

The Linwood Arboretum has been developed on the Atlantic City Electric site, a 0.6-acre triangle formed by the intersections of Wabash

Avenue, Belhaven Avenue, and Morris Avenue. A larger park with a playground, playing fields, and benches will be located on the 5.7-acre South Jersey Industries property, located on the north side of Wabash Avenue at Cleveland Avenue. Both of these parcels are adjacent to the bike path.

Boat Docks

The City operates two municipal boat docks located on Scull Bay, and one boat dock on Patcong Creek. The Bay boat docks are at Seaview Avenue and Poplar Avenue. The Patcong Creek boat dock is located at Hamilton Avenue. These facilities provide residents with physical and visual public access to the bodies of water that surround Linwood.

Private Recreational Facilities

One private golf course, operated by the Linwood Country Club, is located in the City. The golf course is located in the environmentally sensitive area of the City adjacent to Scull Bay. There is also a privately operated pool and tennis club, the Mainland Recreation Association, known as MRA, located on Central Avenue.

Linwood Open Space Areas

COASTAL REGULATIONS/ STATE DEVELOPMENT AND REDEVELOPMENT PLAN

The City is subject to the rules and regulations ofthe Coastal Area Facilities Review Act (CAFRA) and related statutes, which are enforced by the New Jersey Department of Environmental Protection The Coastal Zone Management rules at N J.A.C. 7-7E-5B have adopted policy goals for each Planning Area identified in the State Development and Redevelopment Plan. In the Metropolitan Planning Area (PA I), the following goals have been adopted:

I. Guide development and redevelopment to ensure efficient use of scarce land w hile capitalizing on the inherent public facility and service efficiencies of concentrated development patterns;

2. Accommodate a variety of housing choices through development and redevelopment;

3. Promote economic development by encouraging redevelopment efforts such as infill, consolidation of property, and infrastructure improvements, and by supporting tourism and related activities;

4. Promote high-density developmen tpatterns in coastal urbanized areas to encourage the design and use of public transit and alternative modes of transportation to improve air quality, to improve travel among population and employment centers and transportation termina Is, and to promote transportation systems that address the special seasonal demands of travel and tourism along the coast;

5. Encourage the reclamation of environmentally damaged sites and mitigate future negative impacts, particularly to waterfronts, beaches, scenic vistas, and habitats;

6. Promote public recreation opportunities in development and redevelopment projects. and ensure meaningful public access to coastal waterfront areas; and

7. Encourage the repair or replacement of existing infrastructure systems where necessary to ensure that existing and future development wi ll cause minimal negative environmental impacts.

These policy goals indicate that continued development and redevelopment in the Metropolitan Planning Area is to be encouraged, subject to certain guidelines. For example, the coastal rules limit the amount of impervious cover allowed on development sites in the Metropolitan Planning Area, and they require that a certain percentage of vegetative cover be preserved.

By contrast, the Environmentally Sensitive Planning Area (PA 5) is to be protected from development. in PA 5, development should be encouraged only in designated Centers.

