3.1.2 Regional Soils

The general properties of soils help to determine their suitability for on-lot disposal and land disposal technologies. Poor soil suitability may result in these disposal systems polluting ground and surface waters, thus creating an unacceptable health hazard.

The soils of the Philadelphia Act 537 planning area have been delineated by a very broad interpretation of their hydrologic characteristics. This delineation is based upon Soil Associations, as can be seen on Figure 3.1-2, Regional Soils Map, and includes:

- C2a: Chester-Glenelg Association - Soils formed in materials from igneous and metamorphic rocks; includes substrate of schists, gneiss, porcelonite, metahyolite, and metabasalt.

- E3a: Howell-Fallsington Association - Soils formed in unconsolidated water alluvial materials.

The soils associated with the Piedmont Uplands Physiographic Section primarily have a B hydrologic rating and, therefore, moderate rates of infiltration can be expected. This section has slopes averaging from 15 to 20 percent and soil depths of 50 to 70 inches. Soils within the Coastal Plain Province along the Delaware River are influenced by their substrate of marine clay and sand and give rise to soils formed by unconsolidated alluvial deposits that exhibit slow rates of infiltration. It should also be noted that the dense population, development, and impervious coverage within the City of Philadelphia have a significant impact on the hydrology, runoff potential, and non-point pollution to the surrounding surface waters. The infiltration rates of the planning area are, therefore, generally very slow.

Soil Impact on On-Lot Disposal Systems

In the Philadelphia Act 537 planning area, the soils were delineated by using the Bucks and Philadelphia Counties Soil Surveys developed by the United States Department of Agriculture (USDA), Soil Conservation Service (SCS), in cooperation with the Pennsylvania Department of Environmental Resources, State Conservation Commission.

The specific exposed soil types have been delineated and evaluated for those areas where it has been determined that a high density of recognized on-lot disposal systems (OLDS) exists. These areas are further discussed under Section 4.1, On-Lot Disposal Systems. Figure 4.1-1 shows the areas within the City with the highest concentration of OLDS. Below is a description of each of these types of soils present in Philadelphia. Table 3.1.2 lists significant soil properties and their approximate acreage within Philadelphia.

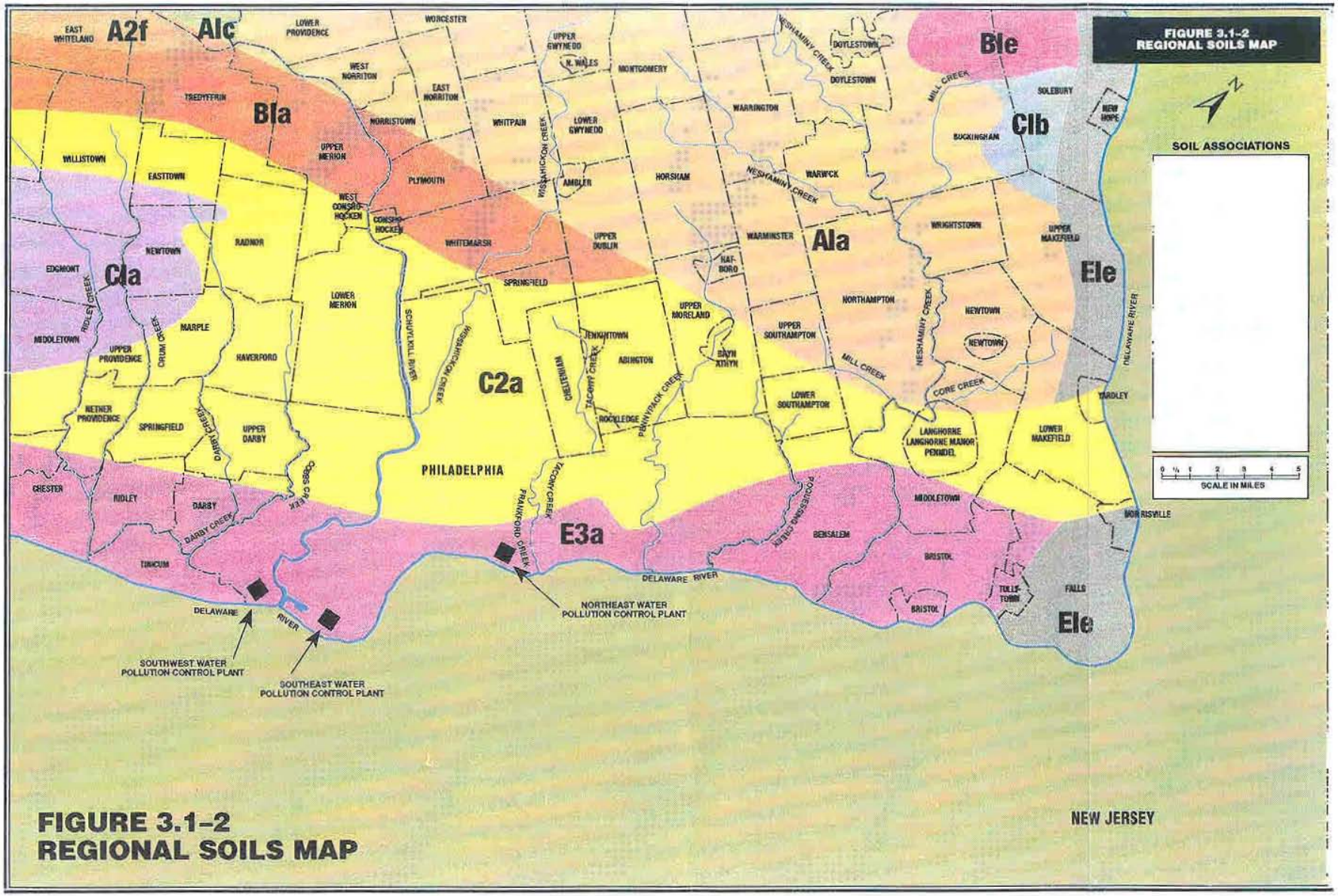

FIGURE 3.1-2
REGIONAL SOILS MAP

BCM

TABLE 3.1.2

APPROXIMATE ACREAGE AND SELECTED PROPERTIES OF SOILS WITHIN PHILADELPHIA

Soil	Depth to Bedrock (ft)	Map Symbol	Acreage	Permeability	PADER Soil Series	Suitability for On-Lot Sewage Disposal
Alluvial Land	Properties are too variable to estimate	Ae	150	Properties are too variable to estimate		Severe: subject to flooding
Chester silt loam, 3- to 8-percent slopes	5 to 10	CeB	925	0.63 - 2.00		Slight
Chester silt loam, 8- to 15-percent slopes	5 to 10	CeC	220	0.63 - 2.00		Moderate slope
Duncannon silt loam, 0- to 3-percent slopes	<4	DuA	605	0.63 - 2.00		Slight
Duncannon silt loam, 3- to 8-percent slopes	<4	DuB	265	0.63 - 2.00		Slight
Hatboro silt loam	5 to 10	Ha	720	0.63 - 2.00		Severe: seasonal high water table; flooding
Manor loam, 3- to 8-percent slopes	4 to 12	MaB	1,060	2.00 - 6.30		Slight: hazard of groundwater contamination
Manor loam, 8- to 15-percent slopes	4 to 12	MaC	1,170	2.00 - 6.30		Moderate: hazard of groundwater contamination; slope
Manor loam, 15- to 25-percent slopes	4 to 12	MaD	695	2.00 - 6.30		Severe: slope
Manor extremely stony loam, 8- to 25-percent slopes	4 to 12	MbD	740	2.00 - 6.30		Severe: stoniness; slope

BCM

TABLE 3.1.2 (Continued)

Soil	Depth to Bedrock (ft)	Map Symbol	Acreage	Permeability	PADER Soil Series	Suitability for On-Lot Sewage Disposal
Manor and Chester extremely stony loams, 25- to 50-percent slopes	4 to 12	McE	1,270	2.00 - 6.30		Severe: stoniness; slope
Marsh	Properties are too variable to estimate	Mh	505	Properties are too variable to estimate		Severe: high water table; flooding
Rowland silt loam	31/2 to 6	Ro	475	0.63 - 2.00		Severe: flooding
Urban land	Properties are too variable to estimate	Ub	43,315	Properties are too variable to estimate		Too variable to rate; requires onsite investigation
Urban land-Chester complex, 0 to 8 percent slopes	Properties are too variable to estimate	UdB	23,245	Properties are too variable to estimate		Slight
Urban land-Chester complex, 8 to 15 percent slopes	Properties are too variable to estimate	UdC	2,000	Properties are too variable to estimate		Moderate: slope
Urban land - Howell complex	Properties are too variable to estimate	Uh	4,155	Properties are too variable to estimate		Severe: moderately slow permeability
Water			175	N/A		N/A
Miscellaneous soils			550	N/A		N/A
TOTAL			**82,240**			

"Soil Survey of Bucks and Philadelphia Counties, Pennsylvania", USDA, Soil Conservation Service, July 1975.

Alluvial Land

Alluvial land usually lies within the floodplain of rivers, streams, and gullies. It consists of frequently flooded, somewhat poorly drained soils that formed in alluvium. These areas are commonly cut by shallow stream channels. They are very long and narrow and range from 5 to 25 acres in size. Most nonfarm land uses on this soil type are limited by flooding and wetness.

Chester Series

The Chester Series consists of deep, well-drained, nearly level to very steep soils on uplands. Those soils are on sides and tops of ridges. The areas are elongated or irregular in shape and 3 to 50 acres or more in size. They formed in loamy material weathered from gneiss and schist. The Chester silt loam with 3- to 8-percent slopes can be found on the sides and tips of ridges. This soil has good drainage and gentle slopes; therefore, it is usually good for most nonfarm uses. The Chester silt loam with 8- to 15-percent slopes can be found on the sides of ridges. The slope often limits most nonfarm uses of this soil.

Duncannon Series

The Duncannon series consists of deep, well-drained, nearly level to gently sloping soils on uplands. These soils are on upper elevations in areas of low relief. They are formed in silty, wind-deposited sediment that overlie shales, sandstone, and occasionally other material. The Duncannon silt loam with 0- to 3-percent slopes can be found in areas of low relief on broad uplands. Areas characterized with this soil series are often oval or elongated in shape and 3 to 25 acres in size. This soil has good drainage and nearly level slopes; therefore, it is only slightly limited for most nonfarm uses. The Duncannon silt loam with 3- to 8-percent slopes is also found in areas of low relief in broad uplands. These areas are elongated or irregular in shape and 3 to 20 acres or more in size.

Hatboro Series

The Hatboro series consists of deep, poorly drained, nearly level soils on floodplains. These soils are mainly along small meandering streams. They formed in loamy alluvium that washed from upland soils underlain by gneiss, schist, and diabase. The Hatboro silt loam with 0- to 3-percent slopes is usually found on smooth or slightly concave floodplains. Areas of this soil type are elongated and narrow and 3 to 50 acres or more in size. The hazards of flooding and a high water table limit most nonfarm uses of this soil.

