

III. Environmental and Other Land Features

This section includes a description and mapping of environmental features and public open space within the county. These features are significant to wastewater management planning for three reasons: they may influence the delineation of sewer service areas, they may reduce the potential future wastewater generation due to existing regulatory programs, or they may be subject to federal grant limitations that prohibit the extension of sewer service into these areas. Some of this mapping has been used in the development of a map of environmentally sensitive areas where the extension of sewer service areas is restricted (see Delineation of Sewer Service Areas, below).

Development in areas mapped as wetlands, flood prone areas, designated river areas, or other environmentally sensitive areas may be subject to special regulation under Federal or State statutes or rules. Interested persons should check with the NJDEP for the latest information. Depiction of environmental features is for general information purposes only, and shall not be construed to define the legal geographic jurisdiction of such statutes or rules.

Surface Waters and Classifications

Map 5 shows the surface waters as mapped by NJDEP based on 2007 aerial photography. (See Appendix L) This is the most current mapping of surface waters for which surface water quality standard classifications were available. The County has 895 miles of streams, along with approximately 2,607 acres of ponds, lakes and reservoirs.

There are two large river watersheds within Middlesex County. The Rahway River [10,147 linear feet (lf)] is at the northeast boundary of the county and in association with its tributary, Woodbridge Creek, includes the entire area of Carteret Borough, 83 percent of Woodbridge Township, 28 percent of Edison Township, and an insignificant area within South Plainfield. Remaining county lands are predominantly within the overall watershed of the Raritan River (111,943 lf). Significant man-made waterways include the Delaware and Raritan Canal (7,356 lf) within New Brunswick, Plainsboro Township and South Brunswick Township; and the Great Ditch (20,566 lf) within South Brunswick, a portion being C1 waters within Pigeon Swamp State Park.

The largest stream system in Middlesex County involves the many unnamed tributaries of the Raritan River, predominantly within municipalities bordering the Raritan River corridor (New Brunswick, Piscataway, Highland Park, East Brunswick, Edison, Woodbridge, Sayreville, Perth Amboy and South Amboy), a total of 375,283 lf. The next stream system in size includes the unnamed tributaries of Manalapan Brook (291,616 lf). This system is in the south central portion of the county (Helmetta, Spotswood, Jamesburg and Monroe). The Manalapan Brook itself encompasses 73,698 lf within Middlesex County.

The largest named stream in Middlesex County is the Ambrose Brook (128,479 lf), within the municipalities of Edison, South Plainfield, Piscataway and Middlesex Borough. The Millstone River is the second largest named stream, encompassing 87,408 lf. The Millstone River is within Monroe, Cranbury, and Plainsboro, forming much of the boundary between Middlesex County and Mercer County, to the south.

Many lakes and ponds within Middlesex County are artificial impoundments formed by dams and acting as reservoirs. The largest artificial lakes that fall entirely within Middlesex County are part of the Lawrence Brook stream corridor. Farrington Lake covers 222.7 acres within the municipalities of South Brunswick, North Brunswick, and East Brunswick. This large artificial waterbody is fed by both Lawrence Brook (39,075 lf) and Oakeys Brook (27,860 lf). The next largest artificial lake is The Operating Engineers Training Center Lake adjacent to Pigeon Swamp State Park and draining to the Great Ditch within South Brunswick. The third largest artificial lake is Duhernal Lake (118 acres) at the upper reaches of the South River (44,617 lf). The South River, formed by the confluence of Manalapan Brook and Matchaponix Brook, becomes tidal downstream of the Duhernal Lake dam and joins the Raritan River approximately midway between New Brunswick and Perth Amboy at the boundary between South River and Sayreville Boroughs.

Surface Waters and Classifications (continued)

While only 67 acres of Carnegie Lake is within Plainsboro and South Brunswick, the lake extends into Princeton Township, Mercer County for a total size of 244 acres.