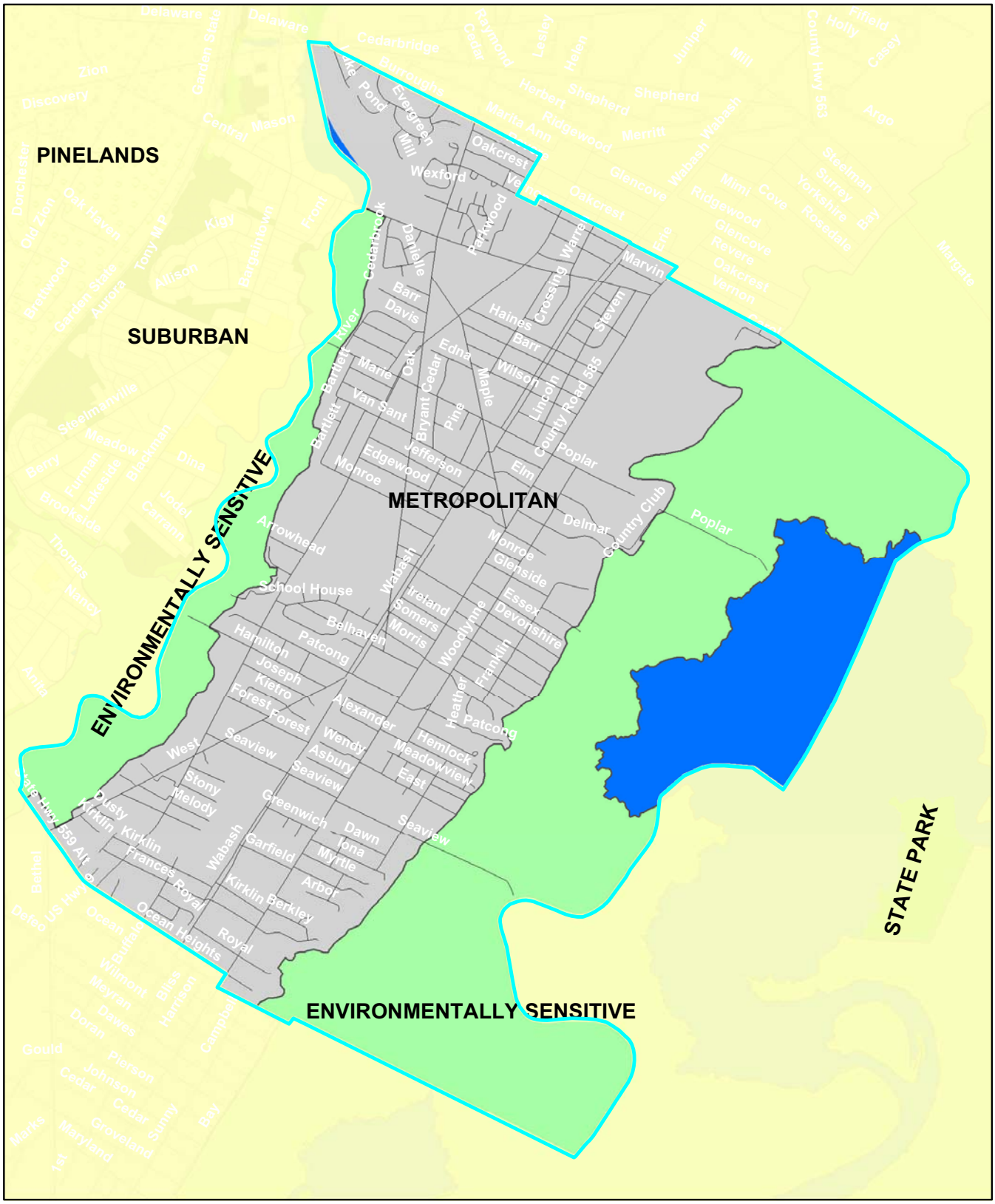
1. Protect environmentally sensitive features by guiding development into centers and maintaining low intensity development patterns elsewhere, carefully link the location. character and magnitude of development to the capacity of natural and built environme nts to support new growth, accommodate development at higher intensities in the Coastal Environmentally Sensitive Planning A rea barrier island centers, compatib!e with development patterns in existing centers, and discourage the development of public infrastructure facilities outside of centers;

2. Encourage transportation systems that link centers and support the travel and tourism industry, recreational and natural resource-based activities, and address the special seasonal demands of travel and tourism to barrier istands;

3. Locate economic development opportunities in centers that serve the surrounding region and the trave! and tourism industry and accommodate in other areas appropriate seasonal. recreational, and natural resource based-activities that have a minimal impact on environmental resources;

4. Protect sensitive natural resources critical to the maintenance of coastal ecosystems by maintaining large contiguous areas of undisturbed habitat,open space and undeveloped land, maintain the balance of ecological systems and growth, and protect the areas outside of centers from the effects of development by maintaining it as open space.

The City of linwood includes no existing or proposed Centers in PA 5. Therefore, the coastal rules call for continued preservation in the City's environmentally sensitive area. The coastal rules also define separate regulations for numerous other types of environmental areas, which impose additional screens on the development process. For example, several different types of wetlands occur in both the Environmentally Sensitive and Metropolitan planning areas in Linwood.



Linwood State Plan
Mapping 2001

EXISTING PRESERVATION EFFORTS

The City has implemented several measures to encourage the preservation of land in the Environmentally Sensitive area. It has implemented Conservation zoning in the entire meadowland area, which prohibits aU development in the meadowlands aside from essential public utilities and municipally owned docks. The only significant development located in the meadowlands is currently the Linwood Country Club's golf course.

The City has also purchased severa! parcels totaling approximately 430 acres located in the meadowland area, as shown in the following table and in the attached map. Each of these tracts is at least partly located in the meadowland, though some contain some upland area as well. These parcels are wholly or almost entirely undeveloped.

Existing Meadowlands and Uplands Held by the City of Linwood

Block	Lot	Acres	Location
1	12,30	1.6	Creek side (SW)
16.01	53	138.9	Bay side (SE)
16.01	56	50.9	Bay side (SE)
16.01	57	37.6	Bay side (SE)
40	40,49	39.6	Bay side (SE)
116	1	8.8	Creek side (SW)
179	1	22.7	Bay side (SE)
180	1	37.6	Bay side (SE)
184	6,29	92.4	Bay side (SE)

Source: City of Linwood Rec reation and Open Space Inventory

The table and map show that most of the City’s purchased open space is on the Bay side of the community. Consideration should be given to acquiring additional land on the Creek side to ensure that both ecosystems are equally protected. In addition to its conserved land in the meadowlands, the City of Linwood contains numerous important environmental features in its developed area. These features include tree-lined streets, two municipal parks that are used for recreation, and an extensive bike path. The City is in the process of acquiring two additional park properties on the Connectiv and South Jersey Industries properties. These facilities present opportunities for preserving and enhancing the environmental qualities in the developed area of the City. Existing City-owned parks provide important open space for residents and can provide habitat for plant and animal species. The City-owned bike path presents an opportunity to create an open-space corridor extending throughout the community.