Manor Series

The Manor Series consists of deep, well-drained, gently sloping to very steep soils on uplands. These soils are mainly found on side slopes and ridge tops. They are formed from loamy material of weathered schist and gneiss. The Manor loam with 3- to 8-percent slopes can be found on hilltops and ridgetops. Areas are oval or elongated and 3 to 10 acres or more in size. This soil has good drainage and gentle slopes; therefore, it is only slightly limited for most nonfarm uses.

The Manor loam with 8- to 15-percent slopes can be found on sides of ridges and hills. Areas are elongated in shape and 3 to 50 acres or more in size. Slope limits most nonfarm uses of this soil. The Manor loam with 15- to 25-percent slopes can be found on the sides of ridges and hills and adjacent to drainageways. Slope limits most nonfarm uses of this soil. The extremely stony Manor loam with 8- to 25-percent slopes can be found on sides of hills and ridges and on short slopes adjacent to narrow floodplains. Areas are elongated in shape and 5 to 75 acres or more in size. Slope and stoniness limit most nonfarm uses of this soil. The Manor and Chester Series have extremely stony loams with 25- to 50-percent slopes. The proportion of soils varies in individual areas. These soils are found mainly on ridges and short-side slopes adjacent to creek floodplains. Areas are elongated in shape and 5 to 100 acres or more in size. The slope and stoniness limit most nonfarm uses of these soils.

Marsh Series

The Marsh Series is often found along shorelines subject to ponding or tidal overflow, or in depressions where runoff collects. The soil material is variable, but it consists mostly of loamy to clayey marine and alluvial deposits. This soil is always very wet and conducive to the development of wetlands. Areas are irregular in shape and range from 5 to 100 acres or more in size. Most nonfarm uses are limited by flooding and wetness.

Rowland Series

The Rowland series consists of deep, moderately well-drained to somewhat poorly drained, nearly level soils on floodplains. These soils are found mainly along small meandering streams. They formed in loamy alluvium that washed from upland soils and are underlain by red and brown shale and sandstone. Flooding from the seasonal high water table and moderately slow permeability limit most nonfarm uses of this soil.

Urban Land

Urban land is the most widely found soil in the planning area and is commonly found in highly built-up areas of Philadelphia County. Most urban land is found on terraces of the Uplands and Coastal Plain; however, some can be found in the floodplain. The soils and foundation materials are highly variable. The use of urban land with 0-to 8-percent slopes to prepare an area for development precludes its use for most other purposes. The Urban Land - Chester complex with 0- to 8-percent slopes is about 60 percent urban land, 33 percent Chester soil, and 5 percent included soils. It is found in semibuilt-up areas, mainly in the gneiss and schist ridge and valley areas of Philadelphia County. Areas are irregular in shape and 5 to 2,500 acres or more in size. Drainage is good and slopes are nearly level to gentle; therefore, this complex is only slightly limited for most nonfarm use. Onsite investigation is needed, however, in open areas to determine the hazards and degree of limitation for specified uses. The Urban Land - Chester complex with 8- to 15-percent slopes is about 60 percent urban land, 35 percent Chester soils, and 5 percent included soils. It is in semibuilt-up areas, mainly in the gneiss and schist ridges and valleys of this County. Areas are irregular in shape and 5 to 500 acres in size. Slope limits most nonfarm uses. The Urban Land - Howell complex with 0- to 15-percent slopes is 60 percent urban land, 35

percent Howell silt loam, and 5 percent included soils. It is located in semibuilt-up areas on terraces of the Coastal Plain. Areas are irregular in shape and 5 to 3,000 acres or more in size. Slow permeability limits nonfarm uses of this complex.

3.1.3 Delineation of Wastewater Service Areas

The PWD maintains three large water pollution control plants (WPCPs) to provide wastewater treatment to the residents, industries, and institutions of the City of Philadelphia and 10 outlying municipalities. As can be seen on Figure 3.1-3, the City of Philadelphia, for the purposes of this report, has been subdivided into three subareas based on the service areas of each of these three WPCPs. The WPCPs are the most significant wastewater treatment facilities within the planning area, both in terms of capital investment and capability of influencing the quality of the receiving waters. Therefore, the WPCPs and their respective service areas are the natural subareas upon which to base evaluation of the facilities, capabilities, and future needs.

The regional service areas of each of the water pollution control plants are shown in Figure 3.1-4, 3.1-5 and 3.1-6.

3.1.4 Delineation of Sewered/Unsewered Areas

The City of Philadelphia has one of the oldest wastewater collection and treatment systems in the United States. It has been extensively developed since the turn of the century. It follows that a vast majority of the City area is serviced by sewers. There are some large open areas, such as Pennypack and Fairmount Parks among others, that are not serviced by sewers.

The Philadelphia Health Department estimates that 2,450 out of 674,900 residences, about 0.4 percent, continue to utilize on-lot disposal systems (OLDS) in very localized areas. The sewered/unsewered areas within the City are delineated on Figure 3.1-7. The evaluation of OLDS is provided in Section 4.1, On-Lot Disposal Systems.

Generally speaking, those areas that have the greatest density of OLDS are those majestic dwellings in and adjacent to the park and in the far reaching northeast and northwest areas of the city. The areas of OLDS concentrations that are adjacent to surface streams and in some sections of the Northeast are low-lying, with elevations below 200 feet. However, in the Chestnut Hill/Manayunk/Roxborough area, the elevations are somewhat higher, and in some cases, greater than 400 feet.

3.1.5 Surface Water Resources

There are two major rivers and six creeks that comprise the surface waters of the City of Philadelphia. There are also minor streams and tributaries below the streets of the City that have been incorporated into the present-day storm drain system. Early maps of the City indicate creeks like Chickhansink, Moyanokin, Kingsessing, Cohoquinock, Wischanemunk, Gunners Run, and the Dock, all of which no longer appear as surface water courses.

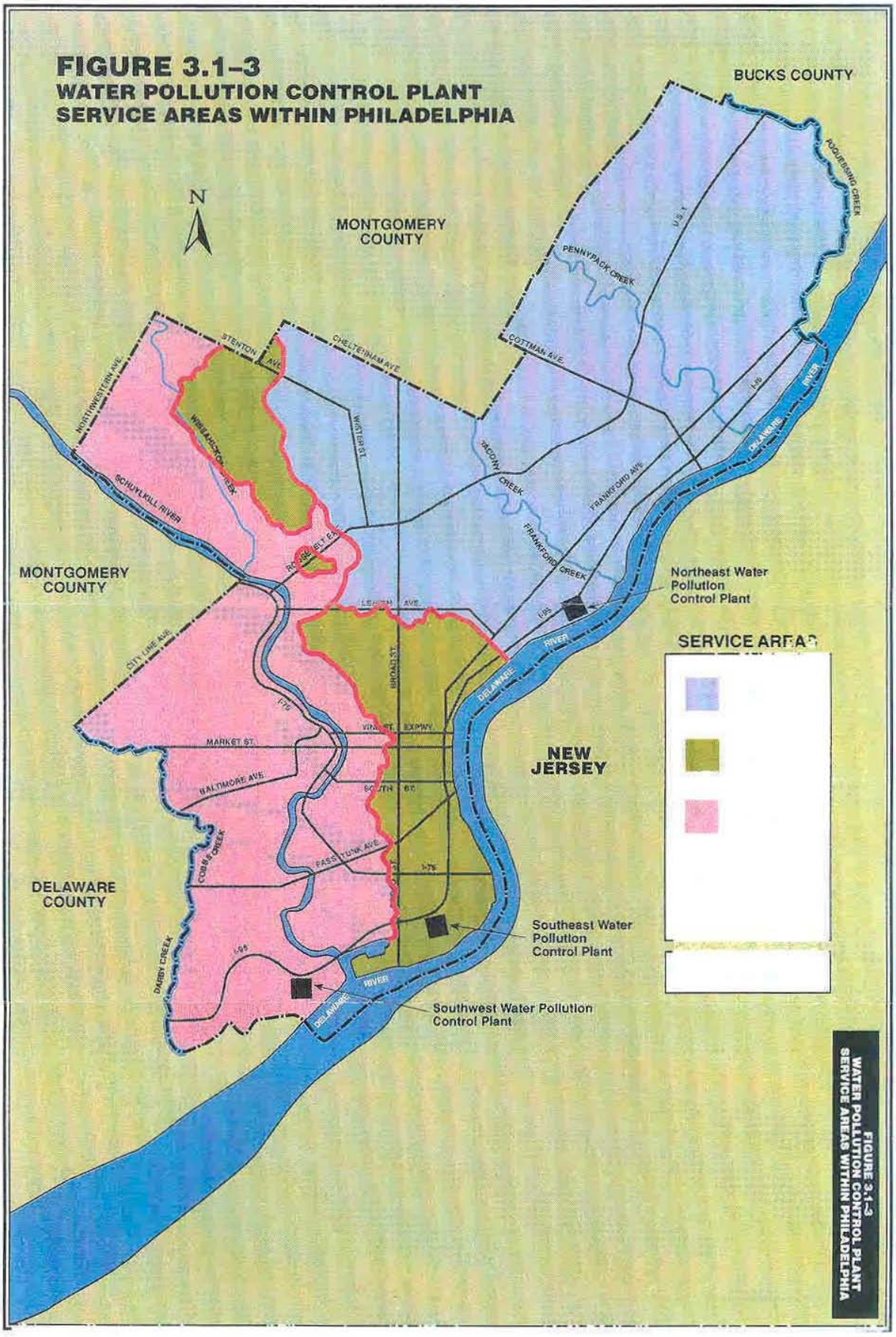
FIGURE 3.1-3
WATER POLLUTION CONTROL PLANT
SERVICE AREAS WITHIN PHILADELPHIA
BUCKS COUNTY
N
MONTGOMERY COUNTY
PENNYPACK CREEK
U.S.1
POQUESSING CREEK
COTTMAN AVE.
CHELTENHAM AVE.
STENTON AVE.
NORTHWESTERN AVE.
WISSAHICKON PARK
SCHUYLKILL RIVER
WISTON ST.
TACONY CREEK
FRANKFORD AVE.
FRANKFORD CREEK
DELAWARE RIVER
MONTGOMERY COUNTY
ROOSEVELT EXP.
LEHIGH AVE.
Northeast Water Pollution Control Plant
CITY LINE AVE.
BROAD ST.
VINE ST. EXPWY.
MARKET ST.
BALTIMORE AVE.
SOUTH ST.
PASSYUNK AVE.
I-76
I-95
NEW JERSEY
SERVICE AREAS
DELAWARE COUNTY
COBBS CREEK
DARBY CREEK
Southeast Water Pollution Control Plant
Southwest Water Pollution Control Plant
FIGURE 3.1-3
WATER POLLUTION CONTROL PLANT
SERVICE AREAS WITHIN PHILADELPHIA