Riparian Zones

Map 5 shows riparian zones or buffers that are established along all surface waters under the following regulations: Flood Hazard Area Control Act Regulations, the Highlands Water Protection and Planning Act Regulations, the Stormwater Management Rules, and the Water Quality Management Planning Rules, and through municipal ordinances. FW1 waters are nondegradation waters in which no change from natural quality shall be allowed. Category One (C-1) waters, their tributaries and all Highlands waters are afforded a 300-foot buffer. The riparian zone adjacent to trout production waters and all upstream waters, including tributaries, is 150-feet. The riparian zone adjacent to trout maintenance waters, and those that contain documented habitat for threatened and endangered species (that are not C-1 waters), which is critically dependent on the water body for survival and upstream tributaries within one mile is 150-feet. The riparian zone of a segment of water flowing through acid producing soils is 150 feet. The riparian zone adjacent to all other surface waters is 50-feet. Most development within these riparian zones is limited by these regulatory programs.

Furthermore, compliance with the riparian zone standard has been demonstrated by the adoption of the municipalities' Riparian Corridor Ordinances which have been updated to be in compliance with the Flood Hazard Control Act Rules (N.J.A.C. 7:13) and Water Quality Management Rules (N.J.A.C. 7:15). The purpose of this municipal ordinance is to protect and maintain the chemical, physical, and biological integrity of streams, lakes, and other surface water bodies, protect the riparian and aquatic life and environment, conserve natural resources like ground water recharge zones, wetlands, springs, and woodlands, protect downstream areas from flooding, and thus regulate the use of the land to achieve the purposes mentioned broadly.

Surface waters designated C1 are listed in the Surface Water Quality Standards at N.J.A.C. 7:9B. The Department's "Surface Water Quality Standards" GIS data layer was utilized to determine these waters. The applicable 300 foot buffer has been applied to these waterways and removed from the proposed sewer service areas on the mapping. Lesser width buffers have not been graphically removed from the sewer service area but are not proposed for sewer service. Jurisdictional determinations by the NJDEP will be utilized to determine the extent of the sewer service area on individual lots.

The Great Ditch in Pigeon Swamp State Park and its upstream tributaries in South Brunswick and Cheesequake Creek in Cheesequake State Park and its upstream tributaries in Old Bridge are the only two Category One (C1) surface water bodies in Middlesex County that require a 300 foot buffer. Category One (C1) surface water buffers are mandated by the Stormwater Management Rules (N.J.A.C. 7:8) and the Flood Hazard Control Act (N.J.A.C. 7:13).

Recorded habitats for threatened and endangered species (T&E) that have NJDEP verification are classified as Ranks 3, 4, and 5 in the Landscape Project. The most current information is available through the Natural Heritage Program within the NJDEP. Protocols established by NJDEP for distribution of this information are structured to reduce the risks of harvesting for profit or intentional destruction of a species or habitat that may arise from general access. Therefore, it is not possible to provide a mapping of the 150 foot riparian zone that is predicated by the presence of water-dependent T&E within Map 5 – Riparian Zones in this report. (See Appendix Q) It is the responsibility of individual property owners who intend to develop parcels to request a T&E determination from the Natural Heritage Program. This determination may be revealed through a Flood Hazard Area Verification, a Habitat Suitability Determination or a Letter of Interpretation (LOI) request to the NJDEP Division of Land Use Regulation for regulated proposed land disturbance activities.

Eighteen municipalities within Middlesex County have some presence of acid producing soils, based upon underlying geologic information provided by NJDEP. Carteret, Helmetta, Milltown, East Brunswick, Edison, Monroe, North Brunswick, Old Bridge, Plainsboro, South Brunswick, and Woodbridge have areas of acid producing soils within their boundaries. Perth Amboy and South Amboy, Jamesburg, Sayreville, South River,

Riparian Zones (continued)

and Spotswood and Cranbury are completely covered by acid producing soils. A 150 foot buffer has been assigned to all surface water bodies in all these municipalities containing acid producing soils as represented on Map 5. New Brunswick, Dunellen, Highland Park, Metuchen, Middlesex, and South Plainfield and Piscataway do not contain acid producing soils.

A 50 foot riparian zone is required for the remaining regulated surface waters in Middlesex County not exhibiting the more restrictive criteria for a wider riparian zone.

Flood Prone Areas

Map 4 shows the flood prone areas as mapped by FEMA. These areas may be subject to Federal 201 Grant Limitations that prohibit the extension of sewers to serve development in these areas.

Wild and Scenic Rivers and Corridors

There are no wild and scenic rivers in Middlesex County.