The City of Linwood has an extensive “urban forest” of street trees and other trees located on private and municipal property. The trees provide shade and wildlife habitat and identify Linwood as a distinctive residential community. The City has been designated in the National Arbor Day Foundation's Tree City USA program for four years and recently received a $7,500 tree planting grant. The City also has adopted Planned Development regulations which are intended to encourage the preservation of large tracts of open space by clustering buildings on a portion of developed sites and preserving the remainder.

HISTORIC PRESERVATION

Historic Overview of Linwood

Linwood has a long and illustrious past as an Indian hunting ground, a center of Quaker settlement, and more recently, a center of shipbuilding, fishing, and farming. Until European conquest in the 17th century, Linwood was used as a hunting and fishing ground by Lenape Indians who came annually from northwestern New Jersey seeking shellfish. In 1695, the land that now constitutes Linwood and surrounding towns was sold to a group of Quaker families who established plantations. The first Quaker Meeting House in the area that is now southern Atlanlic County was construcrt:d in what is now Linwood in 1730. Beginning in the late 1700s, the town that was forming near the Meeting House had become known as Leedsville. Throughout the next century,farmers,fishermen, shipbuilders, and sea captains made Leedsville their home. Shellfish were harvested from Scull Bay, and trade was conducted by ship with ports along the east coast.

Leedsville's name was changed to Linwood in 1880 when the town established a post office; in 1889 the town was incorporated as an independenl political entity. The coming of the railroads brought further changes as accessibility improved and the town became a desirable site for development. In 1881, the Pleasantville and Ocean City railroad escablished a line along Shore Road. Trolley service began in 1907 when an interurban line connecting Linwood to Atlantic City and Ocean City was developed. Shortly after the coming of the trolley, developers began converting Linwood's farm fields into residential subdivisions. This trend intensified as private automobile ownership increased and new highways were constructed to the area. By the end of the 20th century, Linwood was almost completely developed, with the exception of the meadowlands bordering Scu!ls Bay and Patcong Creek.

HISTORIC RESOURCES

Linwood has retained many pieces of its heritage. The attached table lists historic resources in Linwood that have been documented on the National and State Registers of Historic Places. The Linwood Historic District, lisled on the National Register of Historic Places, was designated in 1989 and includes many structures that provide tangible evidence of Linwood's growth and development from 1810 to 1935. The district consists mainly of residential buildings set well back from the street, with some small commercial buildings from the early 20th century and a few institutional structures. In all, 165 buildings are included, 133 of which are listed as contributing to the historical and architectural significance of the district.

The district includes 19th century houses constructed in the Early Federal, Gothic Revival, and Queen Anne styles, as well as early 20th century homes built in the Colonial Revival, Foursquare, and Bungalow styles. The Masonic Hall, a l9th century church, and Linwood Borough School 1/1 also contribute to the historical significance of the district. However, only the schoolhouse building is listed on the State and National Registers of Historic places.

Linwood Historic Resources

RESOURCE NAME	ADDRESS	NATIONAL LISTING DATE	STATE LISTING DATE	STATE ID#
Linwood Borough School #1	16 W. Poplar Ave.	12-20-1984	11-1-1984	346
Linwood Historic District	Shore Road from Royal to Sterling Avenues	7-13-1989	4/27/1989	347

Source: State and National Registers of Historic Places

Linwood Borough School #1, a one-room schoolhouse constructed in 1873, is located within the Historic District and also listed separately on the National Register. The schoolhouse, which has at various times housed the municipal building and the public library, is currently home to the Leedsville School Museum, which is operated by the Linwood Historical Society on a 99-year lease.The Historical Society also operates the James Kirk Maritime Museum in the basement of the current Library with focus on the shipbuilding and shellfishing heritage of the City.

Recommendations

- The City should monitor the Shore Road Historic District for changes such as tear-downs and major renovations. Currently, major changes are not occurring in the historic district. However, if property owners begin to undertake significant structural alterations, the City should consider implementing a Historic Preservation Commission to review these changes .

- The City should continue to support the activities of the Historical Society including its two museums.

- The City should consider conducting a survey to identify additional properties for nomination to the State and National Registers of Historic Places.