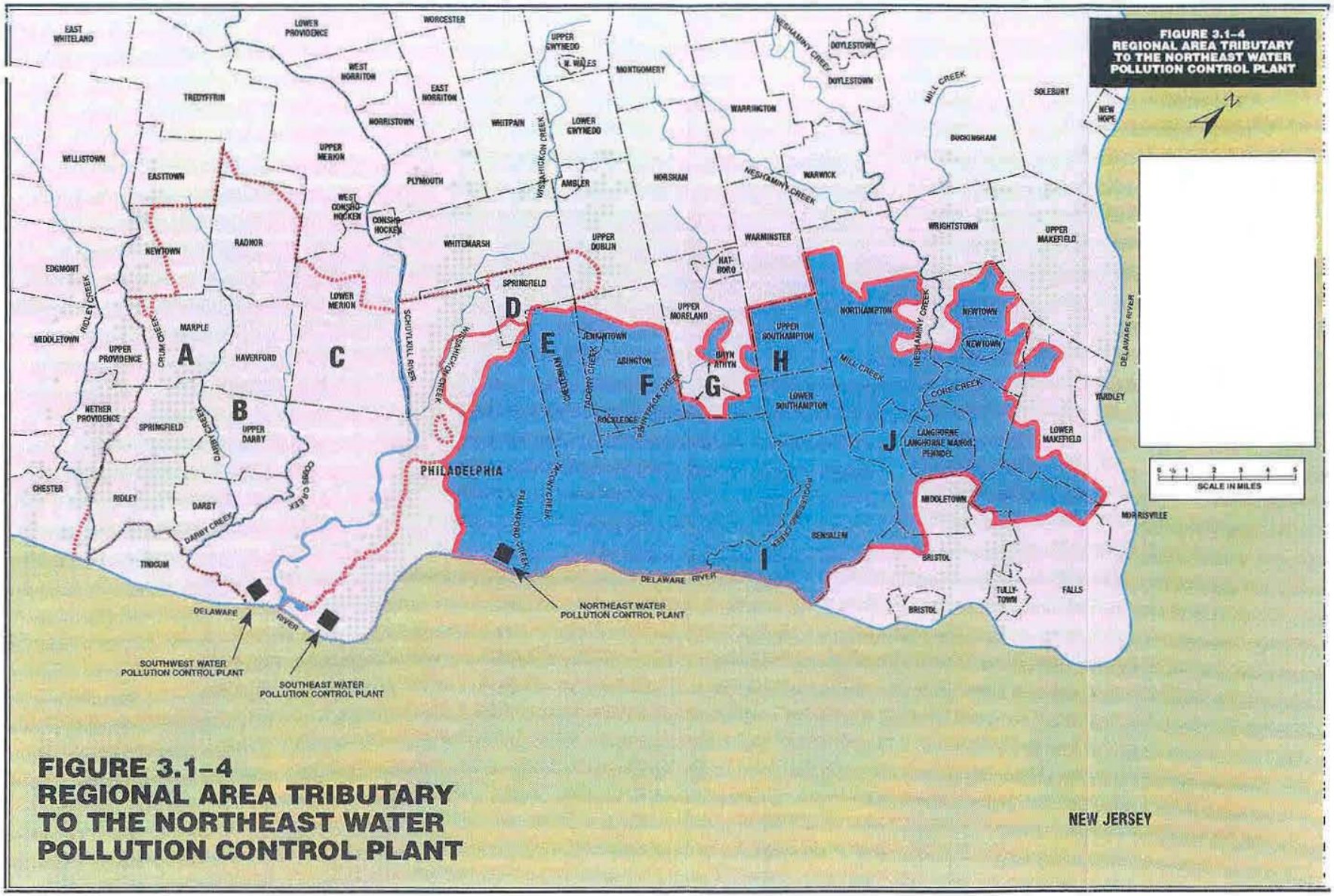

FIGURE 3.1-4
REGIONAL AREA TRIBUTARY TO THE NORTHEAST WATER POLLUTION CONTROL PLANT

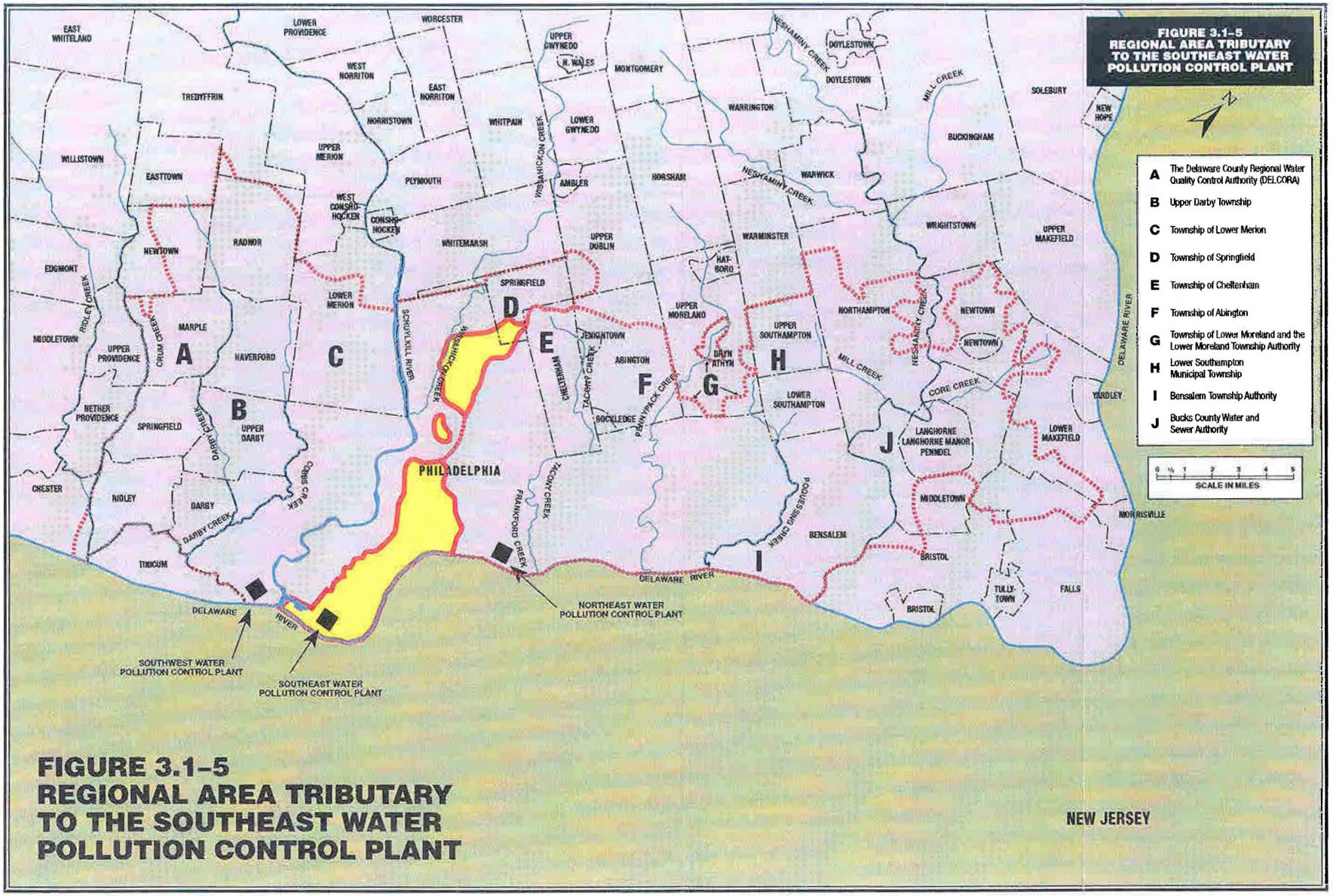

FIGURE 3.1-5
REGIONAL AREA TRIBUTARY
TO THE SOUTHEAST WATER
POLLUTION CONTROL PLANT

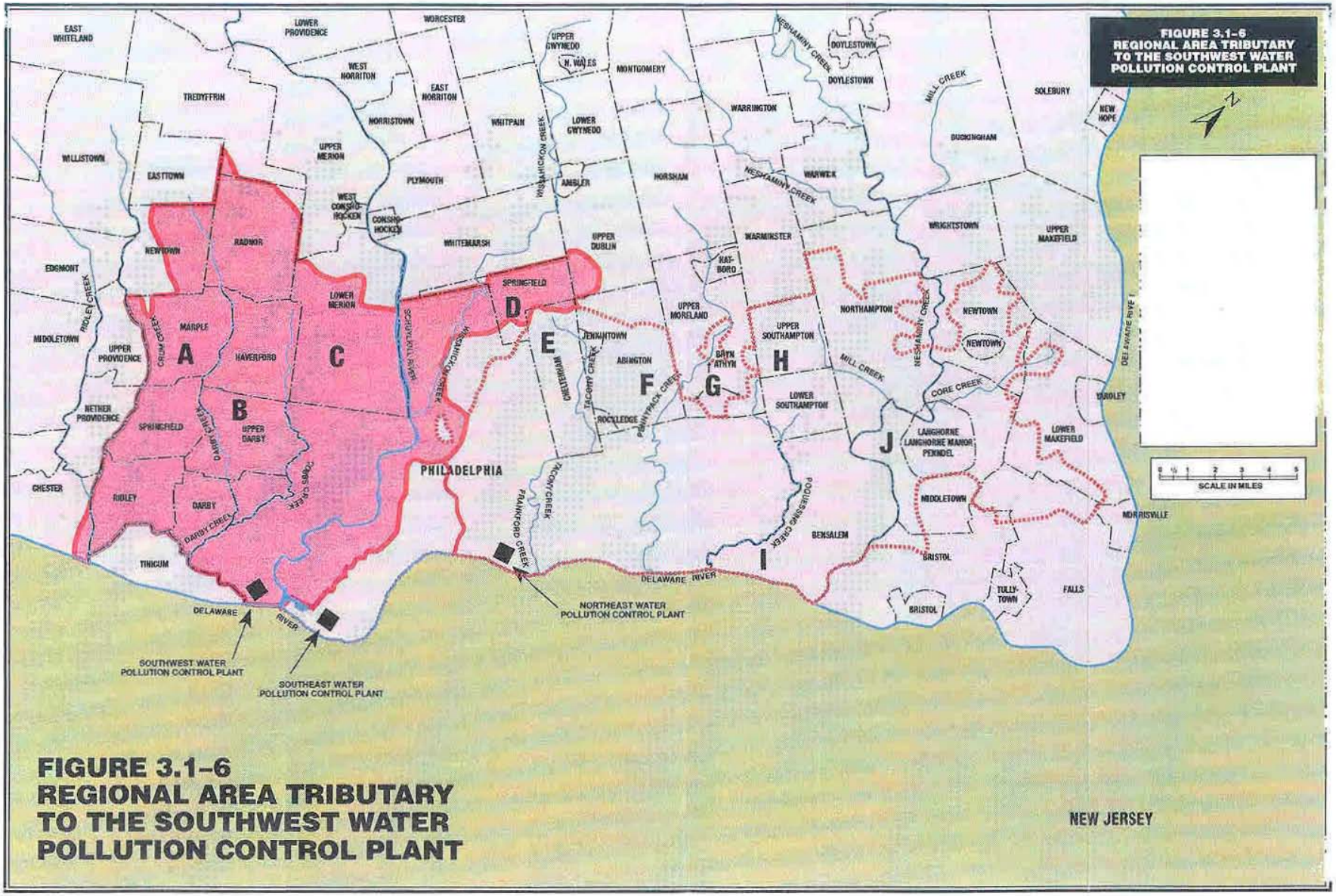

FIGURE 3.1-6
REGIONAL AREA TRIBUTARY
TO THE SOUTHWEST WATER
POLLUTION CONTROL PLANT

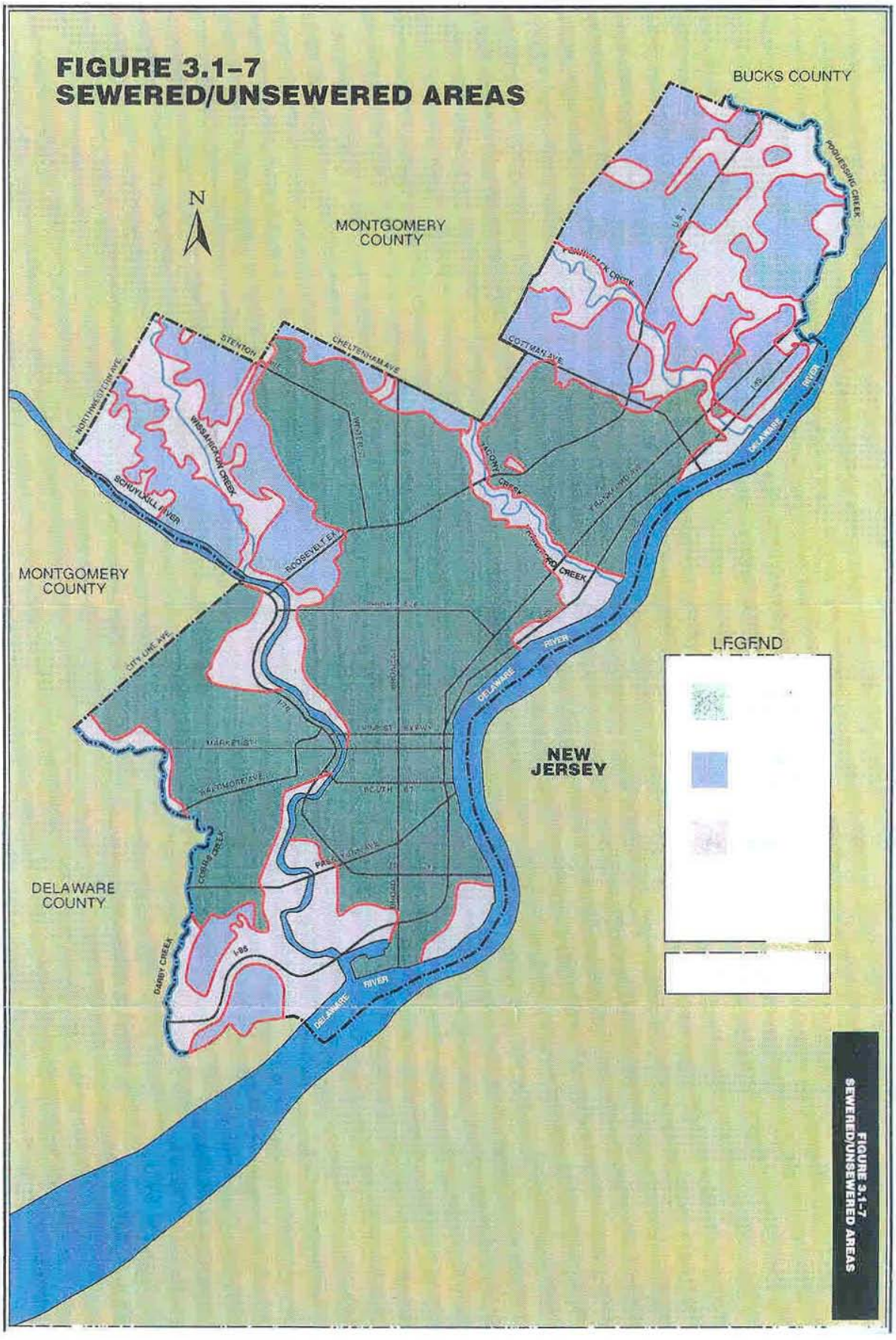
FIGURE 3.1-7
SEWERED/UNSEWERED AREAS
BUCKS COUNTY
N
MONTGOMERY COUNTY
MONTGOMERY COUNTY
DELAWARE COUNTY
NEW JERSEY
LEGEND
PENNYPACK CREEK
POQUESSING CREEK
STENTON AVE
CHELTENHAM AVE
COTTMAN AVE
NORTHWESTERN AVE
WISSAHICKON CREEK
SCHUYLKILL RIVER
ROOSEVELT EX
WYNDEL
ASHBY CREEK
ROBBINS RD
CREEK
DELAWARE RIVER
CITY LINE AVE
RHOADES
MARKET ST
WOODLAND AVE
BALTIMORE AVE
SOUTH ST
PASSYUNK AVE
CRUM CREEK
DARBY CREEK
I-95
FIGURE 3.1-7
SEWERED/UNSEWERED AREAS

Although the Delaware and Schuylkill Rivers are the main sources of the City's water supply, 0.08 percent (530) of the City's 675,000 dwelling owners have reported that they utilize groundwater as a potable water supply. Additionally, a number of industries withdraw groundwater for non-potable purposes. Furthermore, it should be noted that all treated wastewater is discharged to the Delaware.

3.1.5.1 Delaware River

The Delaware River is Pennsylvania's only major undammed river; it borders the City of Philadelphia on the east and south. Its sub-basin has the highest water usage in the state and is the receiving body for most of the point discharges in the region. Although the river currently provides high-quality fishing for bass, walleye, pike, muskie, migrating shad, striped bass, catfish, river sturgeon, blueback herring, carp and eels, in the 1940s, reported dissolved oxygen (DO) levels of zero virtually eliminated marine life.

The Delaware Estuary is delineated by tidal freshwater in the Philadelphia-Wilmington-Trenton-Camden metropolitan area. This reach of the Delaware River is 85 miles long from Trenton, New Jersey, to Liston Point, Delaware, and flows through the nation's fifth largest urban area. The region has one of the greatest concentrations of heavy industry in the world and is the second largest oil refining and petrochemical complex in the United States. Although manufacturing is declining in the area, it is still a major factor affecting water quality. The estuary's ports form the largest freshwater port in the world, the largest U.S. port in terms of international tonnage, and the second busiest port in the U.S. in total tonnage. The lower Delaware region has a population exceeding 5.7 million people, greater than 40 of the 50 states. Historically, the Delaware Estuary has been one of the most polluted waterways in the country, but it has experienced remarkable recovery in the last decade, making it one of the premier water pollution control success stories in the country. Because of the urban-industrial character of the area and the historical use of the waterway, toxics remain a concern.

The headwaters of the Delaware are located in the Catskill Mountains in Schoharie County, New York. It begins with the confluence of the East and West Branches near Hancock and flows 330 miles to the Atlantic Ocean. The Delaware River drainage basin is 13,000 square miles and spans Delaware, New Jersey, New York, and Pennsylvania. The river system is used as the water supply for almost 10 per cent of the U.S. population. Three dams in the Upper Delaware River Basin provide water for New York City. These reservoirs receive runoff from 917 square miles, about 40 percent of the drainage area of the basin in New York State, and have a combined usable capacity of 271 billion gallons. In 1931, the United States Supreme Court issued a decree in regard to the diversion of water from the Delaware Basin to New York City. This decree, amended in 1954, authorizes New York City to make diversions for its water supply, but requires that a minimum flow of 1,750 cfs must be maintained at Montague, New Jersey. The decree provided for a court-appointed Delaware River Master to control releases and monitor New York City's reservoir system. During severe drought conditions, it is impossible to divert the full 800 mgd for New York City's needs and still meet minimum flow requirements for the Lower Basin. A drought operation formula has been adopted for use during these periods.