Freshwater Wetlands

Freshwater wetlands as mapped by the NJDEP are shown in Map 5. Freshwater wetlands are regulated under the Freshwater Wetlands Protection Act Rules, which place stringent limits on development within these areas. "Freshwater wetland" or "wetland", as defined by the NJDEP, means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation; provided, however, that the NJDEP, in designating a wetland, shall use the three-parameter approach (that is, hydrology, soils and vegetation) enumerated in the 1989 Federal Manual. These include tidally influenced wetlands which have not been included on a promulgated map pursuant to the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq.

The advantages of the presence of wetlands include protection of drinking water, provision of natural flood control, protection of fish, wildlife, and other endangered species, and high open space value. Freshwater wetlands in Middlesex County are concentrated in communities south of the Raritan River, especially within Monroe, Old Bridge, and South Brunswick and less so within Cranbury, East Brunswick and Plainsboro. An exception to this is Piscataway which contains 1,715 acres of Freshwater Wetlands, the greatest amount in any town above the Raritan River (Table 10). The presence of wetlands in all other municipalities in the County is significantly less in terms of area covered. Freshwater and Tidal/Coastal Wetlands are depicted on Map 5.

The freshwater wetlands delineations on the NJDEP wetlands layer, are for screening purposes only and are not regulatory. Where NJDEP Letters of Wetlands Interpretation (LOI) and Land Use Regulation Permits (LURPs) were available, Middlesex County used this data to refine the delineation of the sewer service areas. The approximate extent of wetlands (prior to refinements) within each Middlesex County municipality is listed in Table 10.

Freshwater Wetlands (continued)

Municipality	Acres	Municipality	Acres
Carteret	95	North Brunswick	1,073
Cranbury	1,977	Old Bridge	7,878
Dunellen	35	Perth Amboy	33
East Brunswick	1,239	Piscataway	1,715
Edison	2,047	Plainsboro	1,440
Helmetta	194	Sayreville	1,085
Highland Park	115	South Amboy	31
Jamesburg	12	South Brunswick	7,106
Metuchen	56	South Plainfield	909
Middlesex	291	South River	103
Milltown	37	Spotswood	219
Monroe	7,936	Woodbridge	728
New Brunswick	107		
Total for Entire County		36,461 acres	

As Table 10 reveals, Monroe Township contains 7,963 acres (21.8 percent) of Middlesex County's freshwater wetlands, which is the highest proportion among towns in the County. Old Bridge, with 7,878 acres (21.6 percent), contains the next highest amount of the County total. In comparison, the Borough of Jamesburg, with just 12 acres (0.03 percent) of the total freshwater wetlands, has the lowest percentage of Middlesex County freshwater wetlands.

Public Open Space and Recreation Areas

Map 6 shows the land areas currently protected from development as public open space, and also shows other recreational areas that are owned and operated by land trusts, non-profit associations, and for-profit recreational businesses. (See Appendix L) Such properties are limited to those of 10 acres or more in size for mapping clarity.

Middlesex County has an active and vibrant parks and open space program for its communities, largely administered through the Middlesex County Office of Parks and Recreation. The County contains a total of 25,026 acres of public parks and open space.¹ This number does not include preserved farmland and private open space. Apart from these recreational facilities, there are three public golf courses in the county, one each in East Brunswick, Plainsboro, and Piscataway.

The County is a participant in the Green Acres Program which is sponsored by the New Jersey Department of Environmental Protection (NJDEP). The Green Acres Program was created in 1961 to meet the recreational and conservation needs of the State. Funds, generated through bond issues, are available for land acquisition and park development. Some of the acquisitions, redevelopments and improvements done under this program include the expansive Cheesequake Marsh in the Raritan Bay Watershed in Old Bridge Township, Washington Park in Perth Amboy, River Road Waterfront Park in Sayreville, and The Patten Center Park in Perth Amboy.

The County is also involved in the preservation of open space within its jurisdiction through the Middlesex County Open Space, Farmland and Historic Preservation Trust Fund administered by the Middlesex County Board of Chosen Freeholders. The objective of this program is to preserve open space from development by

¹ From Middlesex County Parks and Recreation Website/Interviews with Parks Office Staff

Public Open Space and Recreation Areas (continued)

acquiring them from private land owners. The Trust Fund is supported by a dedicated tax levy of three cents per 100 dollars of assessed valuation.

