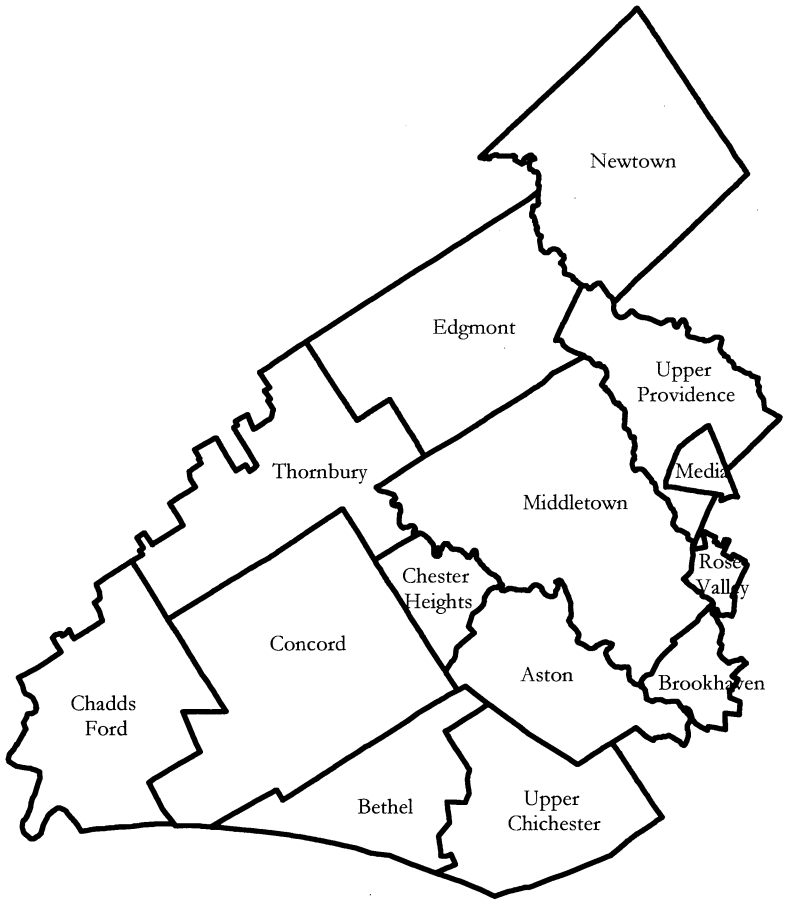
DELAWARE COUNTY

ACT 537 SEWAGE FACILITIES PLAN REVISION

WESTERN PLAN OF STUDY



DELAWARE COUNTY PLANNING DEPARTMENT
and
DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY

2004

DELAWARE COUNTY

ACT 537 SEWAGE FACILITIES PLAN REVISION

2004

WESTERN PLAN OF STUDY

Prepared for
Delaware County Planning Department
and
Delaware County Regional Water Quality Control Authority

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CHAPTER 1

DESCRIPTION OF THE STUDY AREA

GENERAL

Delaware County is located in the southeastern corner of the Commonwealth of Pennsylvania. The County is bounded on the east by the City of Philadelphia, on the southeast by the Delaware River and the State of New Jersey, and on the southwest by the State of Delaware. Figure 1-1 shows Delaware County in its regional setting. Although the County is the third smallest in the state in terms of land area (184.43 square miles), it has the fifth largest population (550,864) according to the Census 2000. Of the 49 municipalities comprising the County, nineteen have areas of less than one square mile, and eleven others do not exceed two square miles (see Figure 1-2).

Environment

Two major topographical areas run through the County. The eastern section of Delaware County is quite level and lies in the Atlantic Coastal Plain. This is an area of low, flat, poorly drained land which extends from the Marcus Hook area northeastward on a line almost paralleling U.S. Route 13 between MacDade Boulevard and Chester Pike into the Yeadon area and south to the Delaware River. Much of this land has been improved for industrial and commercial use because of its proximity to the Delaware River.

The western portion of the County is extremely hilly. This area lies north and west of the Coastal Plain and covers the remaining area of the County. It is the beginning of the Piedmont Province, which extends sixty to eighty miles inland from the Coastal Plain. This area includes rolling or undulating uplands, low hills, and well-drained soils. These features give the County its rolling surface, which ranges from a height of 480 feet (in Marple Township) to sea level (at the Delaware River).

Although all of the land in Delaware County is part of the Delaware River watershed, the County is also divided into eight major subwatersheds which correspond to the County's major streams (see Figure 1-3). The County has many small lakes and farm ponds, as well as the much larger Springton Reservoir, which is located between Marple and Upper Providence Townships.

Governmental Structure

Delaware County is a second class A county with a home rule charter. It is governed by a Council of five members, each of whom is elected to a staggered four-year term.

The County's 49 municipalities include one city of the third class, twelve first class townships, nine second class townships, and twenty-seven boroughs (see Table 1-1). Seven of the County's municipalities are governed by home rule charters.

Chester is a city of the third class. Under powers granted by the Home Rule Charter Amendment of 1957, Chester has adopted a Mayor-Council form of government with the number of councilmen set at four.

All first class townships not governed by home rule are regulated by the First Class Township Code, which requires government by an elected Board of Commissioners. The number of members on the board can vary from five to fifteen members, depending on the political subdivision of the township.

All second class townships not governed by home rule are regulated by the Second Class Township Code, which requires government by an elected Board of Supervisors. The board is composed of either three or five members, depending on the population of the township.

All boroughs not governed by home rule are regulated by the Borough Code, which requires government by a Mayor and Borough Council. The number of councilmen is dependent on the number of political subdivisions of the borough, but cannot exceed fifteen.

Those municipalities governed by a home rule charter (except for the City of Chester) were granted this option by the Home Rule Charter and Option Plans Law of 1972. This law gives every Pennsylvania municipality the opportunity to either draft a home rule charter or to select an optional plan of government. Delaware County home rule municipalities generally have a Council form of government. In these municipalities, the Council form of government is dependent upon and regulated by the charter and generally consists of one councilman from each political subdivision of the municipality but may also include councilmen at large.

Economic Characteristics

Historically, Delaware County's economic development has been based on its readily available supplies of water for power and process needs, for transportation, and for the removal of wastes. Heavy industry came to Delaware County to take advantage of the many swift streams that empty into the Delaware River. A belt of heavy industry developed along the river from the State of Delaware into Philadelphia. This belt includes the City of Chester, Tinicum and Ridley Townships, and the Boroughs of Eddystone, Marcus Hook, and Trainer.

With the advent of good road systems and abundant power, industry began to decentralize. Delaware County has experienced a shift in employment character in the

FIGURE 1-1

Regional Setting

LEGEND

- Roads
- County Boundary
- State Boundary

N
W E
S

Scale in Miles

2 0 2 4 6 8

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

FIGURE 1-2

Delaware County Municipalities

LEGEND

Delaware County Municipalities

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Scale in Miles

1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

FIGURE 1-3

Major Watersheds of Delaware County

DELCORA

LEGEND

- Hydrography
- Major Subwatersheds
- Delaware County Municipalities

N
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Scale in Miles

1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
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- Delaware County Planning Department (DCPD)

TABLE 1-1

GOVERNMENTAL STRUCTURE OF MUNICIPALITIES IN DELAWARE COUNTY

Third Class City	Number of Councilmen	Form of Government
Chester	4	Home Rule

First Class Townships	Number of Commissioners	Form of Government
Aston	7	
Darby	5	Home Rule
Haverford	9	
Lower Chichester	5	
Marple	7	
Nether Providence	6	
Radnor	7	Home Rule
Ridley	9	
Springfield	7	
Tinicum	5	
Upper Chichester	5	
Upper Darby	11	Home Rule

Second Class Townships	Number of Supervisors	Form of Government
Bethel	3	
Chadds Ford	3	
Chester	5	Home Rule
Concord	5	
Edgmont	3	
Middletown	7	Home Rule
Newtown	5	
Thornbury	3	
Upper Providence	5	Home Rule

Boroughs	Number of Councilmen	Form of Government
Aldan	7	
Brookhaven	7	
Chester Heights	7	
Clifton Heights	8	
Collingdale	7	
Colwyn	7	
Darby	9	
East Lansdowne	7	
Eddystone	7	
Folcroft	7	
Glenolden	7	
Lansdowne	7	
Marcus Hook	7	
Media	7	
Millbourne	5	
Morton	7	
Norwood	7	
Parkside	7	
Prospect Park	7	
Ridley Park	7	
Rose Valley	7	
Rutledge	7	
Sharon Hill	7	
Swarthmore	7	
Trainer	7	
Upland	7	
Yeadon	7	

Source: DCPD, 1999

last two decades from one that was dominated by industrial/manufacturing employment to one that has become more service oriented.

Commerce in Delaware County has developed in a linear pattern along the radial highways feeding into Philadelphia, at the City of Chester, at the 69th Street Terminal area in Upper Darby Township, and at Media Borough, the County seat. The most recent area of commercial growth is in the vicinity of U.S. Routes 1 and 202 along the Chadds Ford and Concord Township border. An additional area experiencing a high rate of growth is in the vicinity of U.S. Route 322 in Upper Chichester Township. Although there are several large shopping centers in the County, most commercial development to date has been uncoordinated strip development along the radial highways. The prime influence for this development has been, and continues to be, the automobile.

Recent Trends in County Development

Although specific trends in County development will be discussed in a later chapter, recent development trends indicate that areas from Middletown Township west to the Chester County border are developing most quickly, with 7,334 residential building permits issued between 1988 and 1998 alone. Areas experiencing the greatest level of new development include Aston, Bethel, Concord, and Upper Chichester Townships. A more in-depth discussion of demographics is presented in Chapter 2.

U.S. Route 30 in Radnor Township, PA Route 3 in Marple Township, U.S. Route 1 in Nether Providence, and MacDade Boulevard in Ridley Township have also seen a major increase in development activity since the completion of the Mid-County Expressway, I-476 (Blue Route) in December 1992.

PLANNING AND COORDINATION

Regional Planning and Coordination

Delaware County is a member government of the Delaware Valley Regional Planning Commission (DVRPC). In 1965, DVRPC was established to coordinate planning and development for the Delaware Valley regional area. DVRPC is concerned with regional planning and coordination of land use, transportation, housing, and to a lesser degree, the environment. It is composed of Chester, Bucks, Delaware, Montgomery, and Philadelphia Counties and the City of Chester in Pennsylvania and Burlington, Camden, Gloucester, and Mercer Counties and the Cities of Trenton and Camden in New Jersey.

The Delaware River Basin Commission (DRBC) also exercises authority with regard to all projects having a substantial effect on the water resources of the Delaware River basin. The U.S. Army Corps of Engineers has jurisdiction over construction along and discharges into navigable waterways. The U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (DEP) are

responsible for air and water quality regulation. DEP is specifically responsible for the enforcement of regulations adopted pursuant to Act 537.

Delaware County is also served by a County Conservation District, which has been delegated responsibility for overseeing the State's erosion control regulations under Chapter 102 and general permitting under Chapter 105 for stream and wetland permits. The Conservation District also works on problems of soil use and conservation, runoff, and the protection and proper use of Delaware County's water resources.

County Planning and Coordination

Planning within the County exists on two levels. The Delaware County Planning Commission (DCPC) and Department (DCPD) serve in an advisory capacity to the County's 49 municipalities. The Pennsylvania Municipalities Planning Code (MPC), Act 247, as amended, grants municipalities the power to prepare and enact a comprehensive plan, a zoning ordinance, and a subdivision and land development ordinance to guide their development. As of 1999, all 49 municipalities had prepared a comprehensive plan, and some had already updated their plan or were in the process of doing so. All 49 municipalities have zoning ordinances, and thirty have local subdivision and land development ordinances. The remaining nineteen municipalities utilize the Delaware County Subdivision and Land Development Ordinance, as amended, either by adoption or by virtue of the fact that they lack a local ordinance.

As of 2000, Delaware County did not have an adopted comprehensive plan. In 1976, the *Delaware County Land Use Plan 2000* was developed; however, it was never officially adopted by County Council. On July 18, 1978, the County adopted the Policies and Recommendations section and the Park and Recreation Facilities Improvements Plan map contained in the *Delaware County Open Space, Parks, and Recreation Study*, which was considered for adoption as part of the County's comprehensive plan but was never officially adopted.

The County is currently in the process of preparing a plan for adoption as the official County comprehensive plan, as provided for under the MPC. Several specific elements, including this sewage facilities plan component, are in the development stage. Until that plan is completed, the *Delaware County Land Use Plan 2000* is still the basic source of information on the future development of the County. This plan, which was published in January 1976, was based on economic and population trend data available at the time. This plan was an important element in the regional plan for the year 2000 adopted as part of the regional development guide by DVRPC in 1978.

It is expected that the new comprehensive plan, which will be officially adopted, will re-examine existing and potential future development cores, activity centers, and developing residential areas. It will also take a close look at balancing new development in less densely populated areas with opportunities for redevelopment of existing urbanized areas in light of recent trends and infrastructure changes.

Sewage Facilities Coordination

The Pennsylvania Sewage Facilities Act of 1966 (as amended), more commonly referred to as Act 537, is the primary legislation governing sewage facilities planning and regulation. The Act requires municipalities to submit, either individually or jointly, Official Sewage Facilities Plans to DEP. These plans are to contain information concerning existing and future needs of each municipality, as well as alternatives for providing adequate wastewater facilities to serve the needs of the municipality into the future. The Act also calls for municipalities to periodically revise their Act 537 plans as conditions change or as the need arises. As illustrated in Table 1-2, when the County's Act 537 plan revision (update) was conceived, only eleven (22.4%) municipalities in Delaware County had prepared individual Act 537 plans. The remaining thirty-eight municipalities still recognized the County's Act 537 sewage facilities plan prepared in 1971 as their official plan.

Typically, counties have only an advisory role in sewage facilities planning. DEP requires them to review and provide comments on municipal Act 537 base plans and their revisions. It also requires them to review sewage facilities planning modules for new subdivisions and land developments. However, several years ago it became apparent that the developed portions of the County (the thirty-eight sewered municipalities still utilizing the County's 1971 plan) were experiencing infrastructure problems. As a result, the Delaware County Regional Water Quality Control Authority (DELCORA) suggested to DCPD that a plan update to address these problems might be in order. At the same time it also became clear that the developing municipalities were each preparing separate Act 537 plans that did not take into account the potential for shared systems. Therefore, DCPD volunteered to undertake a Countywide sewage facilities plan on the municipalities' behalf. The eastern portion of the plan was completed in 2002, with all thirty-five municipalities adopting the plan as their own the same year and DEP approving the plan in 2003.

In addition to providing legislation for sewage facilities planning, Act 537 requires permits to be issued for the construction, installation, or alteration of individual and community wastewater systems. Rules and regulations regarding community and individual systems are developed by DEP and adopted by the State Environmental Quality Board. A State Board of Certification of Sewage Enforcement Officers administers the State's sewage enforcement officer (SEO) certification program. The rules and regulations promulgated by DEP in accordance with the Pennsylvania Sewage Facilities Act are contained within Chapters 71, 72, and 73 of DEP's Title 25: Rules and Regulations. The following list briefly summarizes the provisions of these chapters:

Chapter 71: Administration of Sewage Facilities Program

This program provides a comprehensive sewage planning mechanism to identify and resolve existing sewage disposal problems, to avoid potential sewage

problems resulting from new land development, and to provide for the future sewage disposal needs of a municipality.

TABLE 1-2

LOCAL AND COUNTY ACT 537 PLANS[1]

Municipality	Municipality
Use Municipal Act 537 Sewage Facilities Plan	
Aston Township	Middletown Township[2]
Bethel Township[2]	Newtown Township[2]
Brookhaven Borough[2]	Thornbury Township[2]
Chadds Ford Township[2]	Upper Chichester Township[2]
Chester Heights Borough[2]	Upper Providence Township[2]
Concord Township[2, 3]	
Use County's 1971 Sewage Facilities Plan	
Aldan Borough	Millbourne Borough
Chester City	Morton Borough
Chester Township	Nether Providence Township[2]
Clifton Heights Borough	Norwood Borough[2]
Collingdale Borough	Parkside Borough
Colwyn Borough[2]	Prospect Park Borough
Darby Borough	Radnor Township[2]
Darby Township	Ridley Township
East Lansdowne Borough[2]	Ridley Park Borough
Eddystone Borough	Rose Valley Borough
Edgmont Township[2]	Rutledge Borough
Folcroft Borough	Sharon Hill Borough
Glenolden Borough	Springfield Township
Haverford Township[2]	Swarthmore Borough
Lansdowne Borough	Tinicum Township
Lower Chichester Township	Trainer Borough
Marcus Hook Borough	Upland Borough
Marple Township[2]	Upper Darby Township
Media Borough[2]	Yeadon Borough[2]

Source: DCPD, 1999

Notes:

[1] As of 1988, not including Act 537 revisions, amendments, and special studies.

[2] Sewage Enforcement Officer (SEO) responsible for local enforcement of Act 537.

[3] Southwest Delaware County Municipal Authority Plan

Chapter 72: Administration of Sewage Facilities Permitting Program

This program establishes requirements for permitting associated with installation of individual and community on-lot wastewater disposal systems and regulates the administration of permitting functions by local agencies and SEOs.

Chapter 73: Standards for Sewage Disposal Facilities

This program establishes requirements for the design, location, and construction of sewage facilities. It is administered locally by the municipal SEO.

In Delaware County, Act 537 regulations are administered at a local level with advisory comments provided by DCPD. SEOs are responsible for local enforcement of Act 537 in twenty-one of the County's municipalities. The remaining municipalities, located mostly in eastern Delaware County, are served by public sewers; therefore, sewage facilities planning and regulatory functions are performed by a municipal engineer or a code enforcement officer.

Sewer Authorities

There are twenty sewer authorities serving various areas in Delaware County. The service areas associated with these authorities generally correspond to designated public sewered areas within one municipality. However, in areas such as eastern Delaware County, the sewer authority boundaries tend to follow watershed boundaries and, therefore, most often include more than one municipality. A list of sewer authorities and associated municipalities is presented in Table 1-3. Figure 1-4 provides a visual representation of the sewer authority boundaries in the western planning area. Sewer authorities are responsible for carrying out planning and are authorized to finance, construct, and operate public sewer facilities within their designated service areas.

Delaware County Regional Water Quality Control Authority

DELCORA was created in 1971 by ordinance of the Delaware County Commissioners with the purpose of implementing the Official Sewage Facilities Plan. It was authorized to finance, construct, operate, and maintain interceptor systems, pumping stations, and treatment plants in the County with the exception of the Upper Darby-Haverford system (the area currently served by the City of Philadelphia) and the Southern Delaware County Authority (SDCA) system.