The Delaware River Basin Commission (DRBC), an interstate-federal compact agency, is charged with regulating the quantity and quality of water in the basin. The objectives of the DRBC in regard to quantity are:

- To assure satisfactory minimum-sustained streamflows at key locations during critical drought periods
- To limit the intrusion of seawater in the tidal Delaware River Estuary
- To see that the stream system is replenished after critical drought periods

Water quality standards set by the DRBC protect a safe and satisfactory condition for :

- Agricultural, industrial, and public water supplies
- Wildlife, fish, and aquatic life
- Recreation
- Navigation
- Controlled and regulated waste assimilation

Effluent quality standards dictate limits for all dischargers. All wastewater must receive a minimum of secondary treatment and be disinfected before discharge to the Delaware River. Limits have been set for both wastewater treatment facilities and industrial dischargers in regard to suspended solids, oil and grease, dissolved oxygen, temperature, pH, phenols, odor, synthetic detergents, radioactivity, fecal coliform, total dissolved solids, turbidity, and BOD_5. In addition, guidelines have been adopted that limit the concentrations of oil, persistent pesticides, and other toxic substances including arsenic, barium, cadmium, chromium (hexavalent), lead, mercury, selenium, and silver.

3.1.5.2 Schuylkill River

Of all the rivers in southeastern Pennsylvania that are tributary to the Delaware River Estuary, the Schuylkill River is the largest and has the highest water reuse of all sub-basins in the state. The Schuylkill drainage basin is 80 miles long and 25 miles wide, with a drainage area of 1,909 square miles above the confluence with the Delaware River. The Schuylkill River has its headwaters in Schuylkill County. The river forms the boundary between the City of Philadelphia and Montgomery County from Northwestern Avenue to City Line Avenue and flows generally south through the City to the Delaware River Estuary.

The upper portion of the river has been severely degraded by acid mine drainage and serious organic and nutrient pollution. Historically, some of the tributaries in this area have been known to run black with coal fines. There has been an effort to control sediment loads in the river and its tributaries, and the water quality has improved significantly over the last 30 years.

Dischargers to the lower Schuylkill include wastewater treatment plants, oil refineries, chemical industries, manufacturing operations, and the Limerick Nuclear Power Plant. The lower portion of the river from Fairmount Dam to the Delaware is an estuary with a range of tidal fluctuations of about 5.5 feet. Although there is a great diversity of fish above Fairmount Dam, many problems have been experienced in that portion of the river within the Philadelphia city limits. Combined sewer overflows during heavy rainfall affect water quality between Fairmount Dam and Grays Ferry Bridge. In the past, dissolved oxygen levels have been at or above saturation levels. Many of the problems in this area are caused by heated and oxygen-consuming waste discharges.

3.1.5.3 Wissahickon Creek

Wissahickon Creek is a tributary of the Schuylkill River and has a drainage area of 63.8 square miles. Its source is in the northern portion of Montgomery County. The Wissahickon enters the City from the northwest and converges with the Schuylkill River at Fairmount Park. Dischargers to the Wissahickon include wastewater treatment plants and industrial dischargers such as manufacturing, chemical, and pharmaceutical companies.