The Middlesex County Open Space and Recreation Plan was adopted in 1995. At this time, the County owned 5,101 acres of open space, 3,124 acres of which were suitable for active and passive recreation. Eight years later, when the 2003 Open Space and Recreation Plan was adopted, Middlesex County owned 9,091 acres of open space, with 4,973 acres being deemed suitable for active and passive recreation—an 80 percent increase in the county owned open space from 1995.

The broad goals of the Open Space and Recreation Plan 2003 were to provide a public system of major parks and open space, to assure adequate recreational facilities, and to provide opportunities for cultural and heritage appreciation. The County, through its sustained efforts, has been successful in achieving all the goals broadly. Examples of this are mentioned in the beginning of this chapter.

These numbers do not include private open space and preserved farmland (see next section for preserved farmland).

Municipality	Acres	Municipality	Acres
Carteret	132	North Brunswick	791
Cranbury	517	Old Bridge	5,454
Dunellen	43	Perth Amboy	100
East Brunswick	2,574	Piscataway	1,124
Edison	1,898	Plainsboro	1,717
Helmetta	187	Sayreville	1,180
Highland Park	237	South Amboy	29
Jamesburg	23	South Brunswick	4,319
Metuchen	88	South Plainfield	396
Middlesex	198	South River	205
Milltown	62	Spotswood	100
Monroe	2,585	Woodbridge	760
New Brunswick	308		
Total for Entire County		25,027 acres	

Preserved Agricultural Areas and Other Conservation Easements on Private Lands

Map 6 shows the location of land areas currently protected from development as preserved agricultural lands for which the development rights have been retired by purchase or donation. (See Appendix Q)

The County participates in the County Planning Incentive Grant Program (PIG), administered by the State Agriculture Development Committee. Development easements are purchased in conjunction with State, local and County funds. The County utilizes the Middlesex County Open Space, Farmland and Historic Preservation Trust Fund, administered by the Middlesex County Board of Chosen Freeholders and the County Agriculture Development Board, for easement purchases. Farmland preservation was initiated in Middlesex County in 1985 in response to concerns about the increasing loss of farmland to non-agricultural development. As summarized in the following table, preserved agricultural land is located in seven municipalities. Ninety seven percent of the total acres in farmland preservation are found in Cranbury, Monroe, Plainsboro and South Brunswick. The balance of preserved farmland is located in East Brunswick, Old Bridge, and Sayreville. There are 5,280 total acres in farmland preservation, a number which includes acreage preserved through the efforts of farmland preservation partners at the County, the State, and municipal levels, as well as one non-profit group. Of the

Preserved Agricultural Areas (continued)

5,280 acres in farmland preservation, the County has acquired easements covering approximately 4,817 acres on 42 out of the 60 preserved farms in Middlesex County.

The Middlesex County Office of Planning prepared the Middlesex County Farmland Preservation Plan in 2008. Through this plan the county proposed to implement a comprehensive program of agricultural retention and development, which encourages agriculture as a business activity and ensures preservation of agricultural lands in the County.

	Number of Farms	Total Acres**	Percent of Total Acres
Cranbury	30	2,749	52%
East Brunswick	2	81	1.5%
Monroe	12	1,218	23%
Old Bridge	2	71	1%
Plainsboro*	6	580	11%
Sayreville	1	17	<1%
South Brunswick	7	581	11%
Middlesex County Total	60	5,280	100%

*One preserved farm that is bisected by the boundary between Cranbury and Plainsboro is counted once in the sum total number of farms

For details on the breakdown of preserved farmland acres according to preservation program, please refer to the Middlesex County Comprehensive Farmland Preservation Plan 2008.