In one way or another, DELCORA serves most of eastern Delaware County and the communities along the Delaware River except Tinicum Township. Generally speaking, most of the sewage from the Darby, Crum, and Muckinipates watersheds (DELCORA's Eastern Service Area) currently passes through DELCORA's pump stations and force main to the City of Philadelphia Southwest Water Pollution Control

TABLE 1-3

SEWER AUTHORITIES AND MEMBER MUNICIPALITIES

DELAWARE COUNTY EASTERN PLANNING AREA

DELCORA EAST (C)

Muckinipates Sewer Authority (C)
- Aldan Borough
- Clifton Heights Borough
- Darby Township
- Folcroft Borough
- Glenolden Borough
- Norwood Borough
- Ridley Township
- Sharon Hill Borough
- Springfield Township
- Upper Darby Township

Central Delaware County Authority (C)
- Eddystone Borough
- Marple Township
- Morton Borough
- Nether Providence Township
- Norwood Borough
- Prospect Park Borough
- Ridley Park Borough
- Ridley Township
- Rutledge Borough
- Springfield Township
- Swarthmore Borough

Darby Creek Joint Authority (C)
- Aldan Borough
- Clifton Heights Borough
- Collingdale Borough
- Colwyn Borough
- Darby Borough
- Darby Township
- Folcroft Borough
- Lansdowne Borough
- Sharon Hill Borough
- Springfield Township
- Upper Darby Township
- Yeadon Borough

Radnor Haverford Marple Sewer Authority (C)
- Haverford Township
- Marple Township
- Newtown Township
- Radnor Township
- Tredyffrin Township (Chester County)

DELCORA WEST (T,C)
- Brookhaven Borough
- Chester City
- Chester Township
- Lower Chichester Township
- Marcus Hook Borough
- Parkside Borough
- Rose Valley Borough
- Trainer Borough
- Upland Borough

TINICUM TOWNSHIP SEWER AUTHORITY (T,C)
- Tinicum Township

CITY OF PHILADELPHIA WATER DEPARTMENT (T,C)
- East Lansdowne Borough
- Haverford Township
- Millbourne Borough
- Upper Darby Township
- Yeadon Borough

TABLE 1-3

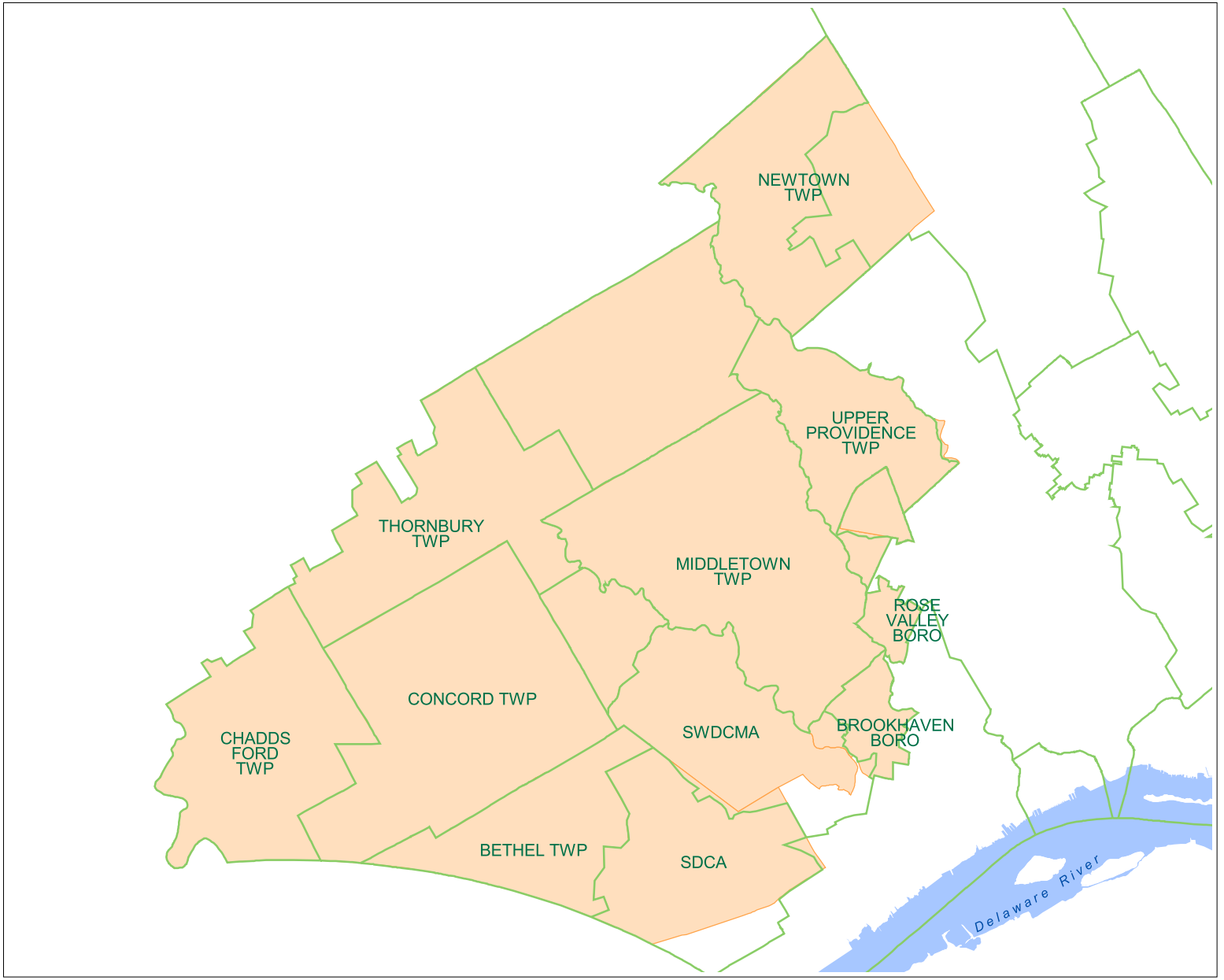
SEWER AUTHORITIES AND MEMBER MUNICIPALITIES (CONTINUED)

DELAWARE COUNTY WESTERN PLANNING AREA	
SOUTHWEST DELAWARE COUNTY MUNICIPAL AUTHORITY (T,C) Aston Township Brookhaven Borough Chester Township Chester Heights Borough Concord Township Upper Chichester Township Upper Providence Township **Middletown Township Sewer Authority**(C) Middletown Township Upper Providence Township	**THORNBURY TOWNSHIP BOARD OF SUPERVISORS** (T,C) Thornbury Township **CHADDS FORD TOWNSHIP SEWER AUTHORITY** (T,C) Chadds Ford Township
DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY (T) **Southern Delaware County Authority**(C) Upper Chichester Township **Bethel Township Sewer Authority** (C) Bethel Township	**CITY OF WILMINGTON** (T,C) **Bethel Township Sewer Authority** (C) Bethel Township
AQUA PENNSYLVANIA, INC. (T,C) Media Borough **Upper Providence Sewer Authority** (C) Upper Providence Township	**CONCORD TOWNSHIP SEWER AUTHORITY** (T,C) Concord Township
ROSE VALLEY SEWER AUTHORITY (T,C) Nether Providence Township Rose Valley Borough	**NEWTOWN TOWNSHIP MUNICIPAL SEWER AUTHORITY** (C) Newtown Township
BROOKHAVEN SEWER AUTHORITY (T,C) Brookhaven Borough	

Source: DCPD, 2003
KEY: C - Conveyance Authority
T - Treatment Authority
Note: Some municipalities lie within more than one Authority's jurisdiction.

FIGURE 1-4

Municipal/Public Sewer Organizations



DELCORA

LEGEND

- Sewer Authority Boundary
- Western Project Area, Municipal Boundaries

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Scale in Miles

1 0 1 2

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Plant (PSWPCP). DELCORA's 44 million gallon/day (MGD) Western Regional Wastewater Treatment Plant (WRTP) in the City of Chester serves most of the waterfront areas (DELCORA's Western Service Area). Long-range plans developed in the early 1970s to tie the western portion of the County into the same regional system have not been implemented.

DELCORA provides wastewater disposal services for the following sewer authorities in its Eastern Service Area: Radnor-Haverford-Marple (RHM), Darby Creek Joint Authority (DCJA), Central Delaware County Authority (CDCA), and the Muckinipates Sewer Authority. Wastewater from these sewer authorities is conveyed by DELCORA to the PSWPCP. The Central Delaware County Pump Station Diversion Project allows for the redirection of flow from the CDCA sewershed to DELCORA's WRTP.

DELCORA's Western Service Area includes Upper Chichester, Lower Chichester, and Chester Townships, Marcus Hook, Trainer, Upland, Parkside, and Eddystone Boroughs, the City of Chester, and the southern portion of Brookhaven Borough. Flows from this service area are conveyed to DELCORA's WRTP in the City of Chester.

REPORT FORMAT: EASTERN AND WESTERN DELAWARE COUNTY

As will be noted in this report, the eastern and western portions of the County are significantly different in terms of sewer planning needs. The primary criterion used in dividing the County into the eastern and western areas was the percentage of the municipality not served by public sewers, as determined by a preliminary survey of SEOs in 1989. The ten municipalities identified with substantial unsewered areas at that time included Newtown, Edgmont, Upper Providence, Middletown, Thornbury, Aston, Chadds Ford (previously Birmingham), Concord, and Bethel Townships and Chester Heights Borough. Upper Chichester Township and Media, Rose Valley, and Brookhaven Boroughs, which are almost entirely sewered, were added to this group because they adjoin unsewered municipalities and either operate sewage treatment plants or serve as a direct link to a sewage treatment system (i.e., New Castle County/City of Wilmington). While we recognize that sewer service has expanded or been extended to several areas within the designated western portion of the County in recent years, for planning purposes, we still feel that the original delineation (growth areas vs. developed areas) is appropriate today. Refer to Table 1-4 and Figure 1-5 for the east/west delineation used for planning purposes.

The eastern half of the County, with the exception of several northern municipalities such as Haverford and Radnor, can be considered developed and serviced with public sewers. Therefore, evaluation and recommendations for corrective action to existing sewer infrastructure (such as repair or replacement of existing sewer lines and repair, expansion, or phase out of poorly operating sewer treatment plants) were considered likely issues to be addressed at the onset of this study.

TABLE 1-4

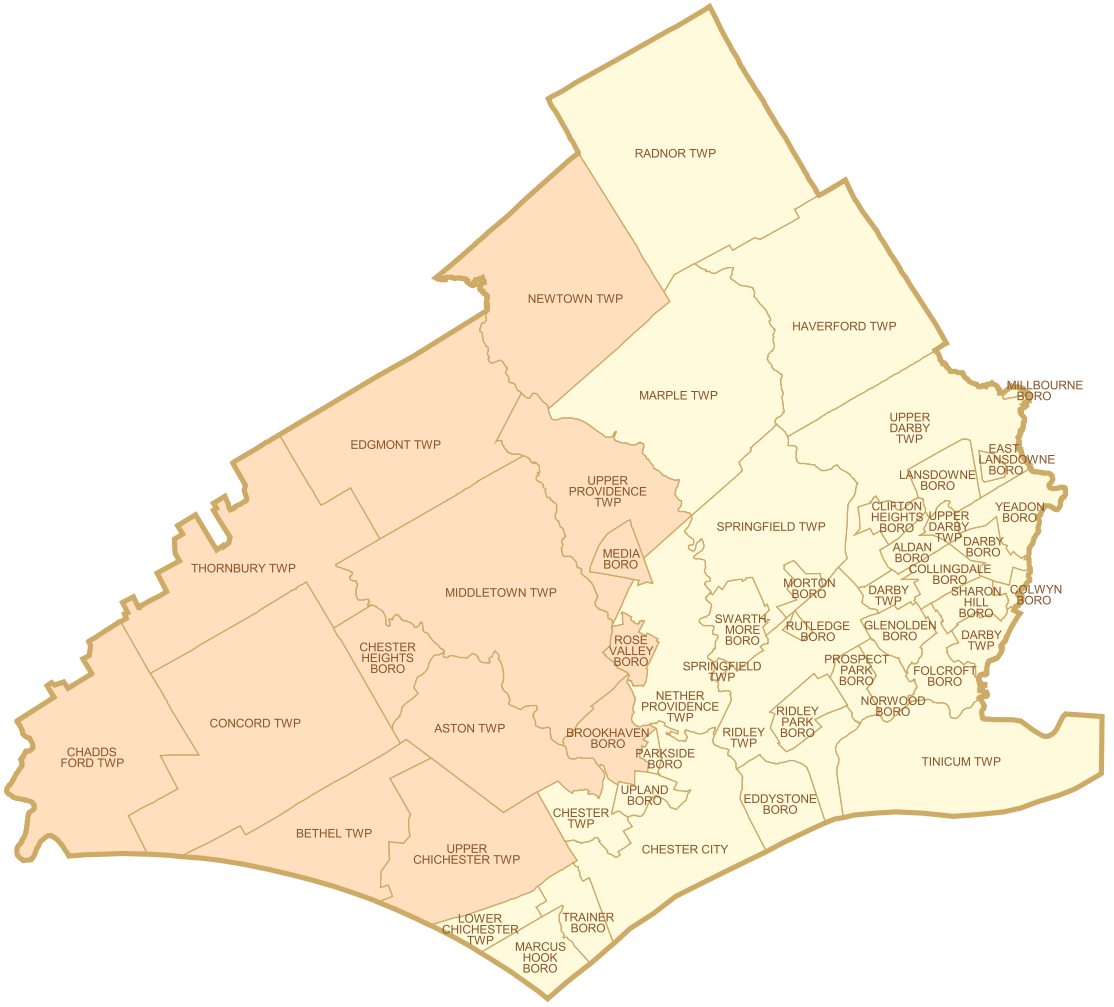
EASTERN/WESTERN DESIGNATION

EASTERN MUNICIPALITIES	
DELCORA's Eastern Service Area	**DELCORA's Western Service Area**
Aldan Borough	Chester City
Clifton Heights Borough	Chester Township
Collingdale Borough	Eddystone Borough
Colwyn Borough	Lower Chichester Township
Darby Borough	Marcus Hook Borough
Darby Township	Parkside Borough
East Lansdowne Borough	Trainer Borough
Folcroft Borough	Upland Borough
Glenolden Borough	
Haverford Township	**City of Philadelphia**
Lansdowne Borough	East Lansdowne Borough
Marple Township	Haverford Township
Millbourne Borough	Millbourne Borough
Morton Borough	Upper Darby Township
Nether Providence Township	Yeadon Borough
Norwood Borough	
Prospect Park Borough	
Radnor Township	
Ridley Township	
Ridley Park Borough	
Rutledge Borough	
Sharon Hill Borough	
Springfield Township	
Swarthmore Borough	
Tinicum Township	
Upper Darby Township	
Yeadon Borough	
WESTERN MUNICIPALITIES	
Aston Township	Media Borough
Bethel Township	Middletown Township
Brookhaven Borough	Newtown Township
Chadds Ford Township	Rose Valley Borough
Chester Heights Borough	Thornbury Township
Concord Township	Upper Chichester Township
Edgmont Township	Upper Providence Township

Source: DCPD, 1999

FIGURE 1-5

Planning Area Boundaries



LEGEND

- Eastern Planning Area
- Western Planning Area
- Delaware County

N
W E
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Scale in Miles

1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

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- Delaware County Planning Department (DCPD)

In contrast, portions of central and most of western Delaware County (with the exception of older municipalities bordering the Delaware River) remained semi-rural until about twenty-five years ago. In recent years, as the County population began to shift northward and westward, many of these areas have been experiencing tremendous growth pressure. This trend is clearly demonstrated in the demographic characteristics presented in Chapter 2.

As a result of the significant differences between the sewer needs of "developed" vs. "developing" municipalities, planning for each of the respective portions of the County will be performed separately. While the same items will be addressed for both portions of the County, emphasis is placed on different elements of the plan in each area. Alternatives and recommendations for each half of the County will also be assessed separately and will appear in two separate reports.

The evaluation of the eastern area places emphasis on the condition and capacity of the existing sewer systems. Between 1996 and 1997, a series of inflow and infiltration (I&I) studies were conducted in the twenty-four municipalities and three municipal authorities in the eastern portion of the County. These studies were performed to determine the extent of I&I in each municipality. The studies were ultimately used to provide technical data for recommendations supporting the need for corrective action and related costs.

Evaluation of sewage facilities in the western area targets communities experiencing a high degree of growth pressure or communities that continue to have a significant number of on-site systems. Generally speaking, these are also communities that operate or are served by sewage treatment plants that are not part of the DELCORA regional system. Detailed population projections, soils analysis, and independent evaluation of existing community systems are addressed to identify problem areas, determine the need for corrective action, and recommend wastewater disposal alternatives. The following is an evaluation of the western area.

CHAPTER 2

DEMOGRAPHIC CHARACTERISTICS OF THE STUDY AREA

INTRODUCTION

When assessing an area's sewerage needs, there are several factors that should be considered. One of the most important of these is the area's population because the number of people living and working in an area determines how much wastewater will be generated. Population along with other relevant factors such as soil conditions, geology, and land use activities can be collectively analyzed in order to provide a basis for sound decision-making and the development of specific sewage treatment alternatives for specific areas.

This chapter presents the current and projected population data for Delaware County. The information in this chapter was instrumental during the evaluation process and weighed heavily in formulating recommendations for future sewage facilities in the plan for the western portion of the County.

EXISTING POPULATION

Current Population in Perspective

The U. S. Department of Commerce, Bureau of the Census (Census Bureau) reports indicate that as of 2000, Delaware County had a population of 550,864 residents within the boundaries of its 49 municipalities. The majority (33) of the municipalities had populations under 10,000, and slightly more than half of those populations were under 5,000. There were only seven municipalities with a substantial number of residents. Upper Darby Township had the largest population with 81,821. Upper Darby was followed by Haverford Township (48,498) and Chester City (36,854), with Marple, Radnor, Ridley, and Springfield Townships having populations over 20,000. The remaining municipalities had populations ranging from 860 in Rutledge Borough to 16,842 in Upper Chichester Township.

Significant growth and development has taken place in the County since the 1990 Census, particularly in the rapidly developing western municipalities. While the County's overall population rose from 547,651 in 1990 to 550,864 in 2000, the most significant population change was in population distribution from east to west. The eastern portion of the County lost 16.8% of its population while the western portion of the County had a 37.9% population increase. Refer to Table 2-1 for the most recent census information.

Growth Rate History

Through the post-Korean War era (1950s), the eastern portion of the County experienced significant growth as a result of industrial expansion. During this time

TABLE 2-1

DELAWARE COUNTY POPULATION, 1970 – 2000

Eastern Municipalities					
Municipality	**1970**	**1980**	**1990**	**2000**	**% Change 1970 - 2000**
Aldan Borough	5,001	4,671	4,549	4,313	-13.8%
Chester City	56,331	45,794	41,856	36,854	-34.6%
Chester Township	5,708	5,687	5,399	4,604	-19.3%
Clifton Heights Borough	8,348	7,320	7,111	6,779	-18.8%
Collingdale Borough	10,605	9,539	9,175	8,664	-18.3%
Colwyn Borough	3,169	2,851	2,613	2,453	-22.6%
Darby Borough	13,729	11,513	11,140	10,299	-25.0%
Darby Township	13,603	12,264	10,955	9,622	-29.3%
East Lansdowne Borough	3,186	2,806	2,691	2,586	-18.8%
Eddystone Borough	2,706	2,555	2,446	2,442	-9.8%
Folcroft Borough	9,610	8,231	7,506	6,978	-27.4%
Glenolden Borough	8,697	7,633	7,260	7,476	-14.0%
Haverford Township	56,873	52,349	49,848	48,498	-14.7%
Lansdowne Borough	14,090	11,891	11,712	11,044	-21.6%
Lower Chichester Township	4,009	3,784	3,660	3,591	-10.4%
Marcus Hook Borough	3,041	2,638	2,546	2,314	-23.9%
Marple Township	25,040	23,642	23,123	23,737	-5.2%
Millbourne Borough	637	652	831	943	48.0%
Morton Borough	2,602	2,412	2,851	2,715	4.3%
Nether Providence Township	13,589	12,730	13,229	13,456	-1.0%
Norwood Borough	7,229	6,647	6,162	5,985	-17.2%
Parkside Borough	2,343	2,464	2,369	2,267	-3.2%
Prospect Park Borough	7,250	6,593	6,764	6,594	-9.0%
Radnor Township	28,782	27,676	28,703	30,878	7.3%
Ridley Township	39,085	33,771	31,169	30,791	-21.2%
Ridley Park Borough	9,025	7,889	7,592	7,196	-20.3%
Rutledge Borough	1,167	934	843	860	-26.3%
Sharon Hill Borough	7,464	6,221	5,771	5,468	-26.7%
Springfield Township	29,006	25,326	24,160	23,677	-18.4%
Swarthmore Borough	6,156	5,950	6,157	6,170	0.2%
Tinicum Township	4,906	4,291	4,440	4,353	-11.3%
Trainer Borough	2,336	2,056	2,271	1,901	-18.6%
Upland Borough	3,930	3,458	3,334	2,977	-24.2%
Upper Darby Township	95,910	84,054	81,177	81,821	-14.7%
Yeadon Borough	12,136	11,727	11,980	11,762	-3.1%
Eastern Municipalities	**519,269**	**461,999**	**443,393**	**432,068**	**-16.8%**

TABLE 2-1

DELAWARE COUNTY POPULATION, 1970 – 2000 (CONTINUED)

Western Municipalities					
Municipality	**1970**	**1980**	**1990**	**2000**	**% Change 1970 - 2000**
Aston Township	13,704	14,530	15,080	16,203	18.2%
Bethel Township	2,034	2,438	3,330	6,421	215.7%
Brookhaven Borough	7,370	7,912	8,567	7,985	8.3%
Chadds Ford Township	1,281	2,057	3,118	3,170	147.5%
Chester Heights Borough	597	1,302	2,273	2,481	315.6%
Concord Township[1]	4,592	6,437	6,933	11,239	116.3%
Edgmont Township	1,368	1,410	2,735	3,918	186.4%
Media Borough	6,444	6,119	5,957	5,533	-14.1%
Middletown Township	12,878	12,463	14,130	16,064	24.7%
Newtown Township	11,081	11,775	11,366	11,700	5.6%
Rose Valley Borough	876	1,038	982	944	7.8%
Thornbury Township[1,2]	3,284	3,653	4,728	5,787	116.0%
Upper Chichester Township	11,414	14,377	15,004	16,842	47.6%
Upper Providence Township	9,234	9,477	9,727	10,509	13.8%
Western Municipalities	**86,157**	**94,988**	**103,930**	**118,796**	**37.9%**
Delaware County	**603,456**	**555,007**	**547,651**	**550,864**	**-8.7%**

Source: U.S. Department of Commerce, Bureau of the Census, prepared by DCPD, 2001

[1] In Concord and Thornbury Townships, the 2000 population figures of 9,933 and 7,093 were revised by the Census Bureau to 11,239 and 5,787 pursuant to municipal challenge.