3.1.5.4 Pennypack Creek

Pennypack Creek is a major tributary of the Delaware River Estuary. With headwaters in Montgomery County, it flows from the county line in the Northeast section of Philadelphia to the Delaware River. Sewage treatment plants and non-point contamination from the Pennsylvania Turnpike have an effect on water quality.

3.1.5.5 Poquessing Creek

Poquessing Creek is the northeastern boundary of the City. It originates in Lower Bucks County and flows east to the Delaware River. The overall water quality of Poquessing Creek has been satisfactory with high levels of dissolved oxygen in the summer months. Periodically, ammonia-nitrogen values exceed 0.5 mg/l and high suspended solid levels have been recorded during storm events.

3.1.5.6 Tacony Creek

Tacony or Frankford Creek originates in Montgomery County in the Jenkintown/Glenside area. It flows to the Delaware River through the northcentral region of the city. The water quality of Tacony Creek is comparable to the Poquessing Creek. Combined sewer overflows during heavy rains can contribute to periodic high levels of bacterial contamination.

3.1.5.7 Cobbs Creek

The headwaters of Cobbs Creek are in the Haverford section of Delaware County. It is a tributary of Darby Creek and forms the southwest boundary of the City. Cobbs Creek can also be adversely affected by combined sewer overflows during wet-weather events.

3.1.5.8 Mingo Creek

Mingo Creek lies in the southern tip of the City, west of the Schuylkill River. It is a relatively small stream that does not flow beyond the City limits, and much of it has been controlled in storm drain culverts and lined channels. The creek no longer follows its original course. It is a discharge point for some large industrial users.

3.1.5.9 Parks and Recreation

The main recreational uses of the surface waters within the City are fishing and boating. Although City regulations prohibit swimming in any of the rivers, creeks or streams without Fairmont Park Commission approval, there is some unapproved swimming at undesignated points. Pollution and safety considerations make this a dangerous activity. The waterfront areas of the Delaware have been targeted for commercial, residential and recreational development. This resurgence represents significant economic benefits from investments in water pollution control facilities. The Upper and Middle Delaware segments are part of the National Wild and Scenic Rivers System. Some portions of the Schuylkill have been selected for inclusion in the Pennsylvania Scenic River Inventory. The areas adjoining many of the rivers and streams in the City have been developed as parks and recreational sites with facilities for picnicking and other outdoor activities. For instance, Fairmount Park is the largest city park in the world. Both the Schuylkill River and Wissahickon Creek flow through this area. Cobbs Creek and Pennypack Creek have park land along their shores. The Tacony Creek flows through Juniata Park. The major Parks within Philadelphia are delineated on Figure 3.1-8. Neighborhood parks are not included.

3.1.6 Wetlands

Wetlands can be defined as areas of land that retain water long enough to promote the formation of hydric soils and support the growth of aquatic plant life. The consideration of wetlands is important due to their ability to retain water and their use as a habitat for unique species of wildlife that depend on them for food and reproduction. As one of the oldest metropolitan areas in the United States, Philadelphia is almost entirely developed, with the majority of the wetlands that once existed within the City having since been drained. However, as indicated on the National Wetlands Inventory maps, dated from March 1972 to August 1981, there remain a few scattered areas of wetlands throughout Philadelphia. These areas have been mapped and are indicated in Figure 3.1-9, Wetlands Location Map. This report limits its concern to areas of wetlands in the vicinity of high-density on-lot disposal systems, the water supply facilities, and the WPCPs.

There are three primary types of wetlands found within the City: palustrine, lacustrine, and riverine. These are classified according to geomorphology, hydrology, biology, and chemistry. Palustrine wetlands systems are nontidal freshwater wetlands systems that host a wide variety of emergent vegetation such as trees, shrubs, and moss. These wetlands retain storm water runoff from surrounding areas and periods of high groundwater. Unlike palustrine wetlands systems, lacustrine systems are often in the form of ponded basins. These ponded basins may be fed by storm water, runoff, or groundwater, where the emergent wetlands vegetation grows along the

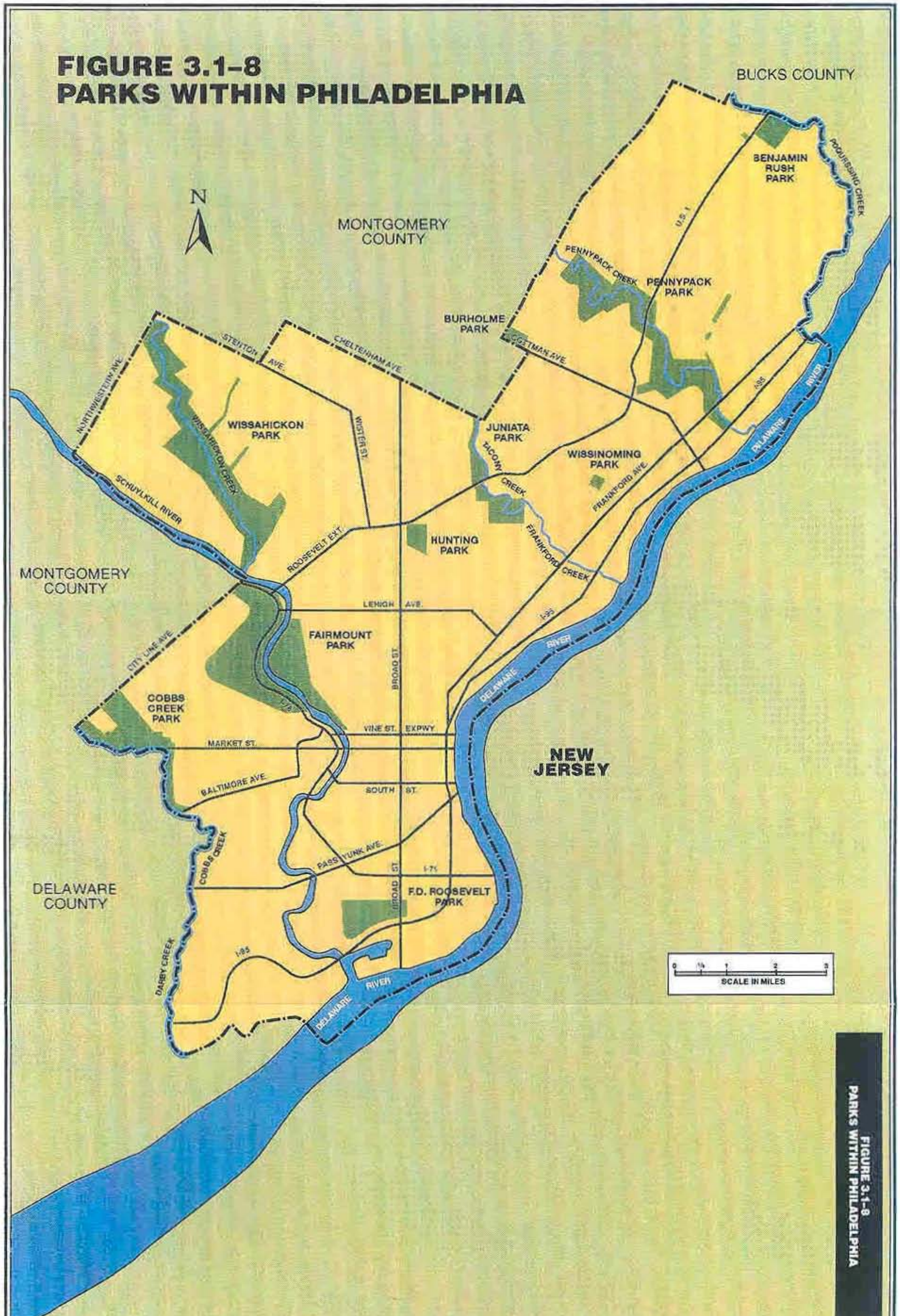
BUCKS COUNTY
MONTGOMERY COUNTY
MONTGOMERY COUNTY
DELAWARE COUNTY
NEW JERSEY
N
BENJAMIN RUSH PARK
POQUESSING CREEK
U.S. 1
PENNYPACK CREEK
PENNYPACK PARK
BURHOLME PARK
COTTMAN AVE.
I-95
DELAWARE RIVER
STENTON AVE.
CHELTENHAM AVE.
NORTHWESTERN AVE.
WISSAHICKON CREEK
WISSAHICKON PARK
WISTER ST.
JUNIATA PARK
TACONY CREEK
WISSINOMING PARK
FRANKFORD AVE.
SCHUYLKILL RIVER
ROOSEVELT EXT.
HUNTING PARK
FRANKFORD CREEK
LEHIGH AVE.
FAIRMOUNT PARK
BROAD ST.
CITY LINE AVE.
COBBS CREEK PARK
I-76
VINE ST. EXPWY
MARKET ST.
BALTIMORE AVE.
SOUTH ST.
COBBS CREEK
PASSYUNK AVE.
I-76
F.D. ROOSEVELT PARK
DARBY CREEK
I-95
DELAWARE RIVER
SCALE IN MILES
0 1/2 1 2 3