Suitable Habitat for Threatened & Endangered Species

Map 6 shows the areas identified by the NJDEP as being suitable habitat for threatened and endangered species, Ranks 3, 4, and 5, through the Landscape Project Version 3.1. This information is provided through the NJDEP critical areas mapping project, (See Appendix L) The Landscape Project (NJDEP 2008). Four of the five available habitat types were utilized – forests, forested wetlands, emergent wetlands and grasslands. The coastal beaches and dunes habitat type is not applicable to the County. In addition, the bald eagle foraging and the wood turtle habitat mapping were used as species-specific mapped products under Rank 5 and 3 respectively. Based on guidance from NJDEP, urban peregrine falcon habitat mapping was not utilized because the County has not verified the mapping of these areas. This mapping was primarily used in the delineation of sewer service areas as described in the next section.

The overall total of potentially suitable habitat for threatened and endangered species, resulting from the analysis used above, is approximately 26,759 acres. Natural habitats that are categorized as threatened and endangered are found in 24 of the 25 Middlesex County municipalities. Metuchen is the only municipality with no land categorized as threatened or endangered habitats. The largest amount of this classification is in South Brunswick Township, with 16.1 percent of the county total. Old Bridge Township contains 15.2 percent and Sayreville Borough contains 11.9 percent of the county total. The municipality that has the lowest existing level of threatened and endangered habitat features is Dunellen at 1 acre or less than .01 percent of the county total. Table 13 lists the impacted municipalities and acreages affected.

Suitable Habitat for Threatened & Endangered Species (continued)

Table 13
Suitable Habitat for Threatened and Endangered Species Located within Middlesex County's WMP Designated Planning Area

Municipality	Acres	Municipality	Acres
Carteret	365	North Brunswick	255
Cranbury	1,276	Old Bridge	4,063
Dunellen	1	Perth Amboy	341
East Brunswick	2,308	Piscataway	482
Edison	2,074	Plainsboro	1,642
Helmetta	245	Sayreville	3,171
Highland Park	113	South Amboy	166
Jamesburg	7	South Brunswick	4,297
Middlesex	237	South Plainfield	62
Milltown	66	South River	628
Monroe	3,074	Spotswood	257
New Brunswick	85	Woodbridge	1,544
Total for Entire County		26,759 acres	

Natural Heritage Priority Sites

Map 6 shows the natural heritage priority sites mapped by NJDEP as of the date of this WMP. (See Appendix L) This mapping was primarily used in the delineation of sewer service areas as described in the next section.

Natural Heritage Priority Sites, an NJDEP initiative, aims to identify "critically important areas" to conserve the state's biodiversity. These sites are mainly those containing rare plant species and ecological communities. Apart from these, sites that encompass significant habitat for rare animals have also been included. These sites are based on the analysis of information in the New Jersey Natural Heritage Database. Using this database, 343 sites have been identified in New Jersey as Natural Heritage Priority Sites by the Office of Natural Lands Management.

There are 1,372 acres on six sites designated as National Heritage Priority Sites (NHPS) within Middlesex County. East Brunswick has 39 percent (834 acres) of the total Middlesex County NHPS acreage, more than any other municipality. Farrington Lake, the Beaverdam Branch, a major portion of the Helmetta site and the Riva Avenue site comprise this acreage in East Brunswick. Old Bridge Township, with the Browntown and South River marshes NHP sites, contain approximately 22 percent (303 acres) of the county total. Of the six municipalities with NHP sites, Spotswood Borough has the smallest area, at less than one acre.

The largest contiguous NHPS is the Helmetta site, comprised of acreage within Helmetta Borough, East Brunswick Township, and Spotswood Borough. The site is a large pond and associated wetlands in pine barren habitat. It includes both upland and wetland rare plant habitats. The site contains one state listed endangered plant plus special concern plant species.

Natural Heritage Priority Sites (continued)

The table below lists NHPS impacted municipalities and acreages affected.

Municipality	Acres	Municipality	Acres
East Brunswick	834	Old Bridge	303
Helmetta	123	South Brunswick	14
North Brunswick	99	Spotswood	<1
Total for Entire County			
		1,373 acres	