[2] Thornbury's 1990 population, as revised by the Census Bureau in 1994, was 4,728, not 5,056 which DVRPC used in its 2025 forecast.

period, the area prospered, jobs were abundant, and the population grew. During this same period, the western portions of the County remained largely rural/agricultural.

Over the last few decades, the total population of Delaware County has exhibited a decline in numbers similar to that of many other manufacturing-dependent urban areas in the United States. Table 2-1, showing the census figures from 1970, 1980, 1990, and 2000, illustrates that although there had been a gradual yet steady decline in total population for three consecutive decades, the Census 2000 actually showed an increase in population.

The eastern municipalities have consistently exhibited a decrease in population, while the western municipalities have experienced significant growth. This shift can be attributed to a number of factors, some of which include the change from a manufacturing to a service economy (1970s) and the migration of people from urban areas like Chester City and Upper Darby to more suburban settings such as Chester Heights Borough and Bethel, Concord, Edgmont, and Thornbury Townships in the western part of the County. Coinciding with this shift is an emphasis on suburbanization.

Population Distribution

As depicted on Figure 2-1, the "developed" eastern portion of the County is much more densely populated than the "developing" western portion. Table 2-2 provides the accompanying numerical data. The eastern municipalities encompass 89.95 square miles, which is 49% of the total land mass, whereas the western municipalities encompass 94.48 square miles, accounting for 51%. However, 78.4% of the County's population is in the eastern half.

County density patterns mirror the County's population distribution. For instance, municipal densities are generally much lower in the developing western/northern portions of the County than in the developed eastern/southern portions of the County. Western municipalities are typically larger and contain smaller populations. Chadds Ford Township, the least dense municipality in the County, has a density of 359 persons/square mile. Chadds Ford Township has the ninth largest land area (8.84 square miles) with a 2000 population of 3,170.

The majority of the County's population is concentrated in the eastern part of the County. Despite the fact that the eastern portion of the County contains several large municipalities, most of this area is characterized by small, heavily populated boroughs that border West Philadelphia. Millbourne Borough, the densest municipality in the County, has a density of 13,471 persons per square mile. Millbourne Borough has the smallest land area (0.07 square mile) with a population of 943.

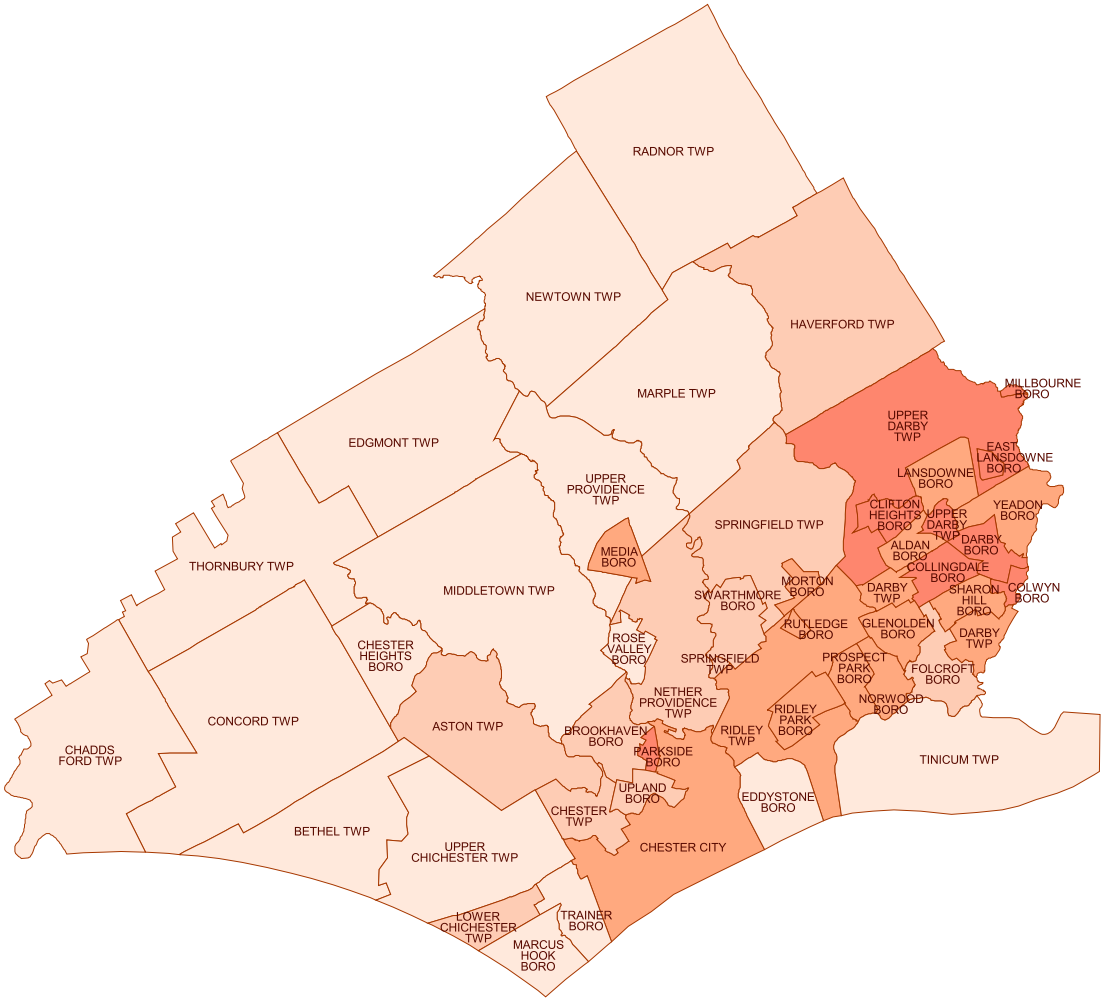
FUTURE POPULATION

The current population shift experienced by Delaware County is expected to continue. Table 2-3 presents the population forecasts for the next twenty-five years as formulated by DVRPC based on Census 2000 population counts.

With the exception of a very few municipalities, the population for most of the eastern municipalities is forecasted to decrease or to stay relatively stable through 2025. In contrast, most of the western municipalities are expected to increase. This can be clearly seen in Figure 2-2 where the darker colored areas, representing the greatest population growth, are found in the western half of the County. For example, the population of western municipalities such as Chester Heights Borough and Bethel, Chadds Ford, Concord, and Edgmont Townships is expected to increase substantially, with a range of 48.6% to 62.8%. In the meantime, eastern municipalities such as

FIGURE 2-1

Population Density by Municipality, 2000



LEGEND

POPULATION DENSITY
(persons per square mile)

- 0 - 2,600
- 2,600 - 5,500
- 5,500 - 9,600
- 9,600 - 13,500

N
W E
S

Scale in Miles

1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)
- Delaware Valley Regional Planning Commission (DVRPC)

TABLE 2-2

DELAWARE COUNTY POPULATION DENSITY, 2000

Eastern Municipalities			
Municipality	**2000 Population**	**Square Miles**	**Persons Per Square Mile**
Aldan Borough	4,313	0.59	7,310
Chester City	36,854	4.77	7,726
Chester Township	4,604	1.38	3,336
Clifton Heights Borough	6,779	0.62	10,934
Collingdale Borough	8,664	0.87	9,959
Colwyn Borough	2,453	0.25	9,812
Darby Borough	10,299	0.81	12,715
Darby Township	9,622	1.64	5,867
East Lansdowne Borough	2,586	0.21	12,314
Eddystone Borough	2,442	0.96	2,544
Folcroft Borough	6,978	1.38	5,057
Glenolden Borough	7,476	0.86	8,693
Haverford Township	48,498	9.95	4,874
Lansdowne Borough	11,044	1.20	9,203
Lower Chichester Township	3,591	1.06	3,388
Marcus Hook Borough	2,314	1.14	2,030
Marple Township	23,737	10.43	2,276
Millbourne Borough	943	0.07	13,471
Morton Borough	2,715	0.36	7,542
Nether Providence Township	13,456	4.64	2,900
Norwood Borough	5,985	0.81	7,389
Parkside Borough	2,267	0.19	11,932
Prospect Park Borough	6,594	0.73	9,033
Radnor Township	30,878	13.83	2,233
Ridley Township	30,791	5.18	5,944
Ridley Park Borough	7,196	1.04	6,919
Rutledge Borough	860	0.15	5,733
Sharon Hill Borough	5,468	0.77	7,101
Springfield Township	23,677	6.29	3,764
Swarthmore Borough	6,170	1.38	4,471
Tinicum Township	4,353	5.53	787
Trainer Borough	1,901	0.98	1,940
Upland Borough	2,977	0.66	4,511
Upper Darby Township	81,821	7.62	10,738
Yeadon Borough	11,762	1.60	7,351
Eastern Municipalities	**432,068**	**89.95**	**4,803**

TABLE 2-2

DELAWARE COUNTY POPULATION DENSITY, 2000 (CONTINUED)

Western Municipalities			
Municipality	**2000 Population**	**Square Miles**	**Persons Per Square Mile**
Aston Township	16,203	5.90	2,746
Bethel Township	6,421	5.44	1,180
Brookhaven Borough	7,985	1.69	4,725
Chadds Ford Township	3,170	8.84	359
Chester Heights Borough	2,481	2.17	1,143
Concord Township	9,933	13.78	721
Edgmont Township	3,918	9.74	402
Media Borough	5,533	0.75	7,377
Middletown Township	16,064	13.43	1,196
Newtown Township	11,700	10.11	1,157
Rose Valley Borough	944	0.74	1,276
Thornbury Township	7,093	9.16	774
Upper Chichester Township	16,842	6.80	2,477
Upper Providence Township	10,509	5.93	1,772
Western Municipalities	**118,796**	**94.48**	**1,257**
Delaware County	**550,864**	**184.43**	**2,987**

Source: U.S. Department of Commerce, Bureau of the Census; prepared by DCPD, 2001

Collingdale, Colwyn, Darby, East Lansdowne, and Sharon Hill Boroughs as well as Darby Township are all expected to decrease in population by a margin of more than 11%.

Table 2-4 presents the projected density figures for both the eastern and western municipalities. In the suburban West, the municipalities are generally projected to experience population (and associated density) increases, which may influence the need for sewage treatment alternatives other than individual on-site systems. The reverse is true in the urbanized East where, with the exception of three municipalities, municipal populations and associated densities are expected to decrease, in some cases significantly.

The increase in population will also bring an increase in employment, and increased employment will result in increased sewage disposal needs. Table 2-5 presents the employment forecasts for Delaware County. Like the population forecasts, employment is anticipated to grow at a much greater rate in the western municipalities than in the eastern municipalities.

TABLE 2-3

DELAWARE COUNTY POPULATION FORECASTS

Eastern Municipalities								
	Census		2005- 2025 DVRPC Forecasts					
Municipality	1990	2000	2005	2010	2015	2020	2025	% Change 00-25
Aldan Borough	4,549	4,313	4,180	4,160	4,030	3,980	3,970	-8.0%
Chester City	41,856	36,854	34,840	35,190	34,880	35,020	35,354	-4.1%
Chester Township	5,399	4,604	4,510	4,460	4,340	4,272	4,170	-9.4%
Clifton Heights Borough	7,111	6,779	6,590	6,480	6,280	6,150	5,990	-11.6%
Collingdale Borough	9,175	8,664	8,390	8,220	7,940	7,750	7,500	-13.4%
Colwyn Borough	2,613	2,453	2,360	2,300	2,220	2,150	2,060	-16.0%
Darby Borough	11,140	10,299	9,960	9,750	9,390	9,170	8,860	-14.0%
Darby Township	10,955	9,622	9,310	9,080	8,720	8,440	8,090	-15.9%
East Lansdowne Borough	2,691	2,586	2,510	2,440	2,350	2,290	2,220	-14.2%
Eddystone Borough	2,446	2,442	2,380	2,340	2,280	2,230	2,170	-11.1%
Folcroft Borough	7,506	6,978	6,770	6,630	6,390	6,210	5,980	-14.3%
Glenolden Borough	7,260	7,476	7,290	7,180	6,970	6,830	6,620	-11.4%
Haverford Township	49,848	48,498	47,500	47,010	46,910	46,840	46,770	-3.6%
Lansdowne Borough	11,712	11,044	10,700	10,490	10,140	9,920	9,610	-13.0%
Lower Chichester Township	3,660	3,591	3,500	3,450	3,350	3,300	3,210	-10.6%
Marcus Hook Borough	2,546	2,314	2,250	2,200	2,120	2,080	2,020	-12.7%
Marple Township	23,123	23,737	23,890	23,830	23,720	23,710	23,330	-1.7%
Millbourne Borough	831	943	930	940	940	940	960	1.8%
Morton Borough	2,851	2,715	2,780	2,800	2,780	2,810	2,830	4.2%
Nether Providence Township	13,229	13,456	13,770	13,760	14,020	13,990	13,940	3.6%
Norwood Borough	6,162	5,985	6,100	6,030	5,870	5,770	5,620	-6.1%

TABLE 2-3

DELAWARE COUNTY POPULATION FORECASTS

(CONTINUED)

Eastern Municipalities								
	Census		2005- 2025 DVRPC Forecasts					
Municipality	1990	2000	2005	2010	2015	2020	2025	% Change 00-25
Parkside Borough	2,369	2,267	2,220	2,200	2,140	2,110	2,070	-8.7%
Prospect Park Borough	6,764	6,594	6,450	6,400	6,260	6,210	6,110	-7.3%
Radnor Township	28,703	30,878	30,870	31,210	31,170	31,460	31,480	1.9%
Ridley Park Borough	7,592	7,196	7,270	7,160	6,940	6,800	6,610	-8.1%
Ridley Township	31,169	30,791	30,670	30,450	29,390	28,620	27,610	-10.3%
Rutledge Borough	843	860	870	850	810	790	760	-11.6%
Sharon Hill Borough	5,771	5,468	5,280	5,150	4,950	4,800	4,710	-13.9%
Springfield Township	24,160	23,677	23,600	22,590	22,590	22,180	22,340	-5.6%
Swarthmore Borough	6,157	6,170	6,170	6,230	6,090	6,040	5,930	-3.9%
Tinicum Township	4,440	4,353	4,410	4,360	4,250	4,190	4,100	-5.8%
Trainer Borough	2,271	1,901	1,870	1,870	1,840	1,840	1,820	-4.3%
Upland Borough	3,334	2,977	2,880	2,830	2,720	2,650	2,650	-11.0%
Upper Darby Township	81,177	81,821	83,210	80,650	77,580	75,510	74,950	-8.4%
Yeadon Borough	11,980	11,762	11,440	11,290	10,970	10,800	10,540	-10.4%
Eastern Municipalities	**443,393**	**432,068**	**427,720**	**421,980**	**413,340**	**407,852**	**402,954**	**-6.7**

TABLE 2-3

DELAWARE COUNTY POPULATION FORECASTS

(CONTINUED)

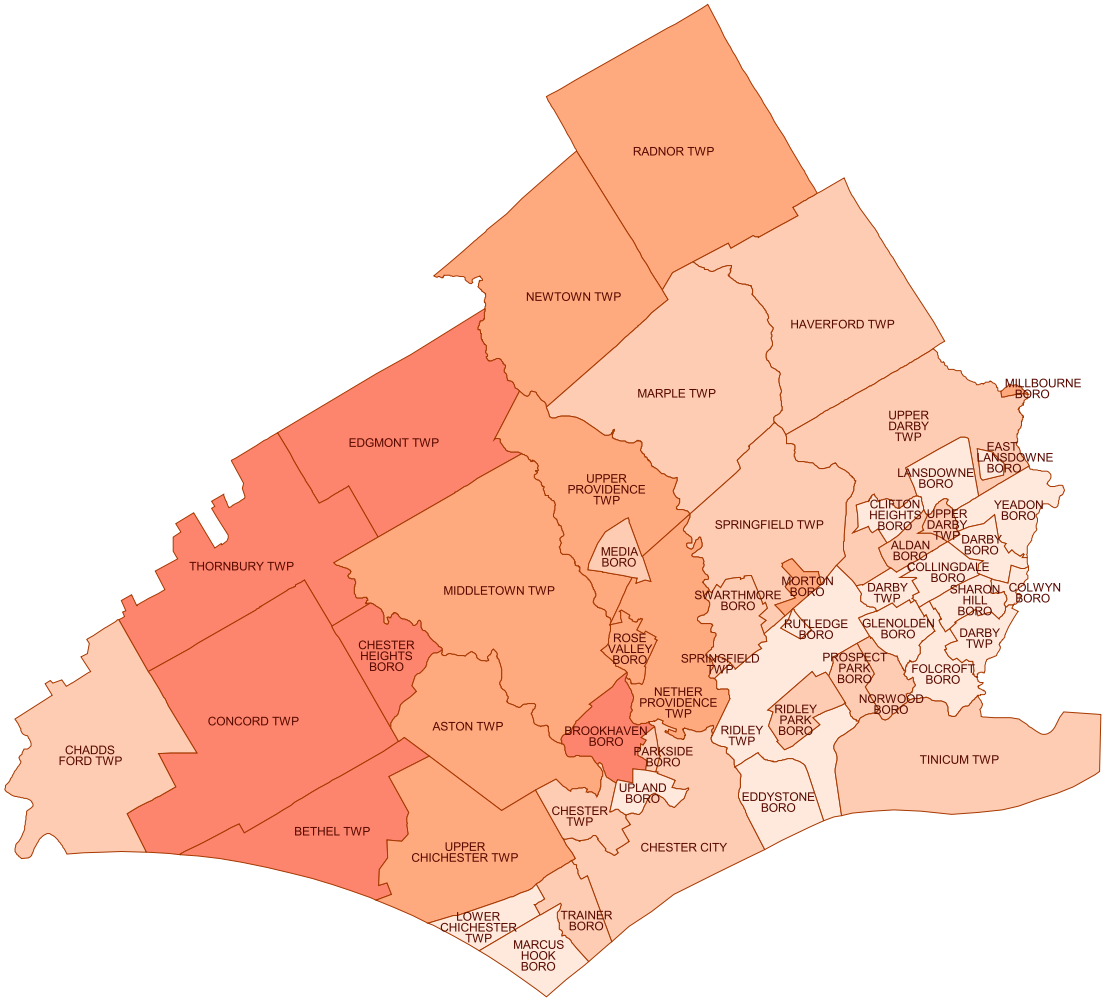
Western Municipalities								
	Census		2005- 2025 DVRPC Forecasts					
Municipality	1990	2000	2005	2010	2015	2020	2025	% Change 00-25
Aston Township	15,080	16,203	17,180	17,630	18,150	18,720	19,260	18.9%
Bethel Township	3,330	6,421	7,110	7,640	8,090	8,910	9,540	48.6%
Brookhaven Borough	8,567	7,985	7,910	7,920	7,900	7,960	7,960	-0.3%
Chadds Ford Township	3,118	3,170	3,360	3,660	3,920	4,340	4,760	50.2%
Chester Heights Borough	2,273	2,481	2,680	2,890	3,110	3,490	3,990	60.8%
Concord Township	6,933	11,239	12,130	13,230	14,140	15,580	16,920	50.5%
Edgmont Township	2,735	3,918	4,240	4,790	5,340	6,030	6,380	62.8%
Media Borough	5,957	5,533	5,400	5,330	5,180	5,100	5,060	-8.5%
Middletown Township	14,130	16,064	16,070	16,370	16,410	16,850	17,690	10.1%
Newtown Township	11,366	11,700	11,570	12,000	12,240	12,170	12,140	3.8%
Rose Valley Borough	982	944	940	940	930	930	1,010	7.0%
Thornbury Township	5,056	5,787	6,780	7,140	7,380	7,840	8,300	43.4%
Upper Chichester Township	15,004	16,842	17,510	18,400	19,020	19,700	20,350	20.8%
Upper Providence Township	9,727	10,509	10,930	11,050	11,420	11,500	11,470	9.1%
Western Municipalities	**104,258**	**118,796**	**123,810**	**128,990**	**133,230**	**139,120**	**144,830**	**21.9%**
Delaware County	**547,651**	**550,864**	**551,530**	**550,970**	**546,570**	**546,972**	**547,784**	**-0.6%**

Source: U.S. Department of Commerce, Bureau of the Census; prepared by DCPD, 2002

The projected shift in population and employment will also shift sewage disposal needs. Where western Delaware County will need increased disposal capacity, eastern Delaware County may have excess treatment capacity available. Subsequent sections of this plan will consider this "balancing" of disposal needs and treatment capacity as an option for western Delaware County.