FIGURE 3.1-8
PARKS WITHIN PHILADELPHIA

FIGURE 3.1-8
PARKS WITHIN PHILADELPHIA

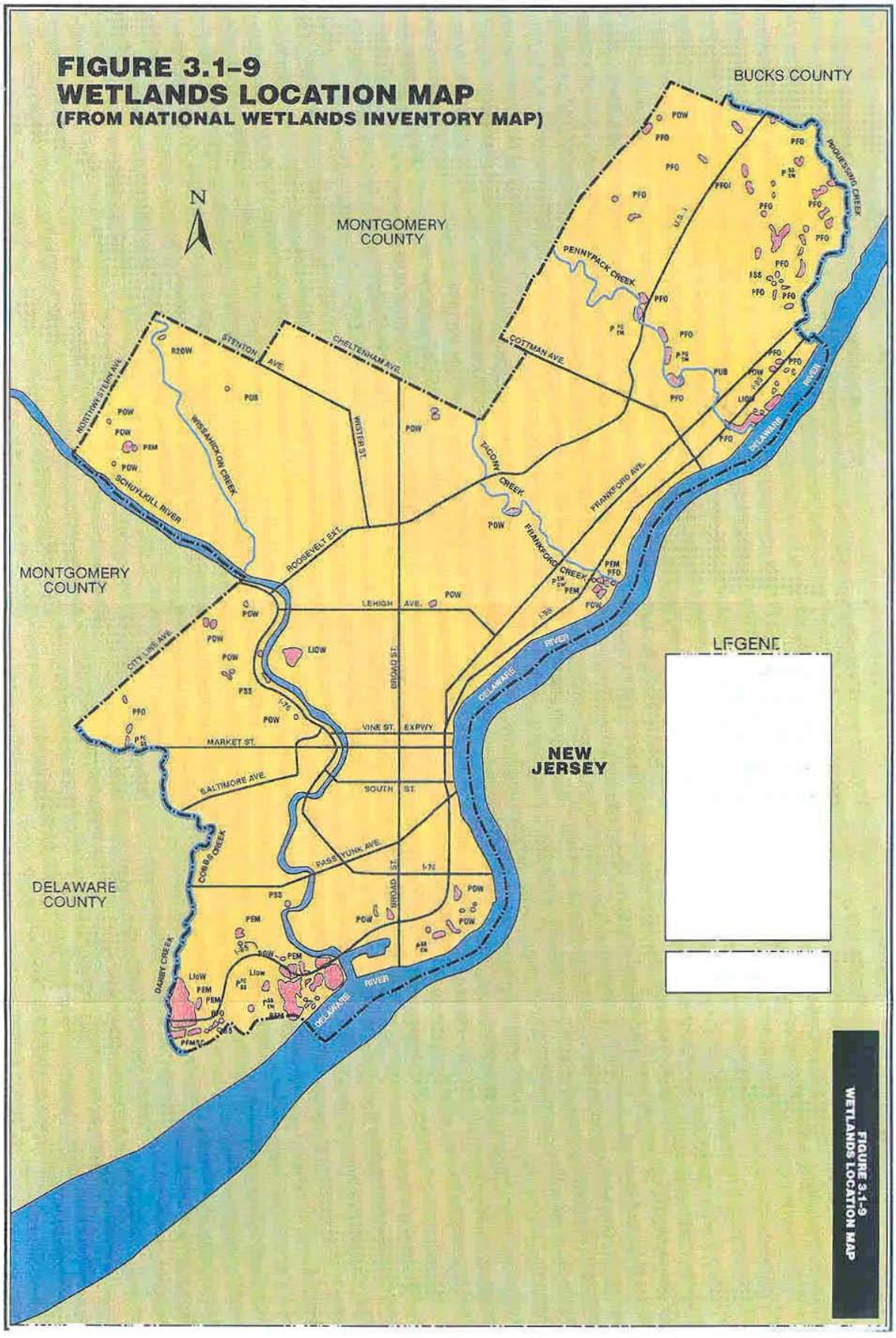
FIGURE 3.1-9
WETLANDS LOCATION MAP
(FROM NATIONAL WETLANDS INVENTORY MAP)
BUCKS COUNTY
MONTGOMERY COUNTY
MONTGOMERY COUNTY
DELAWARE COUNTY
NEW JERSEY
N
PENNYPACK CREEK
PENNYPACK CREEK
COTTMAN AVE.
CHELTENHAM AVE.
STENTON AVE.
WISSAHICKON CREEK
WISTER ST.
ROOSEVELT EXT.
SCHUYLKILL RIVER
TACONY CREEK
FRANKFORD AVE.
FRANKFORD CREEK
DELAWARE RIVER
LEHIGH AVE.
CITY LINE AVE.
BROAD ST.
VINE ST. EXPWY
MARKET ST.
BALTIMORE AVE.
SOUTH ST.
PASSYUNK AVE.
COBBS CREEK
DARBY CREEK
I-76
I-95
LEGEND
FIGURE 3.1-9
WETLANDS LOCATION MAP

edges of these bodies of water. Usually there is a free exchange of water between lacustrine systems and the surrounding groundwater. Riverine wetlands systems occur along streams and rivers and are fed by runoff and groundwater sources. Riverine systems usually have adjacent wetlands of other types into which freshwater seepage occurs.

Due to Philadelphia's urban environment, there are not many large wetlands areas, but there are several significant areas that must be taken into consideration due to their proximity to the WPCPs and areas with on-lot sewage disposal systems.

There are apparent wetlands areas in the vicinity of Philadelphia's WPCPs, as identified in the National Wetland Inventory maps, that will have to be considered during planning efforts including modifications of the existing plants. These wetlands may have a potential impact on any plans for expansion or modifications of the WPCPs. The wetlands that are in the vicinity of the WPCPs are described in Table 3.1.3. It is also important to note, however, that field delineations will be necessary to verify the presence and exact location of wetlands prior to final design.

While contemplating sewer extensions into areas of high density on-lot disposal systems, wetlands will be germane to a variety of planning considerations due to the potential impact on construction methods and costs, or the location of certain wetlands that may influence sewer layout and/or feasibility.

The remainder of the wetlands in Philadelphia are located primarily in Pennypack Park, Fairmount Park, and adjacent to Wissahickon Creek. These wetlands are principally riverine and palustrine systems. There are also a few scattered palustrine wetlands systems to the southeast of the Northeast Philadelphia Airport that will probably not have an impact on wastewater-related projects.

3.1.7 Water Supply System

The Delaware and Schuylkill Rivers are the primary source of raw water for the City of Philadelphia. Heavy industrial and port facilities and a densely populated urban area result in high water usage. The Philadelphia Water Department treats and supplies approximately 342 mgd of water to the City of Philadelphia and sells an additional 16 mgd to the Bucks County Water and Sewer Authority, located northeast of the City.

3.1.7.1 Water Treatment Plants

PWD maintains three water treatment plants to meet the needs of the City. Treatment is generally the same in all three facilities and the process usually consists of sedimentation, pre-chlorination, chemical treatment, flocculation, sedimentation, filtration, and post-chemical treatment. All three plants have reservoirs to accommodate an approximate 1-day storage capacity.

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TABLE 3.1.3
SIGNIFICANT WETLAND AREAS AS SHOWN ON THE NATIONAL WETLANDS INVENTORY MAP
FIGURE 3.1.5

Location	Size	Type	Significance	Remarks
Adjacent to Northeast Sewage Treatment Works	94 Acres	Palustrine	Former sludge dewatering lagoon	Open water
Adjacent to Northeast Sewage Treatment Works	3.4 Acres	Palustrine	Close to water pollutino control plant	Forested
Adjacent too Southwest Sewage Disposal Works	559.8	Lacustrine/ Plaustrine	Former sludge dewatering lagoon	Open water
Adjacent to Southeast Sewage Disposal Plant	9.6 Acres	Palustrine	Former sludge dewatering lagoon	Open water
In vicinity of Byberry Rd. at Philadelphia County border	8.6 Acres	Palustrine	Adjacent to on-lot disposal area "A"	Broad-leaved deciduous trees
In vicinity if Byberry Rd. at Philadelphia County border	0.9 Acres	Palustrine	Within on-lot disposal area "A"	
In vicinity of the intersection of Norwalk Rd., Morefield Rd., and Krewstown Rd.	9.2 Acres	Palustrine	Adjacent to on-lot disposal area "B"	Broad-leaved deciduous trees
Upper Roxborough Reservoir	23 Acres	Facilitates palustrine	Adjacent on on-lot disposal area "D"	

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The Belmont Water Treatment Plant is located on Belmont Avenue, south of City Line Avenue. The water is pumped from the Schuylkill River and serves that portion of the City west of the river. This plant treats an average of 60 mgd.

The Queen Lane Water Treatment Plant is located on West Queen Lane, in the East Falls section of the City. This plant also pumps water from the Schuylkill River and treats an average of 100 mgd. It serves the northwest portion of the City and a large section of North Philadelphia east of the Schuylkill River and north of Callowhill Street. The Queen Lane Plant is totally automated.

The Samuel Baxter Water Treatment Plant is on State Road in the Torresdale section of the City and serves the eastern half of the City, bounded on the west and north by the Schuylkill River, Roberts Avenue, and Tabor Road, and to the east by the City limits. Areas served jointly by the Baxter and Queen Lane Treatment Plants include Hartwell Lane in Chestnut Hill, East Mt. Airy, and West Oak Lane. The source of supply is the Delaware River. This plant treats an average of 200 mgd. The Baxter Plant maintains a taste and odor control lab for all three plants.

3.1.7.2 Water Quality and Quantity

The three water treatment plants have a combined rated capacity of 543 mgd and a total peak capacity of 681 mgd. COWAMP projections indicate that this supply will be sufficient to meet the needs of the City through the year 2020. Philadelphia water meets or exceeds all physical, chemical, radiological, and bacteriological water quality standards established by EPA under the Safe Drinking Water Act. Three laboratories monitor water quality to ensure compliance with all limits. A City ordinance requires fluoridation of the finished water supply.

In addition, the PWD's Planning and Research Unit is involved in a corrosion control study to determine a uniform strategy to reduce corrosion in the City's distribution system. The effectiveness of the chemical inhibitors used by the PWD to minimize corrosion will be evaluated on the basis of infrastructure protection, lead dissolution, water quality, and costs. A future study will examine alternatives for reducing the corrosion rates by using a variety of chemical inhibitors and other schemes.

The PWD has reduced the level of trihalomethanes (THMs) in the finished product by changing the chlorination points in all three water treatment plants. THM levels in water treated by PWD have consistently been below the EPA Maximum Contaminant Level.

3.1.7.3 Operations and Maintenance

The PWD maintains the water treatment plants, pumping stations, and related systems in 89 separate facilities. There are 3,300 miles of water mains, ranging in diameter from 3 inches to 93 inches, with an average age in excess of 70 years. The oldest mains are circa 1820. The distribution system also includes 500,000 service connections, an estimated 3,000 to 4,000 miles of service lines, 83,600 valves, 27,800 pressure fire hydrants, and 15 pumping stations in a 130 square mile service area. The PWD has a preventive maintenance program that includes routine dismantling, cleaning, repairing, and inspection of pumps within the system. A large-valve

inspection and overhaul program was implemented in 1988. The PWD Load Control oversees the maintenance and renewal of large-diameter water mains, pumps, storage basins, reservoirs, tanks, and treatment plant facilities when their capacity is impacted.

In an effort to reduce customer under-registration, a 10-year program to replace 400,000 5/8-inch mechanical meters is in progress. Old meters are being replaced with magnetic meters that are more accurate, easier to read, less costly to repair, and hermetically sealed.

Safety in the water treatment plants is a concern of PWD. In addition to "Right to Know" training, other chemical safety training is available. All new employees are issued safety manuals. Alarm systems, inspections, and periodic meetings are additional efforts employed to maintain safety in the treatment facilities.

Employees are encouraged to improve their technical skills through seminars and training films on various topics offered in-house, and they have the opportunity to attend other types of training programs offered by private corporations.

3.1.7.4 Conservation Efforts

Philadelphia has revised its Plumbing Code to require DRBC mandated conservation plumbing fixtures, including the 1.6 gallon water closet.

In an effort to reduce the water in the system that is not accounted for, PWD has pursued a systemwide leakage detection and repair program for decades. The percentage of unaccounted for water has varied between 31 percent and 39 percent over the last 15 years. The Leak Detection Program conserves water and reduces operating costs. In addition, it is cost-effective in minimizing property damage suits, poor public relations, emergency repairs, expansion of treatment facilities, and water pressure problems. In 1983, the program was accelerated as the water industry realized the efficacy of such a program. PWD maintains a unit that specializes in leak detection and flow measurement and is responsible for leakage abatement. Using electronic listening devises to pinpoint the source of leaks in the distribution system, this unit has been able to significantly reduce leakage and effect measurable cost savings.

A Capital Improvement Program provides funds for infrastructure replacement and rehabilitation. The rate of capital expenditures has increased significantly over the past 15 years to address a growth rate of 1.8 percent in main breaks per 1,000 miles. The prioritized list of projects is incorporated into a 6-year capital program that is revised on a yearly basis to include the latest information.