Steep Slopes

Consistent with the rules found in the State of New Jersey's Water Quality Management Planning rule (WQMP) (N.J.A.C. 7:15), steep slopes are defined as any slope equal to or greater than 20 percent as measured over any minimum run of 10 feet. Steep slopes are determined based on contour intervals of two feet or less. Map 6 shows the steep slopes defined as those slopes with a 15 percent slope or greater. The steep slopes are calculated for 15 percent to 35 percent and not 20 percent, as defined by the WQMP rule, due to the limitations in the data sets available. These slopes are mapped using either or both of USDA and/or NRCS soils data. The potential development of steep slopes is reduced by the Water Quality Management Planning Rules, Planning Act Rules and by municipal ordinance. Disturbance of steep slopes is prohibited except in cases of redevelopment within the limits of existing impervious surfaces, and new disturbance necessary to protect public health, safety and welfare such as remediation of a contaminated site. The purpose of the state mandated steep slope ordinance is to regulate the intensity of use in areas of steeply sloping terrain in order to limit soil loss, erosion, excessive stormwater runoff, the degradation of surface water and to maintain the natural topography and drainage patterns of the land.

Most of the steep slopes in Middlesex County are adjoining the Raritan River or Lawrence Brook, a tributary of the Raritan River, covering Piscataway, Edison, North Brunswick, East Brunswick, Highland Park, New Brunswick, and Milltown with a total area of about 525 acres. Woodbridge has steep slopes covering an area of 30 acres. Old Bridge has a negligible presence of steep slopes.

Municipality	Acres	Municipality	Acres
East Brunswick	71	North Brunswick	96
Edison	123	Old Bridge	<1
Highland Park	49	Piscataway	145
Milltown	15	Woodbridge	30
New Brunswick	16		
Total for Entire County			
		545 acres	

Coastal Wetlands

The land immediately adjacent to tidal water often contains coastal wetlands. These wetland areas are a vital coastal resource serving as habitat for many creatures. The wetlands also serve as buffers that protect upland areas from the flooding and damage caused by storms. New Jersey protects coastal waters and the land adjacent to them under a variety of laws, including the Waterfront Development Law (N.J.S.A. 12:5-3), the Coastal Area Facility Review Act (N.J.S.A. 13:19), and the Wetlands Act of 1970 (N.J.S.A. 13:9A). The New Jersey Department of Environmental Protection (NJDEP) applies the New Jersey Coastal Permit Program Rules, N.J.A.C. 7:7, and the Coastal Zone Management Rules, N.J.A.C. 7:7E, to determine what may or may not be built under these three laws.

In Middlesex County, eight municipalities contain approximately 3,931 acres of coastal wetlands, mainly along the Raritan River and its tributaries: Carteret, Edison, New Brunswick, Perth Amboy, Sayreville, South Amboy, South River and Woodbridge. Edison and Sayreville have the largest presence of coastal wetlands. A few smaller areas of coastal wetlands are also present in the northern part of the county in Perth Amboy, Woodbridge, and Carteret. Map 5A depicts coastal wetlands areas within Middlesex County.

Wetlands Act of 1970 (N.J.S.A. 13:9A)

The Wetlands Act of 1970 (N.J.S.A. 13:9A) requires the NJDEP to regulate development in coastal wetlands. Any time land is located near tidal water, there is a good possibility of coastal wetlands on the property. Statewide, the regulated coastal wetlands are shown on maps prepared by NJDEP. Unlike NJDEP's freshwater wetlands maps, the coastal wetlands maps are used to determine jurisdiction. These maps are available for public inspection at each county clerk's office. You must have a coastal wetlands permit to excavate, dredge, fill or place a structure on any coastal wetland shown on the maps. Map 5 shows the extent of wetlands in Middlesex County regulated under the Wetlands Act of 1970.

The Waterfront Development Law (N.J.S.A. 12:5-3)

The Waterfront Development Law, passed in 1914, seeks to limit problems that new development could cause for existing navigation channels, marinas, moorings, other existing uses, and the environment.

A development in a tidally flowed waterway, anywhere in New Jersey, requires a Waterfront Development Permit. Examples of projects that need a Waterfront Development Permit include docks, piers, pilings, bulkheads, marinas, bridges, pipelines, cables, and dredging.

For development outside of the CAFRA area, the Waterfront Development Law regulates not only activities in tidal waters, but also the area adjacent to the water, extending from the mean high water line to the first paved public road, railroad or surveyable property line. At a minimum, the zone extends at least 100 feet but no more than 500 feet inland from the tidal water body. Within this zone, DEP must review construction, reconstruction, alteration, expansion or enlargement of structures, excavation, and filling.

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