FIGURE 2-2

Projected Population Change, 2000-2025



LEGEND

POPULATION CHANGE

- -16% to -10%
- -10% to 0%
- 0% to 21%
- 21% to 63%

N
W E
S

Scale in Miles

1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)
- Delaware Valley Regional Planning Commission (DVRPC)

TABLE 2-4

DELAWARE COUNTY DENSITY FORECASTS

Eastern Municipalities						
Municipality	**Square Miles**	**2000 Population**	**2000 Persons Per Square Mile**	**2025 Population**	**2025 Persons Per Square Mile**	**Change in Persons Per Square Mile 2000 to 2025**
Aldan Borough	0.59	4,313	7,310	3,970	6,729	-581
Chester City	4.77	36,854	7,726	35,354	7,412	-59
Chester Township	1.38	4,604	3,336	4,170	3,022	-314
Clifton Heights Borough	0.62	6,779	10,934	5,990	9,661	-999
Collingdale Borough	0.87	8,664	9,959	7,500	8,621	-1338
Colwyn Borough	0.25	2,453	9,812	2,060	8,240	-1572
Darby Borough	0.81	10,299	12,715	8,860	10,938	-1234
Darby Township	1.64	9,622	5,867	8,090	4,933	-934
East Lansdowne Borough	0.21	2,586	12,314	2,220	10,571	-1743
Eddystone Borough	0.96	2,442	2,544	2,170	2,260	-283
Folcroft Borough	1.38	6,978	5,057	5,980	4,333	-723
Glenolden Borough	0.86	7,476	8,693	6,620	7,698	-995
Haverford Township	9.95	48,498	4,874	46,770	4,701	-174
Lansdowne Borough	1.20	11,044	9,203	9,610	8,008	-961
Lower Chichester Township	1.06	3,591	3,388	3,210	3,028	-360
Marcus Hook Borough	1.14	2,314	2,030	2,020	1,772	-258
Marple Township	10.43	23,737	2,276	23,330	2,237	-39
Millbourne Borough	0.07	943	13,471	960	13,714	243
Morton Borough	0.36	2,715	7,542	2,830	7,861	652
Nether Providence Township	4.64	13,456	2,900	13,940	3,004	104
Norwood Borough	0.81	5,985	7,389	5,620	6,938	-451
Parkside Borough	0.19	2,267	11,932	2,070	10,895	-1037

TABLE 2-4

DELAWARE COUNTY DENSITY FORECASTS

(CONTINUED)

Eastern Municipalities						
Municipality	**Square Miles**	**2000 Population**	**2000 Persons Per Square Mile**	**2025 Population**	**2025 Persons Per Square Mile**	**Change in Persons Per Square Mile 2000 to 2025**
Prospect Park Borough	0.73	6,594	9,033	6,110	8,370	-663
Radnor Township	13.83	30,878	2,233	31,480	2,276	-18
Ridley Park Borough	1.04	7,196	6,919	6,610	6,356	-563
Ridley Township	5.18	30,791	5,944	27,610	5,330	-629
Rutledge Borough	0.15	860	5,733	760	5,067	-667
Sharon Hill Borough	0.77	5,468	7,101	4,710	6,117	-828
Springfield Township	6.29	23,677	3,764	22,340	3,552	-213
Swarthmore Borough	1.38	6,170	4,471	5,930	4,297	-174
Tinicum Township	5.53	4,353	787	4,100	741	-38
Trainer Borough	0.98	1,901	1,940	1,820	1,857	-83
Upland Borough	0.66	2,977	4,511	2,650	4,015	-495
Upper Darby Township	7.62	81,821	10,738	74,950	9,836	-1644
Yeadon Borough	1.6	11,762	7,351	10,540	6,588	-807
Eastern Municipalities	**89.95**	**432,068**	**4,803**	**402,954**	**4,480**	**-325**

TABLE 2-4

DELAWARE COUNTY DENSITY FORECASTS
(CONTINUED)

Western Municipalities						
Municipality	**Square Miles**	**2000 Population**	**2000 Persons Per Square Mile**	**2025 Population**	**2025 Persons Per Square Mile**	**Change in Persons Per Square Mile 2000 to 2025**
Aston Township	5.90	16,203	2,746	19,260	3,264	717
Bethel Township	5.44	6,421	1,180	9,540	1,754	573
Brookhaven Borough	1.69	7,985	4,725	7,960	4,710	-15
Chadds Ford Township	8.84	3,170	359	4,760	538	229
Chester Heights Borough	2.17	2,481	1,143	3,990	1,839	695
Concord Township	13.78	11,239	816	16,920	1,228	412
Edgmont Township	9.74	3,918	402	6,380	655	253
Media Borough	0.75	5,533	7,377	5,060	6,747	-631
Middletown Township	13.43	16,064	1,196	17,690	1,317	121
Newtown Township	10.11	11,700	1,157	12,140	1,201	44
Rose Valley Borough	0.74	944	1,276	1,010	1,365	89
Thornbury Township	9.16	5,787	632	8,300	906	274
Upper Chichester Township	6.80	16,842	2,477	20,350	2,993	583
Upper Providence Township	5.93	10,509	1,772	11,470	1,934	162
Western Municipalities	**94.48**	**118,796**	**1,257**	**144,830**	**1,533**	**276**
Delaware County	**184.43**	**550,864**	**2,987**	**547,784**	**2,970**	**-57**

Source: U.S. Department of Commerce, Bureau of the Census; prepared by DCPD, 2002

TABLE 2-5

DELAWARE COUNTY EMPLOYMENT FORECASTS

Eastern Municipalities								
	Census	2000 - 2025 DVRPC Employment Forecasts						
Municipality	1990	2000	2005	2010	2015	2020	2025	% Change 00-25
Aldan Borough	599	760	840	850	940	970	970	27.60%
Chester City	14,765	12,110	11,110	10,680	9,790	9,730	7,660	-36.70%
Chester Township	1,101	2,140	2,630	2,900	3,190	3,360	3,420	59.80%
Clifton Heights Borough	3,321	3,190	3,100	2,990	2,880	2,790	2,630	-17.60%
Collingdale Borough	1,966	1,870	1,830	1,790	1,760	1,710	1,620	-13.40%
Colwyn Borough	331	320	310	300	300	290	270	-15.60%
Darby Borough	3,441	3,020	2,900	2,900	2,900	2,900	2,900	-4.00%
Darby Township	833	810	800	770	720	680	600	-25.90%
East Lansdowne Borough	498	490	470	460	450	450	430	-12.20%
Eddystone Borough	3,464	2,790	2,630	2,540	2,480	2,470	2,410	-13.60%
Folcroft Borough	4,041	3,150	2,940	2,880	2,740	2,690	2,710	-14.00%
Glenolden Borough	2,505	2,260	2,210	2,140	2,090	2,000	1,880	-16.80%
Haverford Township	14,428	13,980	13,870	13,700	13,630	13,380	12,880	-7.90%
Lansdowne Borough	2,989	2,890	2,820	2,740	2,680	2,590	2,450	-15.20%
Lower Chichester Township	799	940	1,000	1,050	1,110	1,130	1,140	21.30%
Marcus Hook Borough	3,492	3,040	2,840	2,730	2,550	2,430	2,200	-27.60%
Marple Township	9,866	11,840	12,700	13,460	14,340	14,960	15,300	29.20%
Millbourne Borough	381	330	340	330	330	310	310	-6.10%
Morton Borough	1,348	1,260	1,240	1,220	1,200	1,180	1,140	-9.50%
Nether Providence Township	4,015	4,090	4,360	4,830	5,390	6,210	6,810	66.50%
Norwood Borough	783	770	750	740	730	730	720	-6.50%
Parkside Borough	184	190	190	200	220	250	280	47.40%

TABLE 2-5

DELAWARE COUNTY EMPLOYMENT FORECASTS
(CONTINUED)

Eastern Municipalities								
	Census	2000 - 2025 DVRPC Employment Forecasts						
Municipality	1990	2000	2005	2010	2015	2020	2025	% Change 00-25
Prospect Park Borough	1,621	1,590	1,570	1,550	1,540	1,520	1,470	-7.50%
Radnor Township	28,446	29,450	30,430	31,800	33,420	35,200	36,350	23.40%
Ridley Park Borough	2,576	2,370	2,280	2,120	1,920	1,870	1,780	-24.90%
Ridley Township	11,839	13,860	14,370	15,970	17,860	18,780	19,210	38.60%
Rutledge Borough	96	100	110	130	140	180	210	110.00%
Sharon Hill Borough	2,137	2,690	2,970	3,260	3,600	3,910	4,160	54.60%
Springfield Township	11,419	11,300	11,230	11,230	11,150	11,020	10,670	-5.60%
Swarthmore Borough	3,222	3,250	3,300	3,100	3,090	3,090	3,080	-5.20%
Tinicum Township	6,013	6,100	6,610	6,250	5,930	5,840	5,840	-4.30%
Trainer Borough	821	1,170	1,270	1,310	1,350	1,310	1,250	6.80%
Upland Borough	4,036	4,170	4,340	4,530	4,760	4,950	5,060	21.30%
Upper Darby Township	21,275	20,090	19,470	18,640	17,940	16,900	16,600	-17.40%
Yeadon Borough	3,385	3,370	3,350	3,310	3,280	3,190	3,050	-9.50%
Eastern Municipalities	**172,036**	**171,750**	**173,180**	**175,400**	**178,400**	**180,970**	**179,460**	**4.49%**

TABLE 2-5

DELAWARE COUNTY EMPLOYMENT FORECASTS
(CONTINUED)

Western Municipalities								
	Census	2000 - 2025 DVRPC Employment Forecasts						
Municipality	1990	2000	2005	2010	2015	2020	2025	% Change 00-25
Aston Township	5,864	6,430	6,880	7,450	8,110	8,850	9,470	47.3%
Bethel Township	909	1,060	1,190	1,330	1,490	1,610	1,850	74.5%
Brookhaven Borough	2,237	2,370	2,480	2,600	2,740	2,870	2,950	24.5%
Chadds Ford Township	5,487	7,160	8,470	9,900	11,300	12,210	12,980	81.3%
Chester Heights Borough	1,738	2,100	2,340	2,600	2,890	3,100	3,240	54.3%
Concord Township	3,974	4,930	5,490	6,090	6,780	7,450	8,020	62.7%
Edgmont Township	1,203	1,520	1,700	1,920	2,180	2,500	2,810	84.9%
Media Borough	11,210	11,360	11,650	11,790	12,000	12,030	12,010	5.7%
Middletown Township	10,726	10,710	10,900	11,480	11,710	12,230	12,070	12.7%
Newtown Township	7,195	8,090	8,640	9,230	9,910	10,540	10,990	35.8%
Rose Valley Borough	121	130	130	130	130	130	130	0.0%
Thornbury Township	2,221	2,500	2,740	3,020	3,350	3,700	4,020	60.8%
Upper Chichester Township	2,657	3,140	3,370	3,570	3,810	3,970	4,060	29.3%
Upper Providence Township	2,881	3,080	3,230	3,390	3,570	3,740	3,830	24.4%
Western Municipalities	**58,423**	**64,580**	**69,210**	**74,500**	**79,970**	**84,930**	**88,430**	**36.9%**
Delaware County	**230,459**	**236,330**	**242,390**	**249,900**	**258,370**	**265,900**	**269,890**	**14.2%**

Source: U.S. Department of Commerce, Bureau of the Census; DVRPC, 2002

CHAPTER 3

EXISTING WASTEWATER TREATMENT AND CONVEYANCE SYSTEMS

WASTEWATER TREATMENT AND CONVEYANCE ORGANIZATIONS SERVING DELAWARE COUNTY

Most of Delaware County's domestic sewage is currently conveyed and/or treated by one or more of the twenty public governmental authorities charged with these tasks (refer to Table 1-3 in Chapter 1). Homes and businesses in portions of the County not served by these authorities utilize individual on-site or community treatment systems constructed to serve their respective homes or businesses. The following is a discussion of those municipal and nonmunicipal wastewater treatment (T) and conveyance systems (C) operating in the western planning area. Note that some of these authorities serve more than one function within any given municipality.

Public organizations currently providing sewage treatment or conveyance service within the western planning area are:

- Brookhaven Borough (T, C)
- Chadds Ford Township Sewer Authority (T, C)
- Concord Township Sewer Authority (T, C)
- Delaware County Regional Water Quality Control Authority (DELCORA) (T, C)
- Rose Valley Borough (T, C)
- Southwest Delaware County Municipal Authority (SWDCMA) (T, C)
- Thornbury Township Board of Supervisors (T, C)
- City of Wilmington, DE (T, C)
- Bethel Township Sewer Authority (C)
- Middletown Township Sewer Authority (C)
- Newtown Township Municipal Sewer Authority (C)
- Southern Delaware County Authority (C)
- Upper Providence Sewer Authority (C)
- New Castle County (C)

Currently, there are thirty-three private community treatment systems in western Delaware County. These systems are often operated and maintained by private contractors including:

- Aqua Pennsylvania, Inc. (Media) (T, C)
- American Water Services (14 facilities) (T, C)
- TMH Environmental (2 facilities) (T, C)

A great deal of information associated with the many sewer systems noted has been documented in digital form. For more information regarding geographic information system (GIS) mapping that accompanies this report, refer to Appendix A, which

discusses the mapping process. Figure 3-1 shows the service area of the public and private organizations and the location of their treatment facilities. The plate in the back pocket of the report is a composite of the discussion in this chapter.

PUBLIC ORGANIZATIONS PROVIDING SEWAGE TREATMENT AND CONVEYANCE WITHIN THE WESTERN STUDY AREA

Wastewater Treatment Organizations

Brookhaven Borough

Organizational Description

Sewage treatment in the Borough of Brookhaven is provided as a function of the local municipal government. The plant is financially self-sufficient; capital funds are raised through bond issues while operations and maintenance expenses and debt service are covered by user charges. Besides the treatment plant, Brookhaven owns and operates a sewer collection system that is tributary to both its treatment facility and to SWDCMA's Baldwin Run Pollution Control Facility in Aston as shown in Figure 3-2.

Treatment Facility Description

The Brookhaven Wastewater Treatment Plant (WWTP) is located at 2 Cambridge Road in Brookhaven. The plant was built in 1935 to serve an equivalent population of 3,000. The plant's current average design flow is 0.192 MGD, with design organic capacity of 320 lbs. of 5-day biochemical oxygen demand (BOD_5) per day. Secondary treatment is achieved through a two-stage, high-rate trickling filter process, with recirculation in each stage. Effluent is chlorinated and discharged to Chester Creek under NPDES Permit No. PA0023949 (National Pollutant Discharge Elimination System).

Previous Upgrades

In 2001, the Borough added a 400,000-gallon tank to hold flows so that during extensive wet weather periods the plant will still be able to process sewage flow efficiently. In addition, another final treatment tank was added to increase the treatment time before discharging. The Borough also eliminated the existing primary treatment tank and replaced it with a state-of-the-art primary treatment tank.

Other Issues

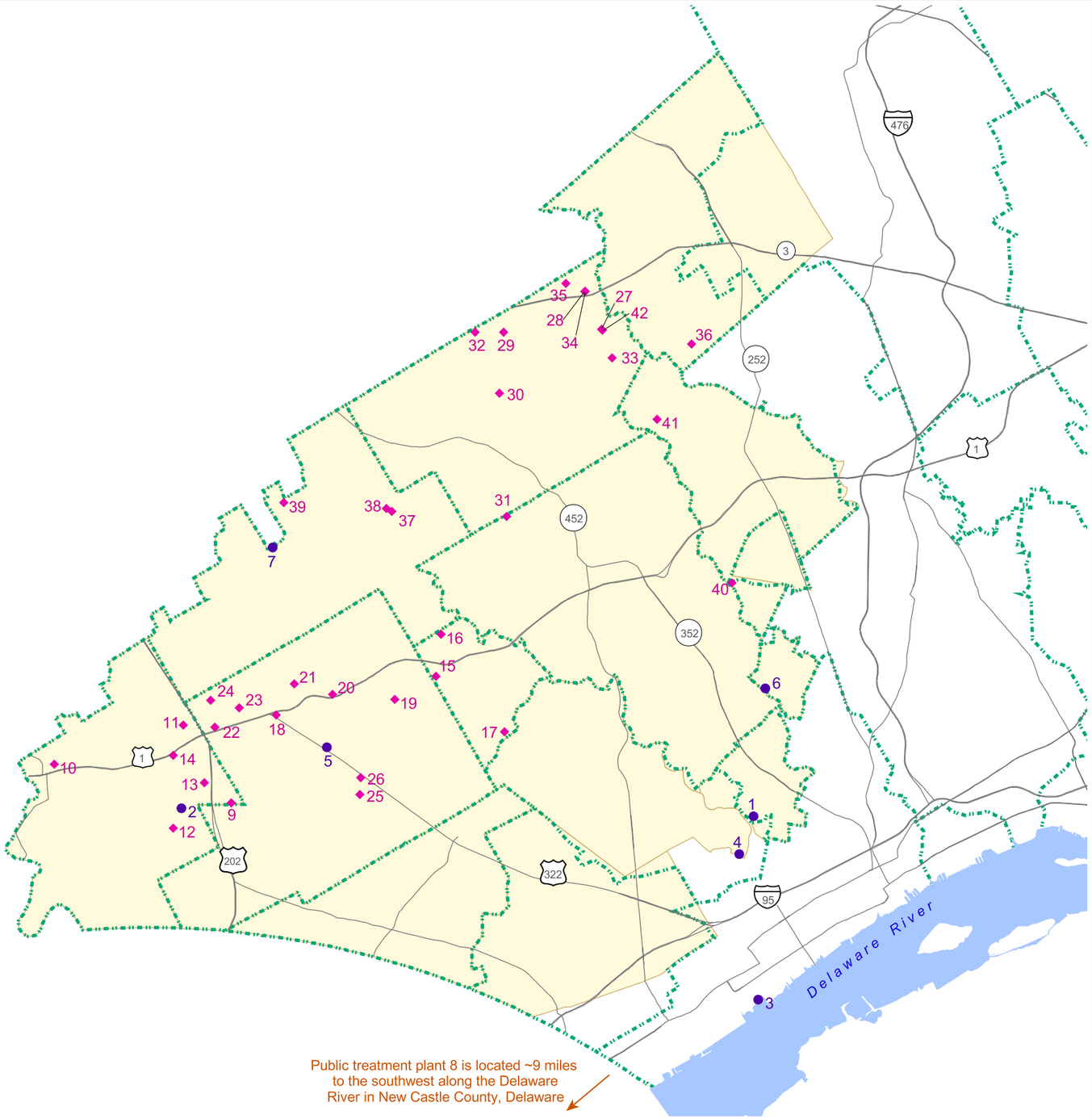
The treatment plant has historically experienced flows in excess of twice the plant's permitted capacity during wet weather events. This is indicative of an inflow problem in the sewage collection system. The Borough has discussed this topic in its newsletter to residents and stressed the importance of disconnecting sump pumps and roof drains.