Hydrant abuse programs are another means to conserve water. To combat the problem of illegal openings, the PWD has installed locking devices on many fire hydrants. In addition, the Public Affairs Division operates an aggressive hydrant abuse education campaign each summer. This multimedia campaign targets both children and adults. It is anticipated that over a period of years, this program will result in reductions of pumped water, peak demands, low-pressure episodes, and the costs of treatment and pumping.

3.1.7.5 Other Sources of Water Supply

Within the City, some residents utilize wells as their source of supply or obtain water from neighboring municipalities. Moreover, there are users within the City who are not hooked up to either the public water or sewer systems. Presently, there are approximately 530 wells within the City limits. Wells are not confined to any particular section of the City, but scattered throughout the entire area. Table 3.1.4 is a summary of well distribution as identified by PWD's "Sewer Only" accounts. Approximately one-third of these accounts are non-residential.

3.1.7.6 Types of Water Usage

The City of Philadelphia is 99 percent metered. Meter size is the basis for billing rates in most cases. The Water Revenue Bureau of the Department of Revenue identifies several categories of water usage: residential, commercial, large industrial, charitable, public, and senior citizens. Charitable users are institutional in nature and include hospitals and universities. State, County, and City properties are grouped under the public category. Senior citizens in the City receive a 25 percent discount on their water bills, and their accounts are coded to designate that status.

3.1.7.7 Potable Water Storage

PWD has the option to respond to extreme drought conditions by drawing its supply from both the Delaware and the Schuylkill River systems, which is a significant advantage held in reserve, should this condition ever occur. Each of the three water treatment plants has an approximate one-day storage capacity without pumping from the rivers. Finished water pumping and storage capacity provide a short-term reserve margin. The current total storage capacity is 932 mg, of which 503 mg is filtered water storage. The treated water storage capacity to be realized upon completion of East Park Reservoir Basin rehabilitation is 814 mgd.

In 1984, a good-faith agreement was executed among the states dependent on the Delaware River that defines new patterns for dividing of the Basin's resources during drought periods. The agreement has a provision calling for expansion and improvement of impoundment storage capacities to provide larger reserves against protracted droughts. The City is studying methods to increase storage capacity, including expansion of the Francis E. Walter Reservoir on the Lehigh River Basin of the Delaware River for flow augmentation; however, the cost of implementing a storage expansion program is an important factor to be considered.

3.2 CONTRIBUTING MUNICIPALITIES/AUTHORITIES

The size and scope of Philadelphia's wastewater system is a result of the regional approach to water quality management that was prevalent from the 1940s through the 1960s. At that time it was felt that the most efficient method of providing wastewater treatment was through large, centrally located treatment facilities with extensive and complex collection systems and service areas. In the past 20 years, conventional wastewater planning has deviated from this philosophy, recognizing that smaller, localized treatment facilities and on-lot disposal systems, where

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TABLE 3.1.4

WELL DISTRIBUTION

	Area	No. of Wells
A	Center City	19
B	South Philadelphia	58
C	Southwest Philadelphia	13
D	West Philadelphia	77
E	Lower North Philadelphia	35
F	Upper North Philadelphia	54
G	Bridesburg/Kensington/Richmond	44
H	Roxborough/Manayunk	13
I	Germantown/Chestnut Hill	21
J	Olney-Oak Lane	39
K	Near Northeast	17
L	Far Northeast	62
	Total	**452**

*Total identified in "Sewer Only" accounts

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appropriate, provide adequate treatment and afford groundwater and small stream recharge, which is generally not true of the larger regional facilities. The three Design Reports on the WPCPs within Philadelphia, dating from March 1972 to October 1973, reflect the planning convention of the time; Philadelphia has agreements with 10 outlying municipalities/authorities to accept, convey, treat, and dispose of their wastewater. Although the regional concept has not expanded as projected in the Design Reports, the relationship between Philadelphia and these ten municipalities/authorities continues with benefit to all.

When evaluating Philadelphia's wastewater system, it is essential to understand the intermunicipal relationship that Philadelphia has and the wastewater flows it accepts from 10 of its neighboring municipalities/authorities. Philadelphia has had a long-standing relationship with these municipalities/authorities that will continue to have a direct impact on the City's wastewater facilities. The municipalities/authorities listed below are considered in this report regarding service areas, intermunicipal agreements, wastewater flows, and fees:

- Township of Abington
- Bensalem Township Authority
- Bucks County Water and Sewer Authority
- Township of Cheltenham
- The Delaware County Regional Water Quality Control Authority (DELCORA)
- Township of Lower Merion
- Township of Lower Moreland and the Lower Moreland Township Authority
- Lower Southampton Municipal Authority
- Township of Springfield, Montgomery County
- Upper Darby Township

The terms of these relationships are detailed in contractural agreements executed between the City and each municipality and authority. The information presented in the following sections outlines the terms agreed to within these agreements. The agreements themselves are available at the PWD for further service.

3.2.1 Service Areas

The areas of each of the above-mentioned, outlying municipalities, serviced by the PWD have been delineated on Figure 3.2-1, Contributing Outlying Municipalities/Authorities. The areas of each of these municipalities/authorities and their contributions to the service areas of each of the three water pollution control plants are presented in Table 3.2.1.

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TABLE 3.2.1

AREAS CONTRIBUTED TO PHILADELPHIA WASTEWATER SYSTEM BY OUTLYING MUNICIPALITIES/AUTHORITIES

Tributary Area	Northeast (acres)	Southeast (acres)	Southwest (acres)
Philadelphia	42,500	13,200	27,200
Suburban			
Abington	4,500	-----	-----
Bensalem	4,400	-----	-----
Bucks County	45,000	-----	-----
Cheltenham	8,300	-----	-----
Lower Moreland	900	-----	-----
Lower Southampton	7,700	-----	-----
Springfield	-----	300	4,500
DELCORA	-----	-----	52,200
Lower Merion	-----	-----	12,100
Upper Darby	-----	-----	7,800
Total Suburban	70,800	300	76,600
Total	113,300	13,500	103,800
Total Area Served	230,600		

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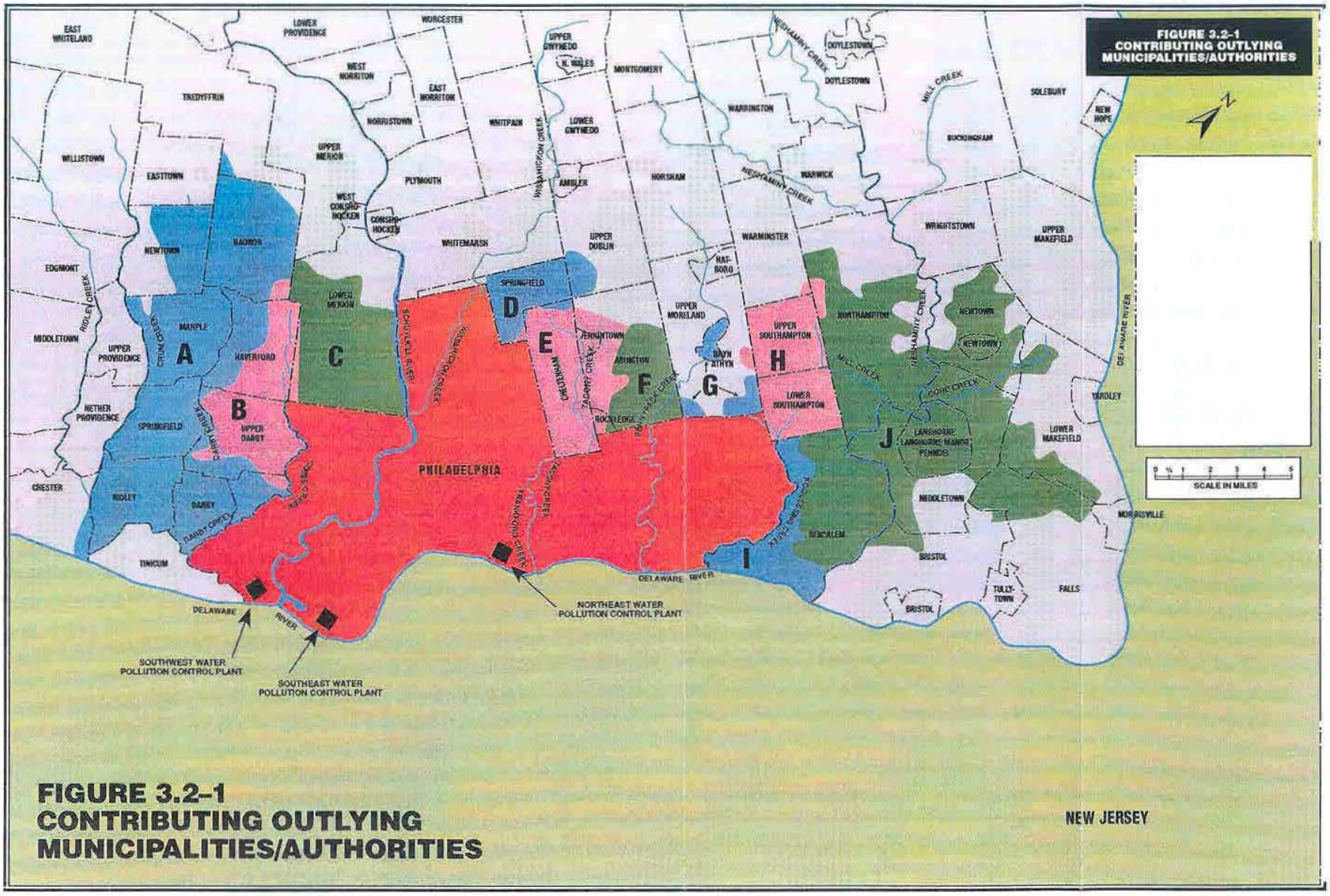

FIGURE 3.2–1
CONTRIBUTING OUTLYING
MUNICIPALITIES/AUTHORITIES

NEW JERSEY

The Philadelphia system, as defined by the intermunicipal agreements, is presented below to fully describe the service areas of each of the three water pollution control plants. Because drainage areas do not necessarily correspond to political boundaries, there is some overlap of municipalities in each agreement and authorities may involve more than one municipality. Furthermore, sections of some municipalities will be covered by an agreement of another municipality/authority even though that municipality may have an agreement of its own.

Township of Abington - The drainage area to the Northeast WPCP is the area of the watershed of Pennypack Creek in the Township of Abington, the Borough of Rockledge and, a portion of the Tacony Creek watershed in the Borough of Rockledge, and the Abington portion of the Tacony Creek watershed adjoining Rockledge.

Bensalem Township Authority - The drainage area includes the area of Bensalem Township, which is within the Poquessing Creek watershed.