FIGURE 3-1

Treatment Facilities, Western Planning Area

Treatment Facility Key

1 BROOKHAVEN WWTP
2 RIDINGS WWTP
3 DELCORA WRTP
4 BALDWIN RUN POLLUTION CONTROL PLANT
5 CENTRAL STP
6 ROSE VALLEY STP
7 THORNBURY TOWNSHIP TP
8 WILMINGTON WATER POLLUTION CONTROL FACILITY
9 SPRINGHILL FARMS WWTP
10 BRANDYWINE RIVER HOTEL WWTP
11 KNIGHTS BRIDGE WWTP
12 RAVENS CREST WWTP
13 BRANDYWINE SUMMIT WWTP
14 PANTOS WWTP
15 COVENTRY CROSSING TP
16 DARLINGTON WOODS TP
17 VALLEYBROOK TP
18 CONCORDVILLE INN SP
19 FOX VALLEY SP
20 BRINTON MANOR SP
21 CONCORD INDUSTRIAL PARK SP
22 STATE FARM STP
23 SOUTHCO STP
24 CONCORD COUNTRY CLUB SP
25 GARNET VALLEY SCHOOL DISTRICT SP
26 CONCORD BEVERAGE SP
27 RUNNYMEADE FARM STP #2
28 EDGMONT SQUARE CENTER TP #2
29 EDGMONT COUNTRY CLUB TP
30 WHITE HORSE VILLAGE TP
31 SLEIGHTON FARM SCHOOL STP
32 US ARMY RESERVE CENTER TP
33 RUNNYMEADE FARM STP #1
34 EDGMONT SQUARE CENTER TP #1
35 EAGLEVIEW TP
36 SPRINGTON POINTE ESTATES TP
37 GODDARD SCHOOL TP
38 GLEN MILLS SCHOOL TP
39 CHEYNEY UNIVERSITY TP
40 MEDIA STP
41 TOFT WOODS TP
42 RUNNYMEADE FARM STP #3



DELCORA

LEGEND

- Public Treatment Plant
- Private Treatment Plant
- Roads
- Streams
- Authority Boundary
- Project Area
- Delaware County Boundary

N
W E
S

Scale in Miles

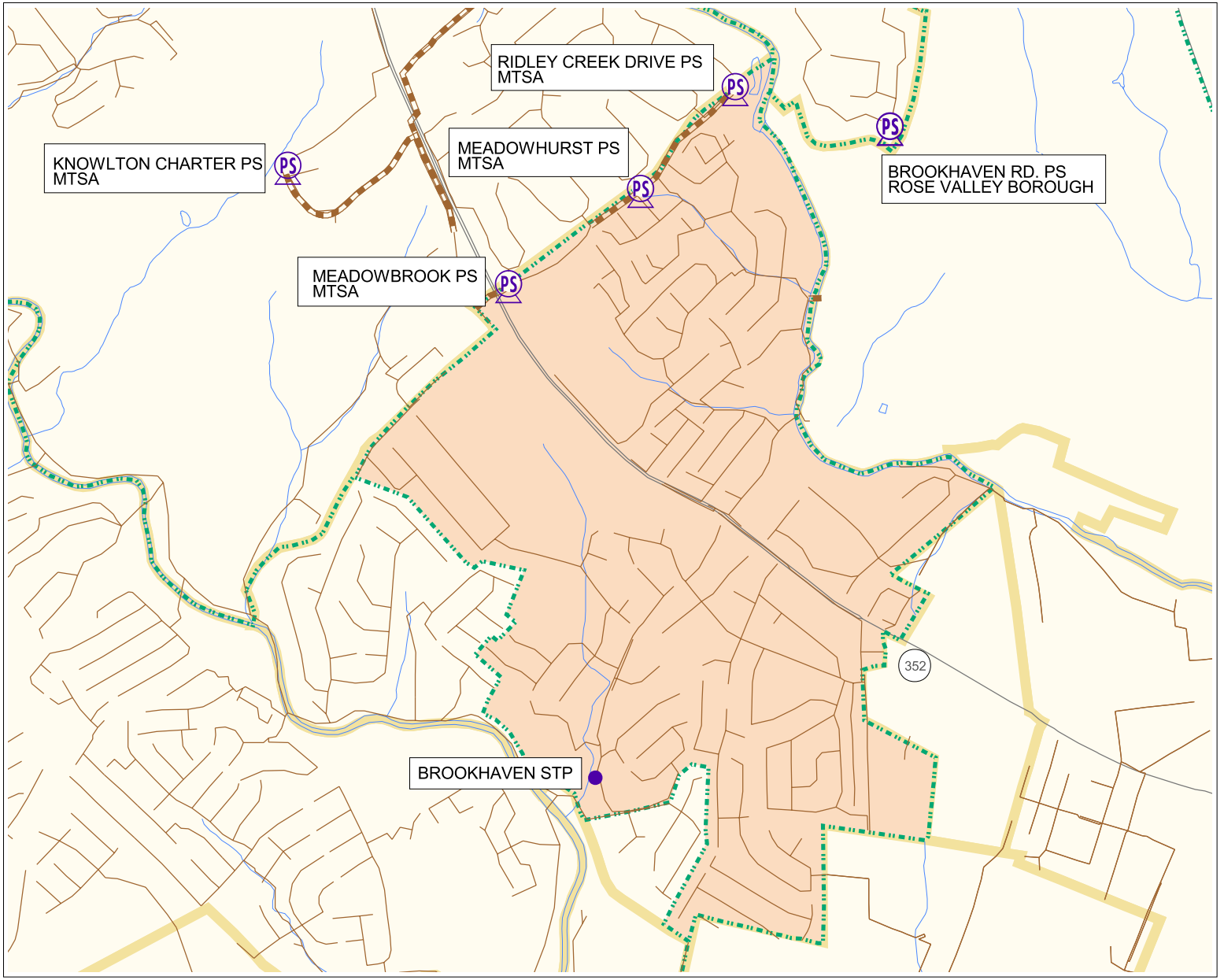
1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

FIGURE 3-2

Brookhaven Borough



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Brookhaven Borough
- Municipal Boundary

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Scale in Feet

500 0 500 1000 1500

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Scheduled Upgrades

No upgrades are currently scheduled.

Current Plant Status

In 2000, an annual average flow of 0.169 MGD was discharged, with a 3-month maximum average daily flow of 0.201 MGD. Annual average BOD_5 load is 236 lbs. per day.

Conveyance Facilities Description

Conveyance Lines

The Borough owns and maintains sanitary sewer lines as shown on Figure 3-2.

Pump Stations

The Borough has no pump stations.

Sludge/Biosolids Generation

No information was provided by the Borough on solids collection during the treatment process or ultimate disposal of these solids.

Chadds Ford Township Sewer Authority

Organizational Description

The Chadds Ford Township Board of Supervisors, pursuant to the Municipality Authorities Act, established the Chadds Ford Township Sewer Authority (CFTSA) in 1988. CFTSA was authorized to exercise all powers granted under the Act to implement the wastewater management plan for its service area. CFTSA's role as an implementation agency involves the acquisition, holding, construction, improvement, maintenance, operation, owning, and leasing of the sewer system and sewer treatment facilities. CFTSA is financially self-sufficient; capital funds are raised through bond issues, while operations and maintenance expenses and debt service are covered by user charges. CFTSA owns and maintains the 0.08 MGD Ridings WWTP located at Ridge Road and Ridings Boulevard, as well as a system of wastewater conveyance facilities and collector sewers as shown in Figure 3-3.

There are currently six private treatment facilities permitted within Chadds Ford Township that serve more than a single residence. Information on these facilities is provided in a subsequent section. In addition to the NPDES permitted facilities, there are a significant number of on-lot treatment systems in the Township, which are discussed in Chapter 4.

Treatment Facility Description

CFTSA owns and operates the Ridings WWTP. This facility was constructed in 1994 and had a permitted capacity of 0.04 MGD. After a 1996 expansion, this limit was raised to 0.08 MGD. The plant serves the Ridings and Ridings II residential communities and accepts additional flow from the Township. The plant operates under NPDES Permit No. PA0055476 and has a design organic load limit of 167 lbs. of BOD_5 per day. The treatment process involves a sequencing batch reactor and dual basins. The plant discharges to an unnamed tributary of Harvey Run.

Previous Upgrades

A major expansion took place in 1996 which increased the plant's capacity to its current level.

Other Issues

The plant is operating well under capacity and has no process problems.

Scheduled Upgrades

No upgrades are currently scheduled at the facility. CFTSA is planning to approach DEP in the near future with a request to re-rate the plant to a 0.09 or 0.1 MGD capacity (final figure to be determined shortly by additional tests).

Current Plant Status

In 2000, the facility had an average monthly flow of 0.022 MGD and a maximum 3-month average flow of 0.026 MGD.

Conveyance Facilities Description

Conveyance Lines

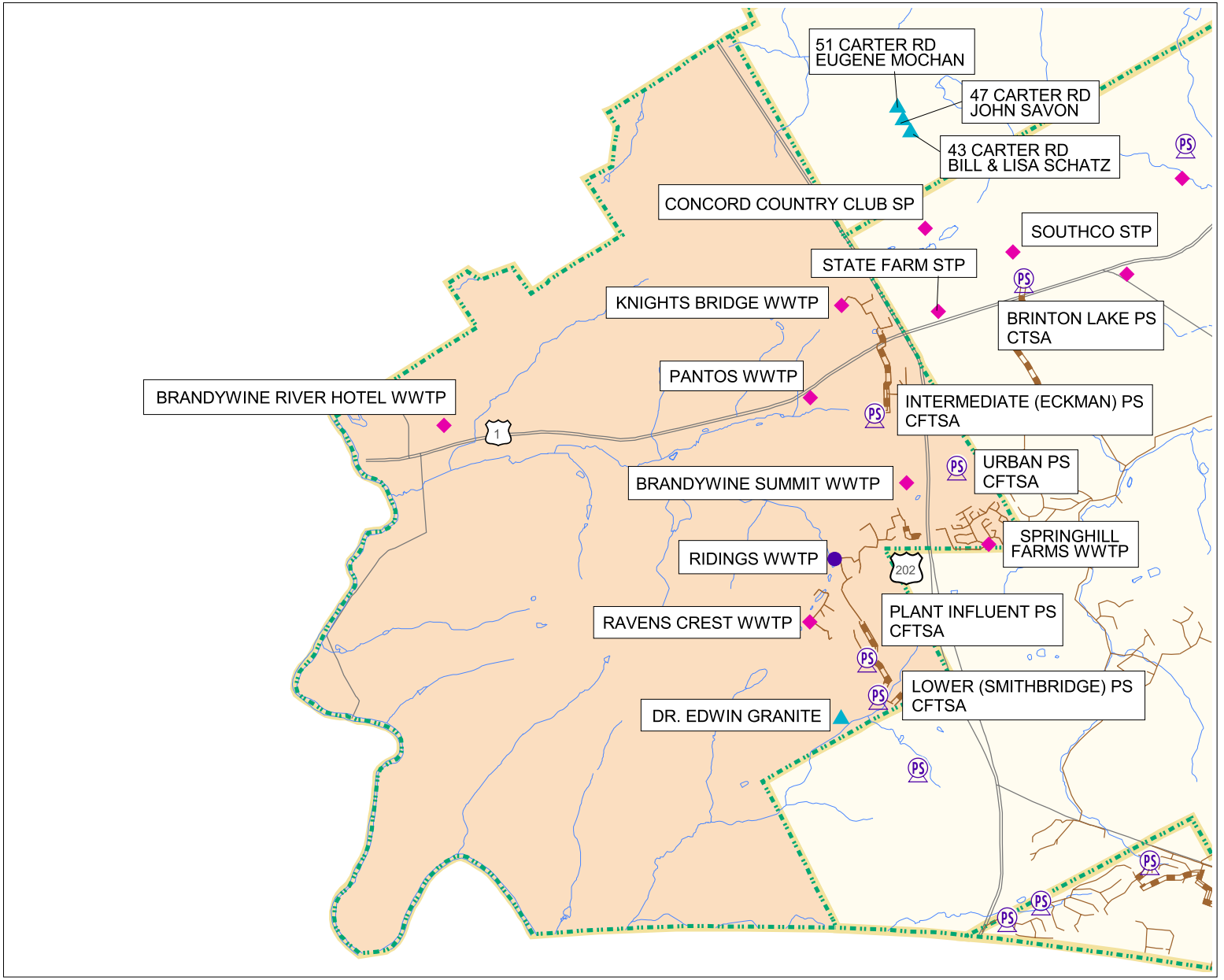
The Authority owns and maintains about 16,600 linear feet (LF) of gravity sewer lines. This includes 2,400 LF of sewer currently under construction. CFTSA owns 3,000 LF (est. 6" diameter) of force main from the Smithbridge Pump Station to the Plant Influent Pump Station. Grinder pumps and lateral connections are privately owned and maintained.

Pump Stations

There are four pump stations (PS) that are owned and operated by CFTSA: Lower (Smithbridge) PS, Plant Influent PS serving the Ridings WWTP, Intermediate (Eckman) PS serving the Knights Bridge WWTP, and a new Urban PS located off of Woodland

FIGURE 3-3

Chadds Ford Township



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Chadds Ford Township
- Municipal Boundary

N
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Scale in Feet

1000 0 1000 2000 3000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Drive. Urban PS was constructed to serve the sewer extension to Woodland Summit and Brandywine Summit office buildings.

Sludge/Biosolids Generation

Sludge from the Ridings WWTP is hauled by Concord Wastewater Services to the SWDCMA Baldwin Run facility in Aston.

Concord Township Sewer Authority

Organizational Description

The Concord Township Board of Supervisors, pursuant to the Municipality Authorities Act, established the Concord Township Sewer Authority (CTSA) on September 14, 1973. CTSA was authorized to exercise all powers granted under the Act to implement the wastewater management plan for its service area. CTSA's role as an implementation agency involves the acquisition, holding, construction, improvement, maintenance, operation, ownership, and leasing of the sewer system and sewer treatment facilities. CTSA is financially self-sufficient; capital funds are raised through tap-in fees while operations and maintenance expenses are covered by user charges. CTSA does not have any debt service as of December 31, 2001. CTSA owns and maintains the 1.2 MGD Central Sewage Treatment Plant located at 664 Concord Road, as well as a system of wastewater conveyance facilities and collector sewers as shown in Figure 3-4.

Treatment Facility Description

The CTSA WWTP was constructed in 1996 and discharges to Chester Creek. The plant is an extended aeration type system that was originally designed for 1.2 MGD but was permitted for 0.6 MGD. In 1997, the discharge limit was increased to 1.2 MGD. Design organic load is 2,500 lbs. of BOD_5 per day. The plant operates under NPDES Permit No. PA0055212. About 40% of the current flow comes from Delaware County Prison, 56% from residential sources, and 4% from commercial sources. Currently there are no industrial contributors.

Previous Upgrades

No upgrades have been performed at this facility.

Other Issues

Major development is expected in the plant service area. Construction of an on-site process plant is underway at the new Toll Brothers development (Riviera at Concord) which will be dedicated to CTSA. The plant's ultimate expansion design is 0.21 MGD, with current design at 0.07 MGD.

Scheduled Upgrades

The following upgrades are scheduled at the CTSA WWTP: fine bubble air aeration, expansion of plant pre-treatment, and ultraviolet disinfection.

Current Plant Status

The plant is currently operating at less than its permitted discharge and is achieving permit limitations. Average daily flow in the year 2001 was 0.390 MGD, while the 3-month maximum average daily flow was 0.406 MGD.

Conveyance Facilities Description

Conveyance Lines

CTSA owns and maintains a 12-mile collection system that serves the plant. This system is relatively new and currently has no significant problems. All lines and manholes are inspected manually or by video and are flushed prior to dedication. Repairs are required prior to dedication.

Pump Stations

CTSA owns and maintains the following pump stations:

- Concord Hunt PS
- Concord Woods PS
- Chase #1 & #2 PS (not dedicated)
- Cheyney Road PS
- Honold (Twin Creeks at Mendenhall) PS
- Brinton Lake PS (not dedicated)
- Fox Valley Life Campus PS (not dedicated)
- Beaver Valley Road PS (not dedicated)
- Windmill Creek II PS (not dedicated)

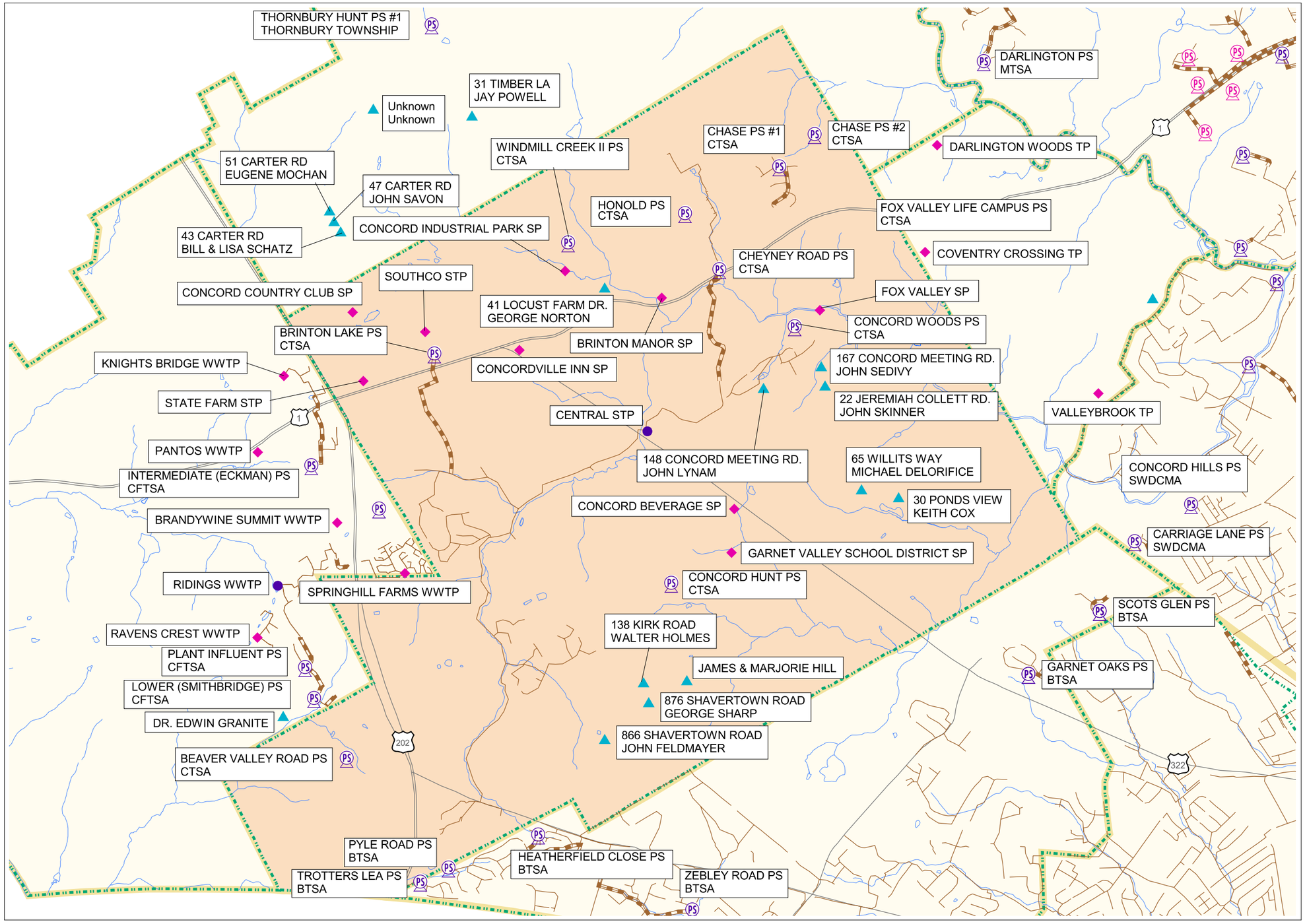
No problems have been reported with any of these facilities.

Sludge/Biosolids Generation

Solids are accumulated in Tank 1 of the facility. CTSA is in year three of its contract with EarthCare, which collects liquid sludge every four to six weeks and hauls it to the DELCORA facility in Chester.

FIGURE 3-4

Concord Township Sewer Authority



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Concord Township
- Municipal Boundary

N
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Scale in Miles

2000 0 2000 4000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Delaware County Regional Water Quality Control Authority

Organizational Description

DELCORA was established in 1971 by the Delaware County Commissioners pursuant to the Municipality Authorities Act, and its Board of Directors is appointed by Delaware County Council. DELCORA was authorized to exercise all powers granted under the Act to implement the Countywide wastewater management plan. DELCORA's role as an implementation agency involves the acquisition, holding, construction, improvement, maintenance, operation, owning, and leasing of sewer systems and sewage treatment facilities. DELCORA is financially self-sufficient; capital funds are raised through bond issues, while operations and maintenance expenses and debt service are covered by user charges. DELCORA owns and maintains the 44 MGD WRTP located in Chester, as well as an extensive system of wastewater conveyance facilities, and, in certain municipalities, the collector sewers.

DELCORA's service area is divided into eastern and western regional drainage districts as established in the 1974 Albreit and Friel plan. The eastern regional drainage district serves a significant portion of the County's population east of Crum Creek (26 municipalities). The western regional drainage district includes the City of Chester as well as all or part of Brookhaven, Marcus Hook, Parkside, Trainer, and Upland Boroughs and Chester Township. In 2002, SDCA completed a force main that directs most of its flows to the WRTP.

Treatment Facility Description

The DELCORA WRTP is located at the foot of Booth Street in the City of Chester and serves DELCORA's western service area. The plant, which has a rated treatment capacity of 44 MGD (92.3 MGD maximum with 30 MGD recycled to aeration basins), discharges to the Delaware River under NPDES Permit No. PA0027103. In 2000, DELCORA averaged 31.2 MGD of flow through the WRTP with a maximum flow of 63.9 MGD. As noted in the Chapter 94 Report, organic capacity is not applicable since the NPDES permit for the plant addresses effluent. The design organic loading for the plant influent is 91,740 lbs. of BOD_5 per day. During 2000, the WRTP averaged 30,285 lbs. of BOD_5 per day in the influent and discharged 968 lbs. per day.

The plant employs an aerated waste activated sludge process that provides primary and secondary treatment levels. The treatment processes include primary clarification, aeration, secondary clarification, post-aeration, and disinfection by chlorination. Sludge is thickened, dewatered, and incinerated. The ash is stored and transported to the City of Wilmington, DE, sludge stabilization facility for disposal. During 2000, DELCORA landfilled 8,041 dry metric tons of ash. Wastewater flow to the WRTP is first treated in a preaeration basin. Next, solids are settled and removed during primary clarification. Flow is then directed to the aeration tanks where biological action takes place to remove organics. From the aeration tanks, flow is transferred to final clarifiers where more solids are settled

and removed. The final step is the chlorine contact tanks, where disinfection to eliminate pathogens and bacteria takes place prior to discharge to the Delaware River.

Approximately 60% of DELCORA's WRTP flow is categorized as industrial wastewater (industrial reserve capacity of 29 MGD). Note that 99% of the industrial flows are generated by two major industries, Kimberly-Clark Tissue Co. and Sun Company-Marcus Hook Refinery. The list of the significant industrial users that discharge to the WRTP is shown in Table 3-1.

All industrial waste discharging to the WRTP must have a DELCORA-issued Industrial Waste Permit in accordance with the EPA-approved treatment program. Pretreated industrial wastewater must comply with limits established by DELCORA and approved by EPA.

TABLE 3-1

SIGNIFICANT INDUSTRIAL USERS DISCHARGING TO THE WRTP

Significant Industrial User	Permitted Discharge (gpd)
Kimberly-Clark Tissue Co.	16,500,000
Sun Company-Marcus Hook Refinery	12,000,000
P.Q. Corporation	125,000
Foamex International, Inc.	80,000
Medford Incorporated	80,000
Stoney Creek Technologies, LLC	80,000
Esschem, Inc.	15,000
Marvec Manufacturing, Inc.	7,500
Kozmer Technologies, Ltd.	1,000

Source: DCPD, 2002

Previous Upgrades

Over the past several years, DELCORA has been in the process of implementing contract improvements to upgrade the treatment at the WRTP. During 1989, DELCORA began a program to adjust the equipment and treatment process to improve effluent quality. Upgrades that have been completed at the WRTP include:

- Modifications in the delivery and storage of chlorine.
- Overhaul of the secondary clarifiers.
- Modifications to the raw sewage pump station.
- Construction of a fifth clarifier.

Other Issues

On June 12, 1991, the City of Philadelphia transmitted a letter to DELCORA notifying the County of the City's intent to terminate its Agreement to treat wastewater from Delaware County upon its 30-year term on March 15, 2004. In general, the reasons for this relate to disagreements over capital contribution payments and increased wastewater treatment rates. In 1995, the dispute was settled, and DELCORA and the City executed an amendment to the Agreement that served as a settlement of the dispute.

In a legal opinion prepared by DELCORA's solicitor, Blank Rome Comisky & McCauley LLP, it was determined that, "The City's 1991 letter did not constitute notice of termination of the Agreement..." because the timing of the 1991 letter was not consistent with the termination clause in the March 15, 1974 Agreement. Also, given the fact that the City's issues were addressed in the 1995 Agreement, and the City has not since served a termination notice in accordance with the requirements of the 1974 Agreement, the Agreement with the City has not yet been terminated.

Scheduled Upgrades

During 1989, DELCORA began a program to adjust the equipment and treatment process to improve effluent quality. It is DELCORA's intention to maximize the utilization of the WRTP. Plans to increase the rated capacity of the WRTP are being considered at this time. Upgrades currently underway or in progress at the WRTP include:

- Rehabilitation of the grit removal system (to be completed in 2004).
- Modifications to the sludge delivery and mixing system (construction to start in 2003).
- Replacement of the mechanical surface aerators with submerged fine bubble diffusers (construction to start in 2003).
- Modifications to the belt presses.
- Automation of process system control and data acquisition.

Current Plant Status

According to DELCORA's 2000 Chapter 94 Report, the "...WRTP continued to discharge high quality effluent ..." except for the January and February time period where BOD percent removal and total BOD discharge exceeded permit limits. These events "...were a direct result of a series of three toxic shock loads that entered the DELCORA aeration system between January 24 and February 12, 2000. DELCORA took swift remedial actions to correct the problems that existed with the operating system and the affected parameters. By March, all parameters were in compliance." According to DELCORA's 2001 and 2002 Chapter 94 Reports, the "...WRTP continued to discharge high quality effluent."

Sludge/Biosolids Generation

Activated sludge is removed from the system based on flow and solids concentration. The sludge is processed in an air flotation system prior to dewatering. The treated waste is then pumped to the filtration building at about 3-5% solids. The sludge can be directed to one or all three filter belt presses. Sludge cake from the belt presses is conveyed to an incinerator. The ash is collected at the bottom of the incinerator and transported by air to two storage silos. The incinerator is normally operated 24 hours a day, seven days a week. An average of 24.5 tons of sludge were incinerated a day in 2000. The operation is permitted for 48 dry tons. Sludge reduction by incineration is about 75%. The ash is permitted for disposal in the State of Delaware, and all ash generated is disposed of there.

The approximately 24.5 dry tons incinerated per day at the DELCORA plant include sludge from its own treatment processes as well as an additional 2 to 10 tons per day from contract customers. In accepting contract sludge, DELCORA gives preference to Delaware County facilities. DELCORA asks for a minimum of 4% solids in contract sludge and charges higher rates if the solids drop below that percentage. Each incinerator unit is permitted to burn 48 tons per day for a total of 96 tons per day for the facility.

Rose Valley Borough

Organizational Description

Rose Valley Borough Council is responsible for overseeing operation and maintenance of the treatment plant, pump stations, and sewers associated with these facilities. Since Rose Valley Borough is generally fully developed and no major expansion is expected, Borough activity focuses on maintaining and replacing existing infrastructure in order to control I&I issues.

Treatment Facility Description

The Rose Valley Sewage Treatment Plant (STP) is located off of Long Point Lane on Ridley Creek as shown in Figure 3-5. This facility, constructed in 1937, employs a trickling filter process and is designed to treat 0.13 MGD. Design organic load of the plant is 221 lbs. of BOD_5 per day. The plant is owned and operated by Rose Valley Borough under NPDES Permit No. PA0020575.

Previous Upgrades

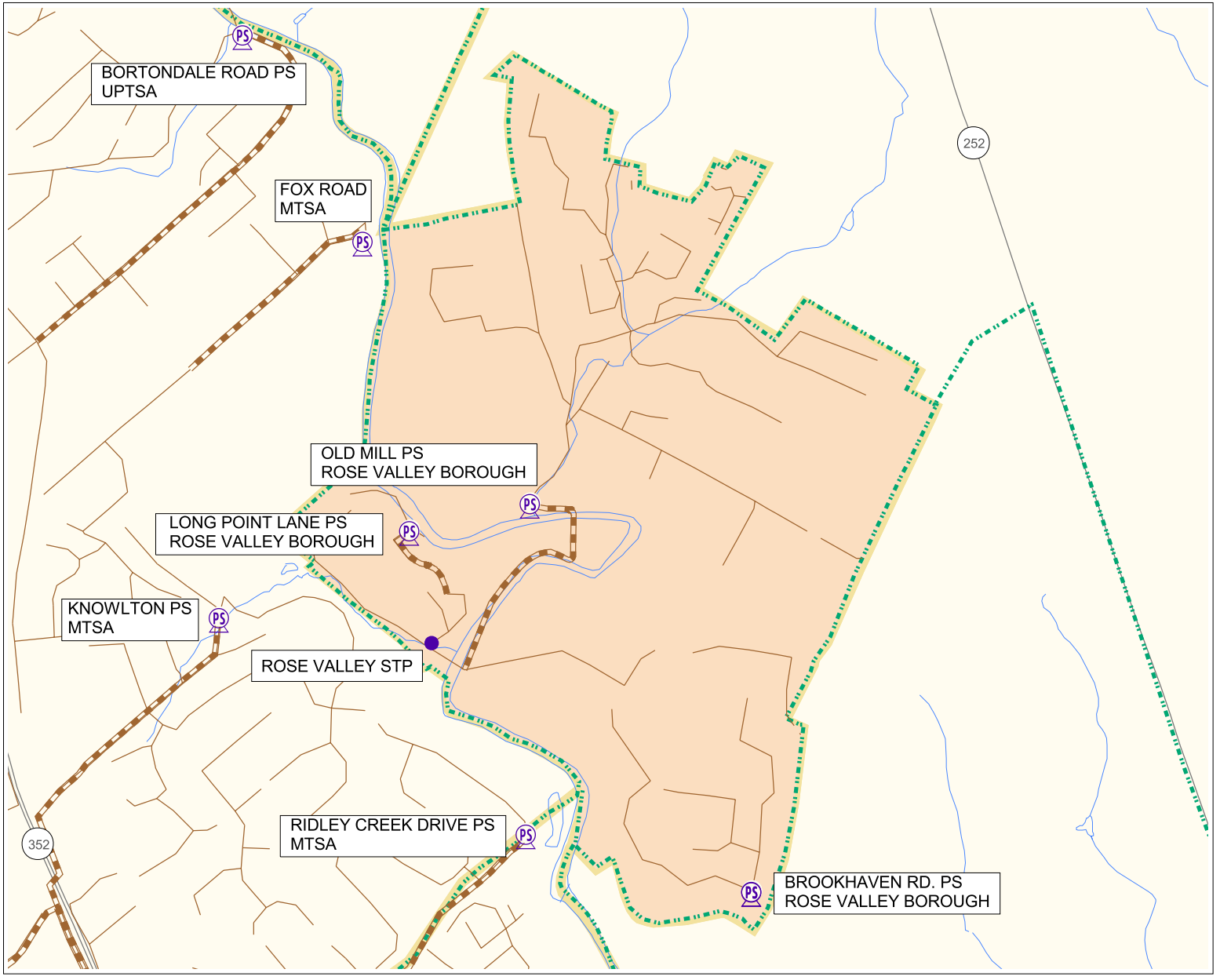
There have been no recent upgrades to the plant.

Other Issues

The Rose Valley STP service area includes only residential properties. There are no industrial or commercial users discharging to the plant.

FIGURE 3-5

Rose Valley Borough



DELCORA

LEGEND

- A Public Pump Station Location
- A Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Rose Valley Borough
- Municipal Boundary

N
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Scale in Feet

500 0 500 1000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Scheduled Upgrades

Plans are currently underway for an overhaul of the trickling filter at the plant.

Current Plant Status

The plant currently operates within its NPDES permit limits, below hydraulic and organic capacity. In 2000, the average dry-weather flow was 0.076 MGD, and the 3-month maximum average daily flow was 0.103 MGD.

Conveyance Facilities Description

Conveyance Lines

The 6.53 miles of sanitary sewers located in Rose Valley Borough are owned and maintained by the Rose Valley Department of Public Works.

Pump Stations

Rose Valley Borough currently operates and maintains three wastewater pump stations. Two of them (Long Point Lane Station and Old Mill Pump Station) transport the flow to the Rose Valley WWTP. Long Point Lane Station serves approximately eleven homes, while Old Mill Pump Station serves about 260 homes, operating two 250 gallon/minute (gpm) pumps. Brookhaven Road Station, located in the southern portion of town, conveys the flow from approximately 93 residences to DELCORA by means of two 125 gpm pumps.

Sludge/Biosolids Generation

Sludge generated at the Rose Valley STP is collected without dewatering and transferred directly to DELCORA's Chester facility for further treatment.

Southwest Delaware County Municipal Authority

Organizational Description

The Aston Board of Commissioners, pursuant to the Municipality Authorities Act, established the SWDCMA on December 16, 1957. The Aston Township Board of Commissioners appoints its seven-member Board of Directors. SWDCMA was authorized to exercise all powers granted under the Act to implement the wastewater management plan for its service area. SWDCMA's role as an implementation agency involves the acquisition, holding, construction, improvement, maintenance, operation, owning, and leasing of the sewer system and the sewer treatment facilities. SWDCMA is financially self-sufficient; capital funds are raised through bond issues while operations and maintenance expenses and debt service are covered by user charges. SWDCMA owns and maintains the 6 MGD

Baldwin Run Pollution Control Facility located in Aston, as well as an extensive system of wastewater conveyance facilities and, in certain municipalities, the collector sewers as shown in Figure 3-6.

Treatment Facility Description

The Baldwin Run Pollution Control Plant is located at the terminus of Gamble Lane and Park Lane in Aston. The plant was built in 1959 with an average design flow of 2.0 MGD. Secondary treatment was originally designed as a trickling filter plant but has since been changed to an aerated bio-filter with attached growth nitrification. Effluent is chlorinated and discharged to Chester Creek. The design BOD_5 of the facility is 12,510 lbs./day. The existing NPDES permit (No. PA0027383) identifies the effluent discharge limitation for the Baldwin Run Pollution Control Plant as 6 MGD. SWDCMA has plans to re-rate the plant for higher capacity.

Previous Upgrades

Since construction, the treatment plant has undergone a number of upgrades. The most recent upgrade included the installation of a new screening system (rotomat and grit classifier), the addition of two activated bio-filters (formerly trickling filters), the conversion of a tricking filter to a third primary clarifier, and the construction of a third final clarifier.

Other Issues

In 2000, the plant discharged an average of 5.54 MGD. The highest monthly average recorded was 6.43 MGD during April, and the highest 3-month average was 6.24 MGD (February to April). Daily average flows over 8 MGD were observed in 2000 with instantaneous peak flows in excess of 10 MGD. The highest instantaneous flows corresponded to specific precipitation events, indicating an I&I problem in the collection system. On October 5, 2001, SWDCMA was notified by DEP that it was to prohibit new connections in all areas and communities served by the Baldwin Run Pollution Control Plant. It was also directed to begin the planning, design, financing, construction, and operation efforts necessary to meet the anticipated demand. DEP directed that a corrective action plan be submitted within ninety days. In June 2002, DEP approved a proposed re-rate of the SWDCMA treatment facility. Per DEP requirement, this plan will follow the format of the standard Act 537 plan and will evaluate all municipalities served by SWDCMA.

Scheduled Upgrades

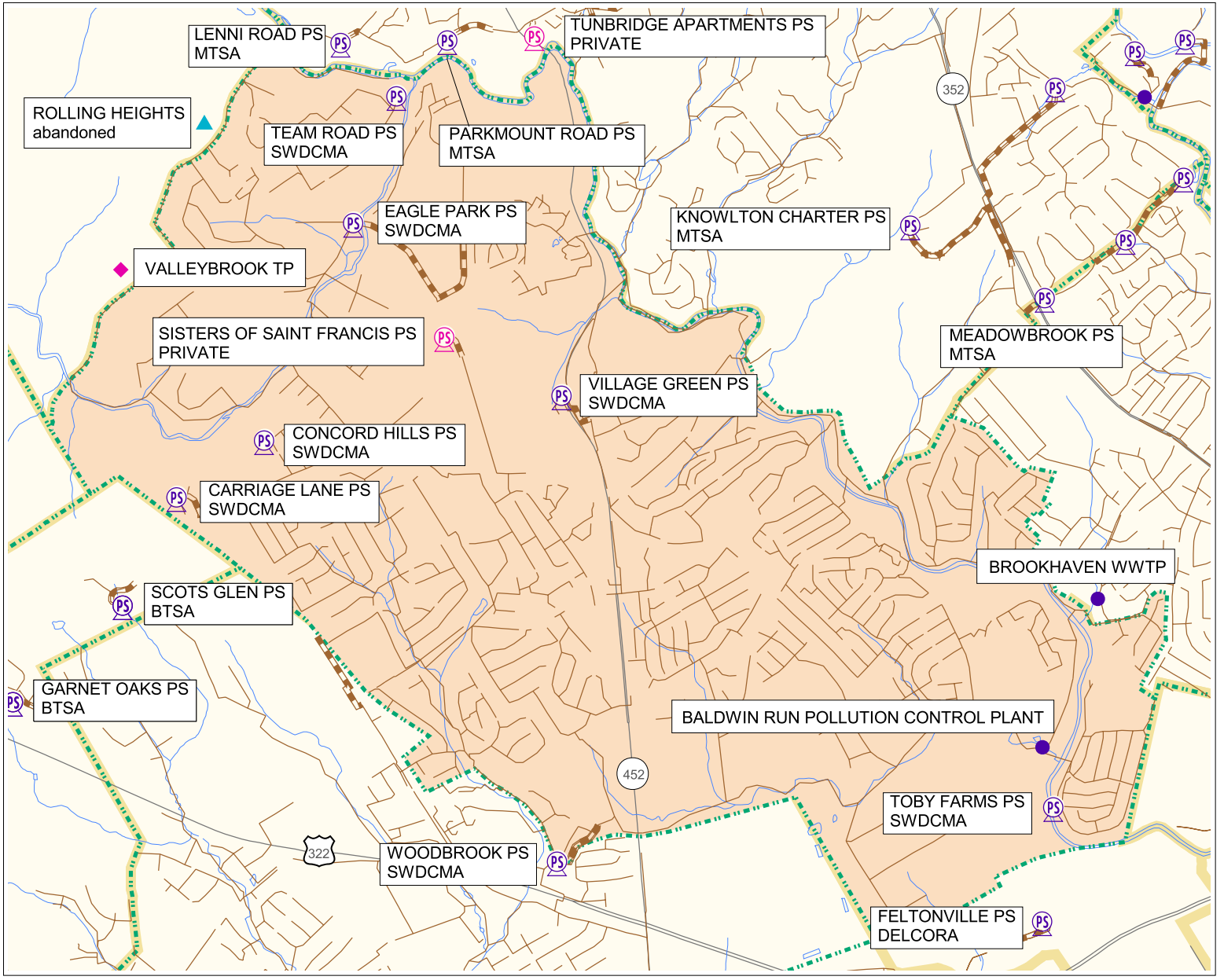
No upgrades are currently scheduled.

Current Plant Status

The highest 3-month average flow was 6.24 MGD, which exceeded the permitted capacity of 6 MGD. This prompted DEP to issue a ban on new sewer connections on

FIGURE 3-6

Southwest Delaware County Municipal Authority



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- SWDCMA
- Municipal Boundary

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Scale in Feet

1000 0 1000 2000

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Data Source:
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- Delaware County Planning Department (DCPD)

October 5, 2001. In November 2001, SWDCMA prepared a corrective action plan addressing ways to provide hydraulic relief. The plan describes the I&I abatement program, proposed planning and design, and operational and maintenance procedures employed to prevent hydraulic overloading.

Conveyance Facilities Description

Conveyance Lines

SWDCMA owns and maintains approximately 63 miles of sanitary sewer lines as shown on Figure 3-6. This system includes two main delivery interceptors (Chester Creek Interceptor and Baldwin Run Interceptor) and eight siphons for creek crossings. SWDCMA also maintains approximately forty individual grinder pumps for single-family homes in its service area. Blockages and system failures resulted in three reported overflows in 2000. In addition, I&I problems resulted in thirteen reported overflows.

Pump Stations

SWDCMA owns and operates the following seven pump stations:

- District 4/Team Road PS
- Eagle Park PS
- Carriage Lane PS
- Woodbrook PS
- Toby Farms PS
- Concord Hills PS
- Village Green PS

Sludge/Biosolids Generation

Solids are collected at six locations in the treatment process: the aerated holding tanks, rotomat screens, grit chamber, primary clarifiers, final clarifiers, and filter presses. The screenings and grit from the rotomat screens and the grit chamber are sent to Pottstown Landfill. The solids from the clarification tanks, holding tanks, and the presses are digested in anaerobic digesters to reduce mass. After digestion, the remaining solids pass through a press with the resulting "cake" being sent to the Pottstown Landfill for disposal.