Bucks County Water and Sewer Authority - The agreement between Philadelphia and the Bucks County Water and Sewer Authority covers those areas within the Authority that are serviced by the Neshaminy Interceptor system and the Totem Road Pumping Station within the Neshaminy Creek watershed. This area includes all or parts of the following municipalities:

Bensalem Township
Bristol Township
Falls Township
Hulmeville Borough
Langhorne Borough
Langhorne Manor Borough
Lower Makefield Township
Lower Southampton Township
Middletown Township
Newtown Borough
Newtown Township
Northampton Township
Penndel Borough

Township of Cheltenham - The drainage area includes those areas that are in the Tacony Creek watershed in the Township of Cheltenham, Township of Abington, Borough of Jenkintown, and a certain portion of the City of Philadelphia whose wastewater flows through the sewers of Cheltenham, thence into the City's sewers.

The Delaware County Regional Water Quality Control Authority (DELCORA) - This agreement covers an extensive area under the unified responsibility of DELCORA, including those areas in the Darby, Crum, Ridley, and Chester Creek watersheds. This area once coincided with the service area boundaries of the Muckinipates, Central Delaware County, Darby Creek Joint, and Radnor-Haverford-Marple Authorities. The municipalities included in this agreement in whole or in part include the following:

Borough of Norwood
Borough of Glenolden
Borough of Swarthmore
Haverford
Radnor
Newtown

Borough of Morton
Borough of Rutledge
Borough of Prospect Park
Borough of Ridley Park
Township of Darby
Township of Upper Darby
Township of Ridley
Township of Springfield
Township of Marple
Township of Nether Providence
Upper Providence
Tinicum
Borough of Eddytone
Borough of Norwood
Borough of Folcroft

Township of Lower Merion - This agreement includes all of the Township and parts of Radnor, Haverford, and Narberth that are within the drainage basin of the Schuylkill River.

Township of Lower Moreland and the Lower Moreland Township Authority - The areas serviced by this agreement are specified on Figure 3.2-1, they and include some areas in Lower Moreland within both the Pennypack and Poquessing Creeks watersheds.

Lower Southampton Municipal Authority - Those areas of Lower Southampton that are within the Poquessing Creek watershed are covered under this agreement.

Township Springfield, Montgomery County - Areas of Springfield, Cheltenham Township, Upper Dublin Township, and Whitemarsh Township that are within the Wissahickon Creek watershed are covered by this agreement.

Upper Darby Township - Those portions of Upper Darby that are not included in the DELCORA agreement are covered by this agreement.

3.2.2 Contractual Agreements

As is standard practice and required by the Philadelphia Home Rule Charter, Philadelphia has entered into legal agreements with the organizations from which it accepts wastewater for treatment and disposal. These agreements establish the term of the relationship, connection points between Philadelphia's collection system and that of the municipality/authority, limits to the amount of flow and loadings, financial reimbursement, and other requirements that must be undertaken by the municipality/authority for the PWD's facilities to remain eligible for state and federal funding. Philadelphia made a concerted effort in the late 1980s to reestablish its relationships with the outlying municipalities/authorities by drafting new agreements with most of these neighbors to ensure that the most recent state and federal concerns were being addressed by each of the organizations involved. A summary of the current status of the intermunicipal agreements is shown on Table 3.2.2.

Except for the agreements with Springfield Township, Philadelphia has set up two basic types of agreements to contract wastewater transport, treatment, and disposal services with the outlying municipalities/authorities. They differ primarily in the length of the term and the type of commitment to long-term capital improvements, with which each outlying municipality/authority wishes to be involved. It is advantageous to the City to enter into longer term agreements for long-term needs and allocation of resources; therefore, these agreements are encouraged. However, some municipalities feel more comfortable with shorter term agreements that can be more easily adapted to evolving needs and treatment requirements. The issue of making the appropriate contribution to capital improvements and the resultant repayment of bond obligations is handled separately for these two types of agreements. The long-term agreement usually includes a capital contribution paid up front, based on the proportion of the contracted capacities and present value of the facilities. With the capital contribution, the fees paid by the outlying municipality/authority for conveyance, treatment, disposal, and maintenance do not include a contribution to the repayment of bond obligations. This agreement also includes a commitment by the outlying municipality/authority to contribute to improvements and expansions as required by state and federal statutes. The standard length of term for a long-term agreement is 35 years with a 5-year notification of intent to dissolve the relationship. While not including an up-front capital contribution, the short-term agreements include a charge for the current bond repayment obligation. These shorter agreements are generally for 7 years with a 6-month notification of intent to dissolve the agreement.

All agreements, long-term and short-term, begin with the recognition that the outlying municipality/authority has a need to dispose of its wastewater and that the PWD has the capacity and desire to fulfill this need. Furthermore, the City commits to setting aside the required capacity and the outlying municipality/authority commits to paying for the treatment and PWD's future ability to maintain such capability. There are other common conditions in the agreements that will become evident upon review of the agreement summaries; however, one stands out and deserves mention. Each agreement (save those for DELCORA and Springfield) includes a recognition of and commitment to the problem of biosolids management. With the increasing pressure to find programs and alternatives for safe biosolids management, the City made it a significant condition of the agreements to seek a cooperative effort on the part of all of the wastewater system users.

The agreement between the City and the Township of Abington is a typical short-term agreement, and similarly, the agreement with the Bensalem Township Authority is a typical long-term agreement. These two agreements will be presented in some detail as examples and have been included in Appendix B. The other agreements that follow will be described according to the ways in which they concur or deviate from these two typical agreements. Springfield is dealt with on its own merits since it is not in the format of either of these typical agreements.

Township of Abington - This agreement was executed in May 1983, and it is a standard short-term (7-year) agreement. It includes the following pertinent terms:

- The City and the Township agree to apply jointly for available grants or loans pursuant to improvements to the PWD wastewater collection, treatment, and disposal facilities. To this end, the Township is committed to adhering to several measures necessary to be eligible for such funding, such as: perform a Sewer System Evaluation Study of the Township's collection system, initiate a User Charges System consistent with EPA guidelines, initiate an Industrial Pretreatment Program at least as stringent as Philadelphia's, and adhere to the terms of the Federal Facilities Cost Recovery Program.

- The Township agrees to pay quarterly fees to the City based on measured and/or estimated flows including charges related to depreciation and return on existing facilities; operations and maintenance; replacement, repairs, and removal facilities; employee benefits; overhead; and non-direct expenses.

- The ownership and responsibility for the City's and Township's collection and treatment facilities remains within the authority of the current owners. Basically, each municipality is responsible for those facilities within its borders; however, the City reserves the right of inspection and sampling of facilities within the Township.

- The agreement establishes the allowable quantities of flow and loadings that may be discharged into the PWD system and the locations where this discharge may occur. Furthermore, the Township is required to install metering chambers for the measurement of flow being discharged, and assures the rights of the City to monitor and sample such flow.

- The Township is restricted from discharging harmful substances into the Philadelphia system, and is liable for any damages caused by any caustic substances that are discharged into the system.

- The Township is committed to Philadelphia's biosolids management program.

- Finally, the agreement sets procedures for inspections and audits; arbitration of disputes; claims, insurance, and related matters; term; no joint ownership; severability; successors; and assigns and waivers.

- An addendum to the agreement cites specific issues such as flow and payment amounts and is discussed further in Section 3.2.3, Wastewater Flows, Loadings, and Fees. It also details conditions for the flows from some homes in Philadelphia that drain to sewers in the Township and thence into the City's sewers.

Bensalem Township Authority - The agreement between the Bensalem Township Authority and Philadelphia is a typical long-term (35-year) agreement that was executed in May 1988. The pertinent details of this agreement are set forth as an example of a long-term agreement.

- The City agrees to set aside the amount of capacity required by the Authority in return for a capital contribution for those PWD collection and treatment facilities installed prior to July 1, 1986, and a second payment for those facilities installed between July 1, 1986, and March 31, 1988. Furthermore, the Authority agrees to pay its proportionate share of future improvements, renewals, replacements, and new facilities as needed, except for new facilities that would be intended solely for the increase of marketable capacity of the plant.

- The agreement includes provisions for the Authority to pay additional fees if it exceeds the flow and loading quantities set forth in the agreement. Furthermore, the Authority must make improvements to its own system if it routinely fails to meet its flow and loadings limits.

- The Authority agrees to pay wastewater treatment charges on a quarterly basis including operations and maintenance, management fees, and direct and indirect expenses.

- Requirements for meters, flow estimations, and sampling necessary to calculate the above charges are also set forth.

- The Authority also agrees to enter into an Interjurisdictional Pretreatment Agreement and co-develop a biosolids utilization program for Bensalem.

- Finally, as set forth in the short-term agreement previously described, the agreement sets terms for the following issues, including inspections and audits; arbitration of disputes; claims, insurance, and related matters; no transfer of rights; term (35 years with a 5-year notice to dissolve the relationship); ownership, management, and control of the plant facilities; severability; successors; and assigns, waivers, and notices.

Bucks County Water and Sewer Authority - In the same vein as the Bensalem Agreement detailed above, the Bucks County Water and Sewer Authority has entered into a long-term agreement with Philadelphia. This agreement was executed in February 1988, and those items that deviate from the Bensalem agreement are presented below:

- The Authority is to pay the City a capital contribution for those wastewater collection and treatment facilities installed up to July 1, 1986, and an additional capital contribution is to be paid for those facilities installed between July 1, 1986, and December 31, 1987.

- The Authority agreed to build, with its own funds, a new pumping station (Totem Road Pumping Station) and force main (State Road Force Main) to facilitate the flow of wastewater from the Neshaminy watershed to the PWD collection system (see Section 4.2.1 Description of Collection System for

further details on the State Road Force Main). The Authority is to own, maintain, and operate the new facilities within Bucks County and the new force main in the City. The City owns and maintains the telemetering devices (modem and data logger) for the system within Bucks County.

- In addition to the establishment of a biosolids utilization program, as previously described, the Authority is to support the community education program concerning the disposal of biosolids and to seek out individuals and groups that would benefit from such an educational program.

- Otherwise, this agreement contains basically the same conditions detailed in the Bensalem Agreement.

Township of Cheltenham - The agreement between the City and Cheltenham, executed in 1987, parallels the short-term agreement with Abington with the following exceptions:

- Philadelphia recognizes that Cheltenham has separate wastewater agreements with Abington and Jenkintown and the intent of this agreement is not to affect these separate agreements.

- Cheltenham recognizes the importance of an effective biosolids management program, and it is committed to full cooperation with the City's biosolids management programs; however, the agreement contains the caveat stating that Cheltenham will not be forced at any time to accept more than its proportionate share of biosolids from the City for management.

The Delaware County Regional Water Quality Control Authority (DELCORA) - The DELCORA agreement is a typical long-term agreement and has a format similar to that described under the Bensalem agreement. This agreement was executed in March 1974 and varies from the Bensalem agreement in the following ways:

- DELCORA agreed to construct and operate, at its own expense, the Eastern Delaware Conveyance System, which is comprised of a pumping station located in the vicinity of the abandoned wastewater pollution control plant of the Darby Creek Joint Authority and a 66-inch force main that terminates at the PWD's Southwest WPCP.

- The City agreed to expand the Southwest WPCP and reserve 50 mgd of capacity for DELCORA.

- Metering and sampling procedures were established similar to those in the Bensalem agreement.