Thornbury Township

Organizational Description

There are currently three private treatment facilities permitted within Thornbury Township that serve more than a single residence. Information on these facilities is provided in a subsequent section. In addition to the NPDES permitted facilities, there are a significant

number of on-lot treatment systems in the Township, which will also be discussed in a subsequent section.

Treatment Facility Description

The Thornbury Township STP is located on Thornton Road as shown in Figure 3-7. This plant, which was constructed in 1991, is an activated sludge type facility designed to treat 0.06 MGD by a private land developer. In 1996, a second 0.06 MGD treatment train was constructed, increasing the permitted capacity to 0.12 MGD. The main treatment process involves an extended aeration activated sludge process with flow equalization. In 1998, ownership of the plant was transferred to Thornbury Township. The plant operates under NPDES Permit No. PA0053473. Its design organic capacity is 240 lbs. of BOD_5 per day.

Previous Upgrades

A 1994 expansion of the plant increased plant capacity from 0.06 MGD to its current 0.12 MGD.

Scheduled Upgrades

DEP approval has been granted for an expansion to 0.18 MGD, and the project is currently in the design phase.

Current Plant Status

The plant currently operates within its permit limits. Monthly average for the year 2000 was 0.056 MGD, with a 3-month maximum daily average at 0.062 MGD. Average monthly organic loading was 112 lbs. of BOD_5 per day.

Conveyance Facilities Description

Conveyance Lines

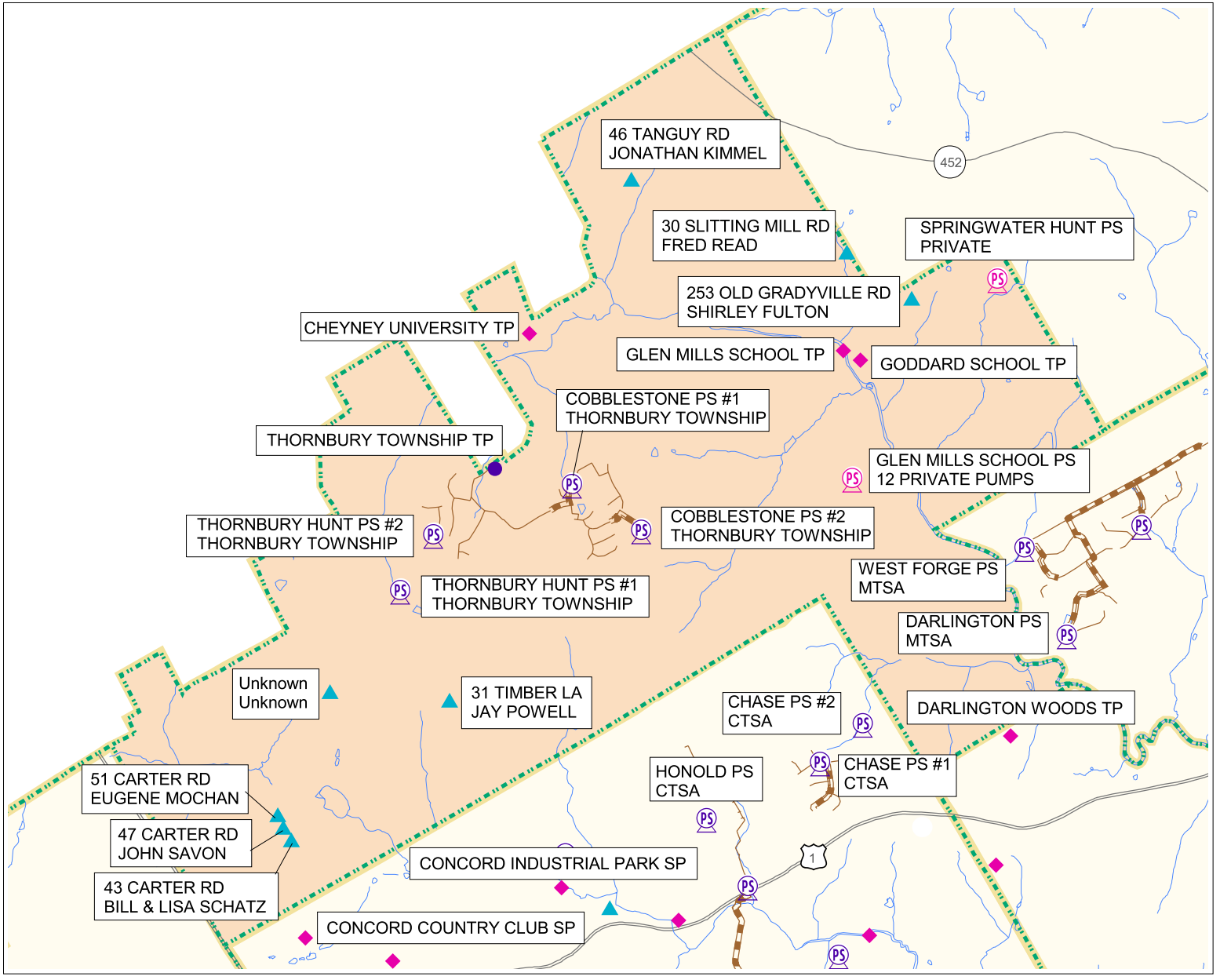
Thornbury Township Department of Public Works owns and maintains approximately 4,300 LF of sewers serving the Cherry Farm development and transporting wastewater to Concord. Public conveyance systems currently serving the Thornbury Treatment Plant contain approximately 25,200 LF of sewers. Residential development on the eastern side of the Township will lengthen conveyance systems by about 20,200 LF outside of those developments, with collection system length inside the developments reaching 22,220 LF.

Pump Stations

There are currently seventeen sewage pump stations in Thornbury Township. Of these, Thornbury Township currently owns and operates Thornbury Hunt (#1 and #2) and

FIGURE 3-7

Thornbury Township



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Thornbury Township
- Municipal Boundary

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Scale in Feet

1500 0 1500 3000

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- Delaware County Planning Department (DCPD)

Cobblestones (#1 and #2) Pump Stations with the remainder being privately owned and operated.

Sludge/Biosolids Generation

Thornbury Treatment Plant sludge is not dewatered on site. The sludge is removed by EarthCare and hauled to the DELCORA and SWDCMA facilities for further treatment.

City of Wilmington

Organizational Description

The City of Wilmington Department of Public Works is responsible for wastewater collection and treatment in the City and surrounding areas.

Treatment Facility Description

The Wilmington Water Pollution Control Facility is owned by the City of Wilmington and operated by U.S. Filter. The plant was built in 1954 for the City of Wilmington. The City of Wilmington and U.S. Filter are co-holders of NPDES Permit No. DE0020320 to discharge into the Delaware River. The plant's current treatment capacity is 134 MGD, with a 19,080 lbs. of BOD_5 daily average and a 38,160 lbs. of BOD_5 daily maximum. The facility employs a standard secondary activated sludge process. The tertiary ponds serve as a capture point for stormwater/rain event bypasses of the system.

Previous Upgrades

Several rounds of upgrades were undertaken at the plant in 1976, 1986, and 1992.

Other Issues

The plant functions very effectively slightly below design flows. As design flows (134 MGD) are approached, poor flow distribution of the secondary system causes some solids loss in the tanks that have high flow rates.

The facility has twenty-two permitted industrial contributors, such as pharmaceutical, metal finishing, paper and pulp, and power station clients. Several industrial contributors (including Allied Signal and Honeywell) are located in southern Delaware County and have direct connection to a pump station in Claymont, DE.

Scheduled Upgrades

No upgrades are scheduled at this time. There exists a possibility of some changes required for combined sewer overflow (CSO) abatement in the future.

Current Plant Status

The plant has had storm flows in excess of 300 MGD for short periods of time during rain events. In the last year, the highest flow value has been in the range of 90 MGD, with peak flow of 250 MGD. All NPDES permit requirements for 3-month maximum daily average and monthly average have been met.

Conveyance Facilities Description

Conveyance Lines

Currently, three conveyance lines transport wastewater from Delaware County to New Castle County, DE. One line conveys sewage from SDCA, and two lines convey wastewater from Bethel Township. Several small industrial wastewater lines transport sewage from Pennsylvania to the Wilmington Wastewater Plant.

Pump Stations

Wastewater from SDCA is transported to the Wilmington Wastewater Plant by the Naamans PS, while both lines from Bethel Township enter Brandywine Town Center PS.

Sludge/Biosolids Generation

After initial dewatering, sludge is stored at the plant for additional drying and stabilization. When this is complete, the biosolids are then disposed of at a landfill or applied as landfill cover by an independent contractor. The disposal facility currently being used is Delaware Solid Waste Authority's Northern Solid Waste Management Center (Cherry Island Landfill) in Wilmington, DE.

Summary

Currently, there are eight publicly-owned treatment facilities serving western Delaware County, one of which is located in the State of Delaware. Table 3-2 provides a summary of the publicly-owned facilities.

Wastewater Conveyance Authorities

Bethel Township Sewer Authority

The Bethel Township Sewer Authority (BTSA) was formed in 1973. It currently has five Board members. The Authority oversees the Township's conveyance facilities

TABLE 3-2

SUMMARY OF PUBLICLY-OWNED TREATMENT FACILITIES SERVING WESTERN DELAWARE COUNTY

Facility	Owner/Operator	NPDES Permit No.	Receiving Water	Permit Capacity (MGD)	Avg. Flow (MGD)	Maximum 3-Month Avg. Flow (MGD)	Avg. / Peak BOD_5 Load (lbs/day)	BOD_5 Design Load (lbs/day)
Western Regional Treatment Plant	DELCORA	PA0027103	Delaware River	44	31.2	35.6	1,292 / 24,255	91,740
Baldwin Run Pollution Control Plant	SWDCMA	PA0027383	Chester Creek	6	5.54	6.24	8,203 / 11,018	12,510
Brookhaven Wastewater Treatment Plant	Brookhaven Borough / Public Works	PA0023949	Chester Creek	0.192	0.169	0.201	236 / NA	320
Ridings Wastewater Treatment Plant	Chadds Ford Township	PA0055476	Unnamed Trib. of Harvey Run	0.080	0.011	0.022	NA / NA	167
Central Sewage Treatment Plant	Concord Twp. Sewer Authority	PA0055212	W. Br. Chester Creek	1.2	0.357	0.386	1,000 / 1,500 (est)	2,500
Rose Valley Sewage Treatment Plant	Rose Valley Borough / Public Works	PA0020575	Ridley Creek	0.130	0.076	0.103	102 / 124 (1999)	221
Thornbury Township Treatment Plant	Thornbury Township / American Water Services	PA0053473	Unnamed Trib. to Chester Cr.	0.120	0.056	0.062	112 / 142	240
Wilmington Water Pollution Control Facility	City of Wilmington / US Filter	DE0020320	Delaware River	134	78.8	86.2	9,350 / 64,363	19,080

Source: U.S. EPA EnviroFacts Database and DEP files, 2003

which include about ten miles of sewers and several pump stations as depicted on Figure 3-8. The wastewater is currently conveyed to SDCA.

Middletown Township Sewer Authority

Middletown Township Sewer Authority (MTSA) was formed in the late 1960s and has been historically delegated with the responsibility of developing and implementing all plans for sewage facilities as directed by Township Council. MTSA is currently a "Lease Back Authority" and provides conveyance of wastewater (Figure 3-9), oversight of alternative disposal facilities, and sewer planning in the Township. MTSA transports its wastewater flows to SWDCMA.

Newtown Township Municipal Sewer Authority

The Newtown Township Municipal Sewer Authority was formed in the mid-1950s. The Authority has a five-member Board responsible for overseeing the Township's sewage conveyance facilities, which include gravity lines and pump stations that connect to RHM, as shown in Figure 3-10.

Southern Delaware County Authority

SDCA's member municipalities are Upper Chichester and Bethel Townships. The Authority was organized in 1954 and has five Board members. The Authority's service area covers portions of the Marcus Hook Creek, Naamans Creek, and Bezor's Run watersheds. It maintains 65 miles of sewers and five interceptors as shown in Figure 3-11.

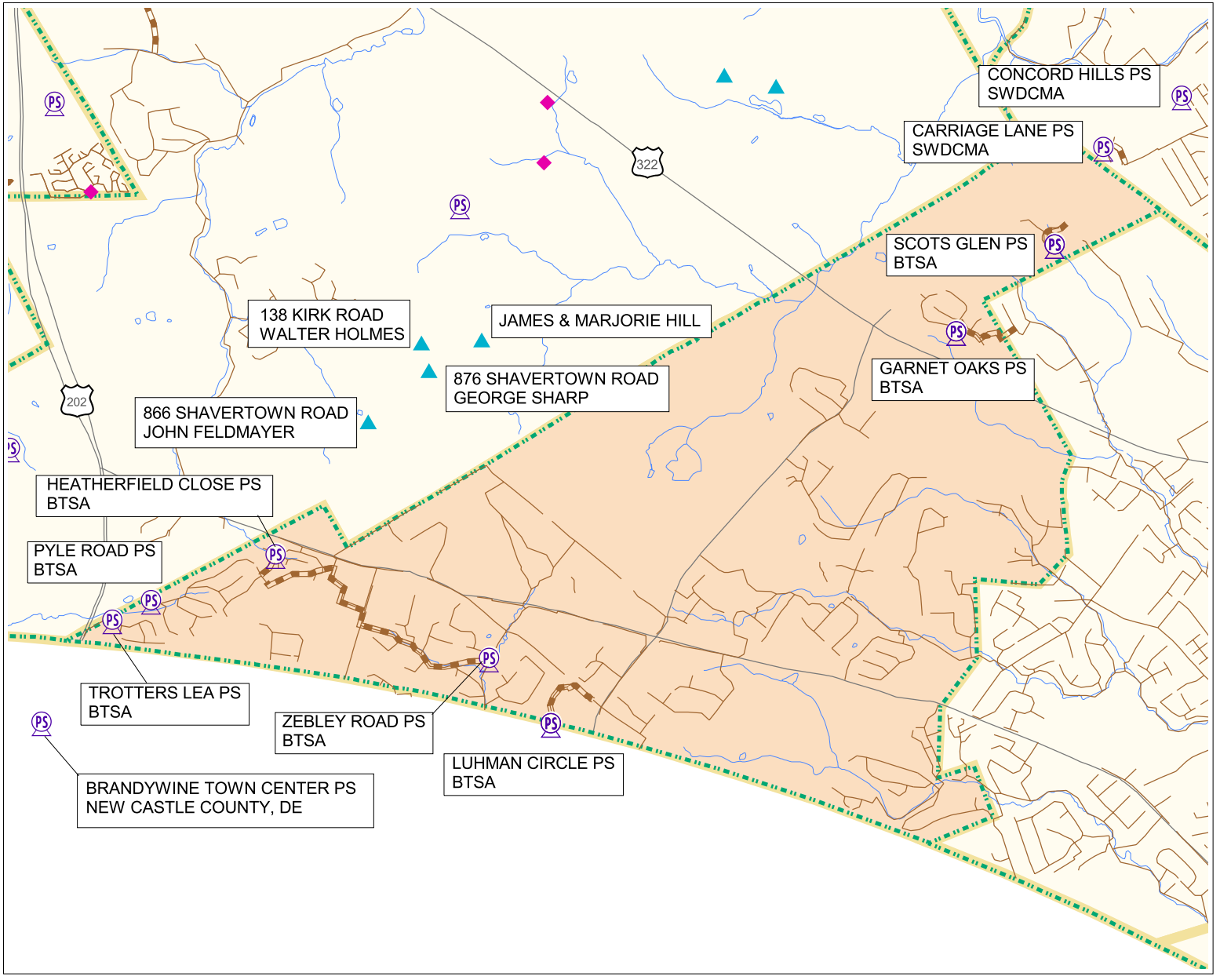
Approximately 1.5 MGD of sewage formerly conveyed to the New Castle County Authority's system to be treated at the City of Wilmington Water Pollution Control Plant has been diverted to DELCORA's WRTP effective March 20, 2002. Per an agreement with SWDCMA, additional flows are treated at the Baldwin Run Plant in Aston Township. An amendment to SDCA's 537 Plan which was submitted to and approved by DEP redirected approximately 0.8 MGD from SWDCMA's Baldwin Run Pollution Control Plant to DELCORA's WRTP. Currently, only about 613 equivalent dwelling units (EDUs) from SDCA's collection system are treated at SWDCMA's plant.

Upper Providence Township Sewer Authority

Upper Providence Township Sewer Authority (UPTSA) was formed under the provisions of the Municipality Authorities Act on May 15, 1979, establishing a seven-member Board. UPTSA was authorized to exercise all powers granted under the Act to implement the wastewater management plan for its service area. UPTSA maintains over ten miles of sewer lines as shown in Figure 3-12. Wastewater from most of the sewered areas is transported to the Aqua Pennsylvania, Inc. Media WWTP (previously owned by the Borough of Media). Several single residences in Upper Providence Township are

FIGURE 3-8

Bethel Township Sewer Authority



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Bethel Township
- Municipal Boundary

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Scale in Feet

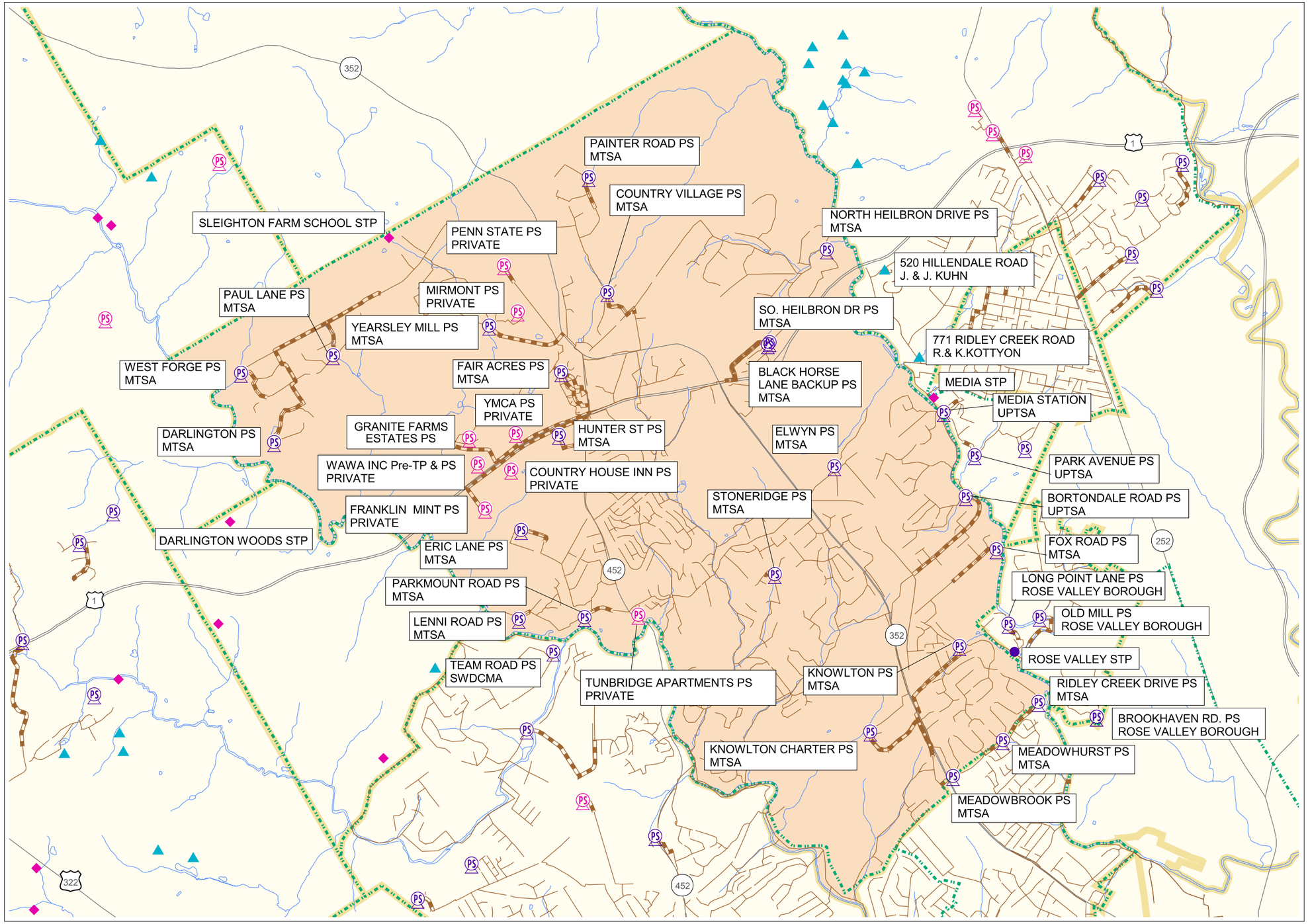
1000 0 1000 2000 3000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

FIGURE 3-9

Middletown Township Sewer Authority



LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Middletown Township
- Municipal Boundary

N W E S

Scale in Miles

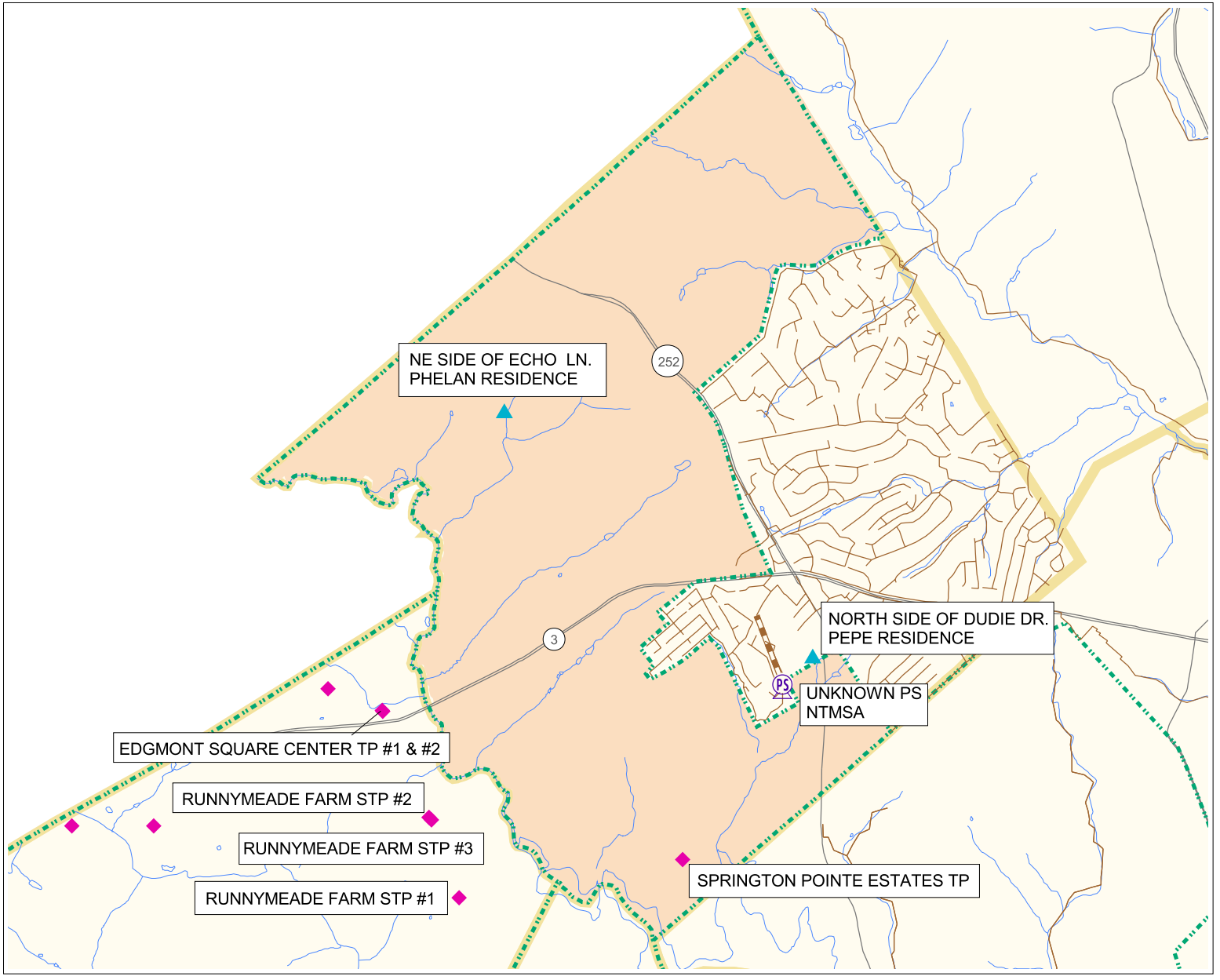
2000 0 2000 4000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)
- Midletown Twp Sewer Authority (MTSA)

FIGURE 3-10

Newtown Township Municipal Sewer Authority



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Newtown Township
- Municipal Boundary

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Scale in Feet

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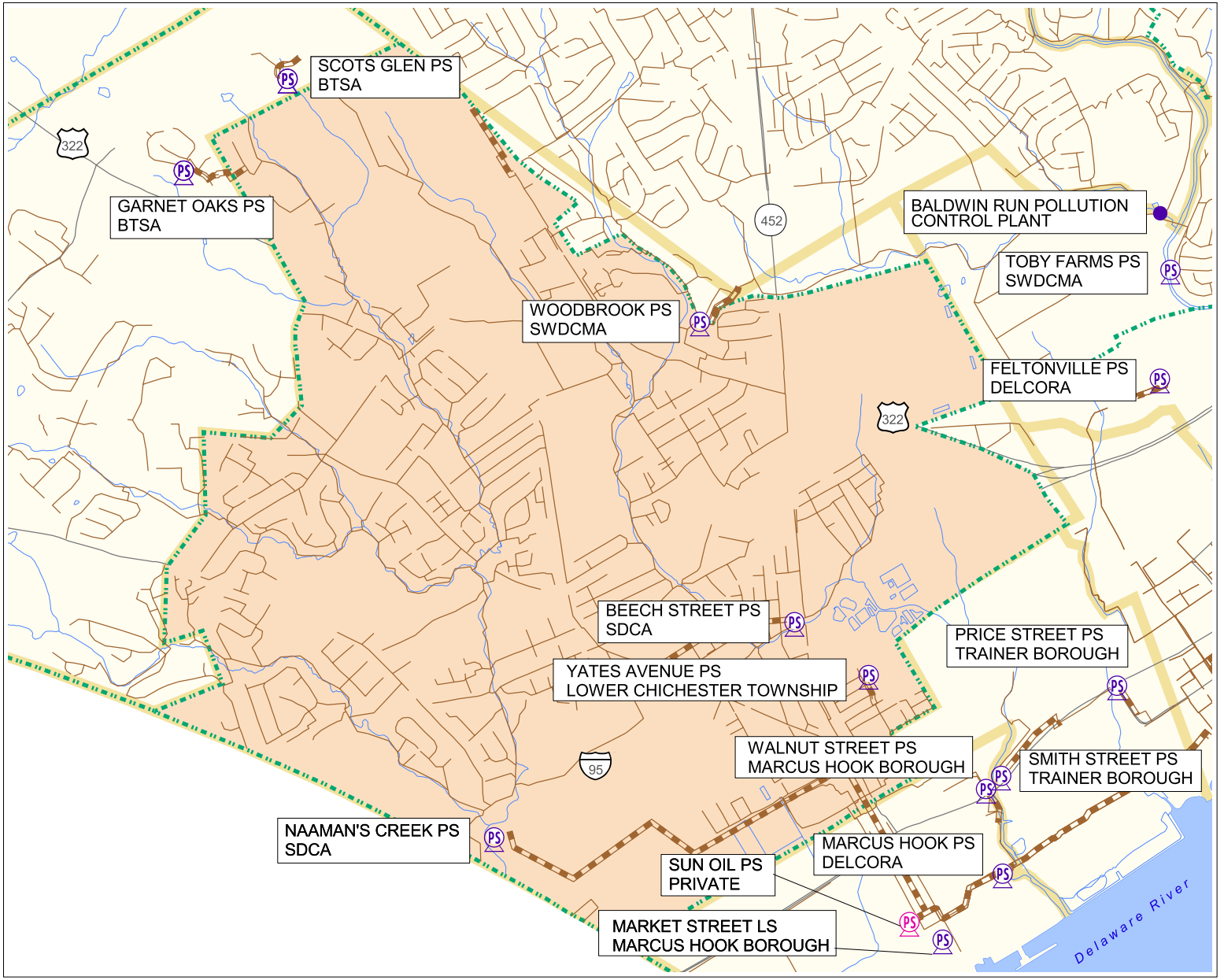
- Delaware County Planning Department (DCPD)

FIGURE 3-11

Southern Delaware County Authority



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Southern Delaware County Authority
- Municipal Boundary

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Scale in Feet

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Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

FIGURE 3-12

Upper Providence Township Sewer Authority

RUNNYMEADE FARM STP #1

SPRINGTON POINTE ESTATES TP

TOFT WOODS TP

3315 CHATAM PLACE
S.& H.WHITNEY

2232 E.DEERFIELD DRIVE
L.& I.ALLEN

60 CHAPEL HILL ROAD
WHINFREY, DAVID

2390 N.FEATHERING ROAD
J.& S. MCGEEVER

APPLETREE,STEEPLECHASE&FOXCHASE
131 APPLETREE DRIVE

131 APPLE TREE ROAD
ROACH WHEELER

321 N.FEATHERING ROAD
T.SCHEURERMAN

241,261 WOODHILL LANE
SAFT LOWINSKI

PARK PLACE PS
PRIVATE

VILLAGE OF ROSE TREE PS
PRIVATE

1981 KIMBERWICK ROAD
N.MCHUGH

1971 KIMBERWICK ROAD
N. & D. KEMP

1921 RIDLEY CREEK ROAD
D.MEINHART & P.REICHEL

ROSE TREE CROSSING PS
PRIVATE

VALLEY VIEW PS
UPTSA

2201 N.RIDLEY CREEK ROAD
D.BYRNE & M.MANNO

1941 RIDLEY CREEK ROAD
R.& L.PROTESTO

CEDAR HILL PS
UPTSA

CEDAR MEADOW PS
UPTSA

NORTH HEILBRON DRIVE PS
MTSA

WINTER STREET PS
UPTSA

520 HILLENDALE ROAD
J. & J. KUHN

BRAVES TRAIL PS
UPTSA

LEMON STREET PS
AQUA PENNSYLVANIA

ORANGE STREET PS
AQUA PENNSYLVANIA

771 RIDLEY CREEK ROAD
R.& K.KOTTYON

LINCOLN STREET PS
AQUA PENNSYLVANIA

MEDIA STP

MEDIA STATION
UPTSA

LETITIA PS
UPTSA

PARK AVENUE PS
UPTSA

BORTONDALE ROAD PS
UPTSA

FOX ROAD PS
MTSA

252

476

1

452

352

DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Upper Providence Township
- Municipal Boundary

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Scale in Miles

2000 0 2000 4000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

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- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

individually connected to CDCA's and Rose Valley Borough's sewer systems. UPTSA does not operate any treatment facilities itself. Fifteen single residences operate individual package plants in place of failed on-lot systems. UPTSA inspects those systems regularly and plans to connect many of the residences to public sewer in the near future. One community treatment facility (Tofts Woods Treatment Plant) is operated and maintained by a private contractor.

New Castle County

New Castle County Department of Special Services is responsible for operating and maintaining public sewer lines and lift stations. Currently one pump station transports wastewater from Delaware County to Delaware, the Brandywine Town Center Station in Bethel Township.

PRIVATE ORGANIZATIONS PROVIDING SEWAGE TREATMENT AND CONVEYANCE WITHIN THE WESTERN STUDY AREA

There are a number of private wastewater treatment facilities located in western Delaware County that serve more than one single-family residence. The available information on the particular facilities varies because DEP reporting requirements are different for small, privately-owned facilities. The facility NPDES permit requires a discharge monitoring report like all other publicly-owned facilities, but otherwise there is limited reporting. Some municipalities have developed inspection requirements and maintain some information on these facilities. The following facilities are located on the individual municipal maps shown previously. The facility servicing Media Borough was until recently a publicly-owned and operated facility. As such, considerably more information is currently available about the plant and collection system than is available for the smaller community systems that serve residential developments.

Media Borough

Organizational Description

Philadelphia Suburban's Little Washington Wastewater Company (now Aqua Pennsylvania, Inc.) purchased the Media Borough Treatment Plant and collection system from the Borough in 2001.

Treatment Facility Description

The plant was constructed in 1937 and currently operates under NPDES Permit No. PA0024121. Design capacity of the plant is 1.8 MGD. The plant is located in Upper Providence Township and discharges treated water into Ridley Creek. The plant (shown in Figure 3-13) accepts wastewater from Media Borough, parts of Upper Providence Township, and Elwyn Institute.

Previous Upgrades

The last major expansion of the plant was completed in 1988 and concerned primary and secondary processes that were converted from a trickling filter to a conventional activated sludge process with nitrification removal.

Other Issues

There is currently a self-imposed moratorium on multiple connections from Upper Providence, Elwyn, and Media. Several approvals were granted to Upper Providence conditionally upon the reduction of I&I.

Scheduled Upgrades

No upgrades are scheduled for the Media Plant at this time.

Current Plant Status

The annual average flow at the Media Plant in the year 2000 was 1.50 MGD, with a 3-month maximum flow of 1.63 MGD.

Conveyance Facilities Description

Conveyance Lines

I&I problems in aging infrastructure are the main issues for the public sewer system in Media. Aqua Pennsylvania, Inc. is working on an I&I abatement program.

Pump Stations

There are three pump stations currently operating within the Borough sewage system:

- Lemon Street PS
- Lincoln Street PS
- Orange Street PS

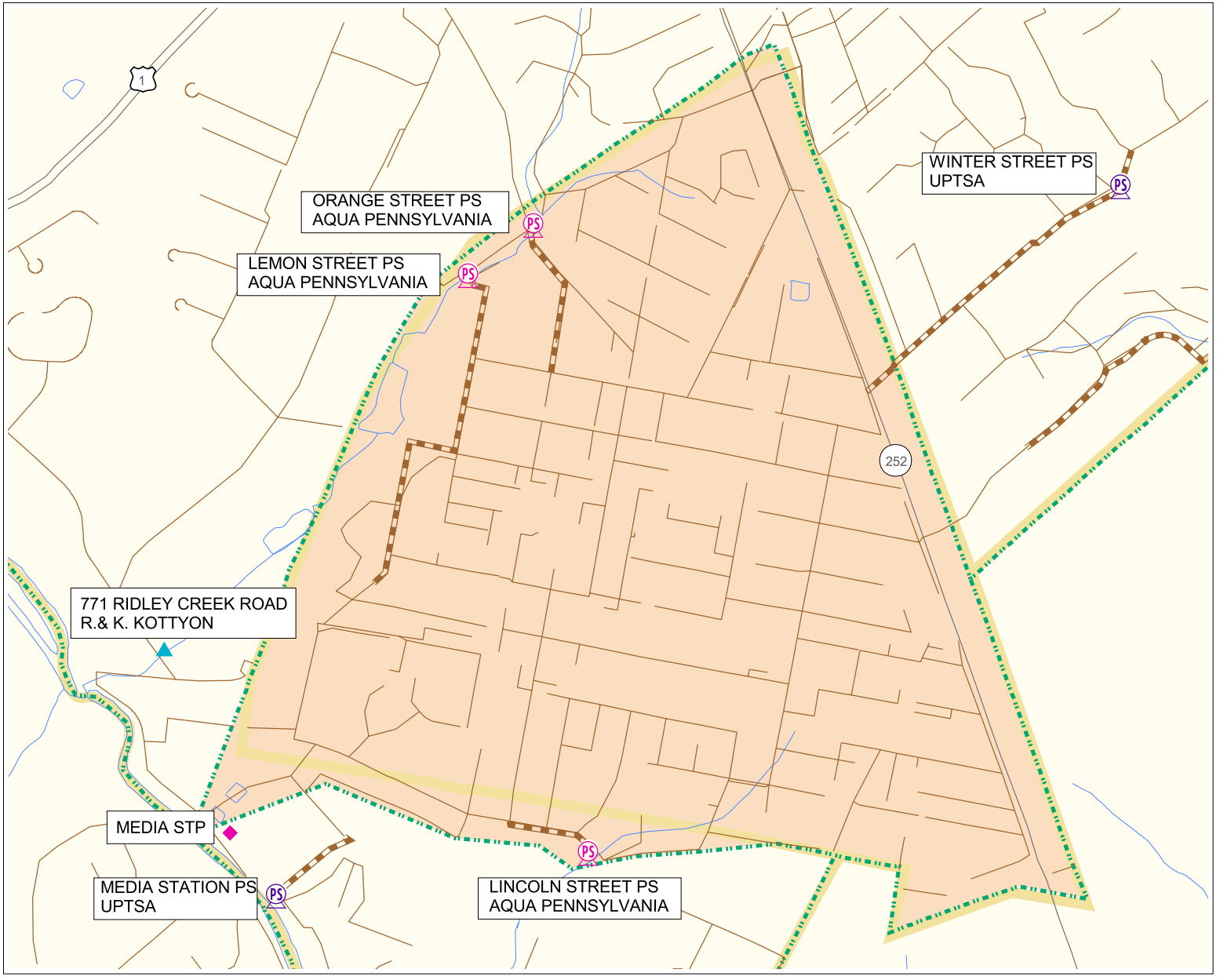
One station (Elwyn) is currently not in operation.

Sludge/Biosolids Generation

A majority of sludge generated in the plant (about 95%) is dewatered using a felt press and hauled to a landfill. About 5% of the sludge in liquid form is hauled to DELCORA using a 4,000-gallon truck.

FIGURE 3-13

Media Borough



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Media Borough
- Municipal Boundary

N
W E
S

Scale in Feet

500 0 500 1000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Chadds Ford Township

There are currently six small community treatment systems in Chadds Ford Township, of which three are stream discharges and three discharge to an absorption field. These treatment facilities, shown in Figure 3-3, are:

- Knight's Bridge WWTP
- Pantos WWTP
- Springhill Farms WWTP
- Brandywine Summit WWTP
- Brandywine River Hotel WWTP
- Ravens Crest WWTP

The Chadds Ford Township Engineer conducts regular inspections of the treatment facilities to ensure proper maintenance and operation.

Chester Heights Borough

There are currently three small community treatment systems in Chester Heights Borough that have stream discharges. These treatment facilities, shown in Figure 3-14, are:

- Coventry Crossing WWTP
- Darlington Woods WWTP
- Valleybrook WWTP

Concord Township

There are currently nine small community treatment systems in Concord Township which all have stream discharges. The CTSA contracts regular inspections of the treatment facilities to ensure proper maintenance and operation. These treatment facilities, shown in Figure 3-4, are:

- Brinton Manor Sewage Plant
- Concord Beverage Sewage Plant
- Concord Country Club Sewage Plant
- Concord Industrial Park Sewage Plant
- Concordville Inn Sewage Plant
- Fox Valley Sewage Plant
- Garnet Valley School District Sewage Plant
- Southco STP
- State Farm STP

There are currently nineteen private treatment facilities permitted within Concord Township, ten serving single residences, one serving a residential community, seven serving industrial/commercial establishments, and one serving an industrial park. Information on these facilities is provided in a subsequent section. In addition to the NPDES permitted facilities, there are a significant number of on-lot treatment systems in the Township, which will also be discussed in a subsequent section.

Edgmont Township

There are currently ten small community treatment systems in Edgmont Township. These treatment facilities, shown in Figure 3-15, are:

- Sleighton Farm School STP
- Runnymeade Farm Development – 3 facilities
- U.S. Army Reserve Center Treatment Plant
- White Horse Village Treatment Plant
- Edgmont Square Center – 2 facilities
- Eagleview Treatment Plant
- Edgmont Country Club Treatment Plant

Runnymeade utilizes a community on-lot disposal system for Phases 2 and 3, and two large-volume on-lot systems for Phases 4, 5, and 6. Edgmont Square Center systems currently serve a movie theater, retail shops, and an office complex. One of the systems currently has compliance problems and is forced to haul wastewater off-site for treatment and disposal. The recent Act 537 Plan prepared by Edgmont Township proposes replacing facilities serving Runnymeade Farm Planned Residential Development (PRD) and Edgmont Square Center with a central wastewater conveyance system to the proposed wastewater facilities in Newtown Township (Old Masters Golf Course STP).

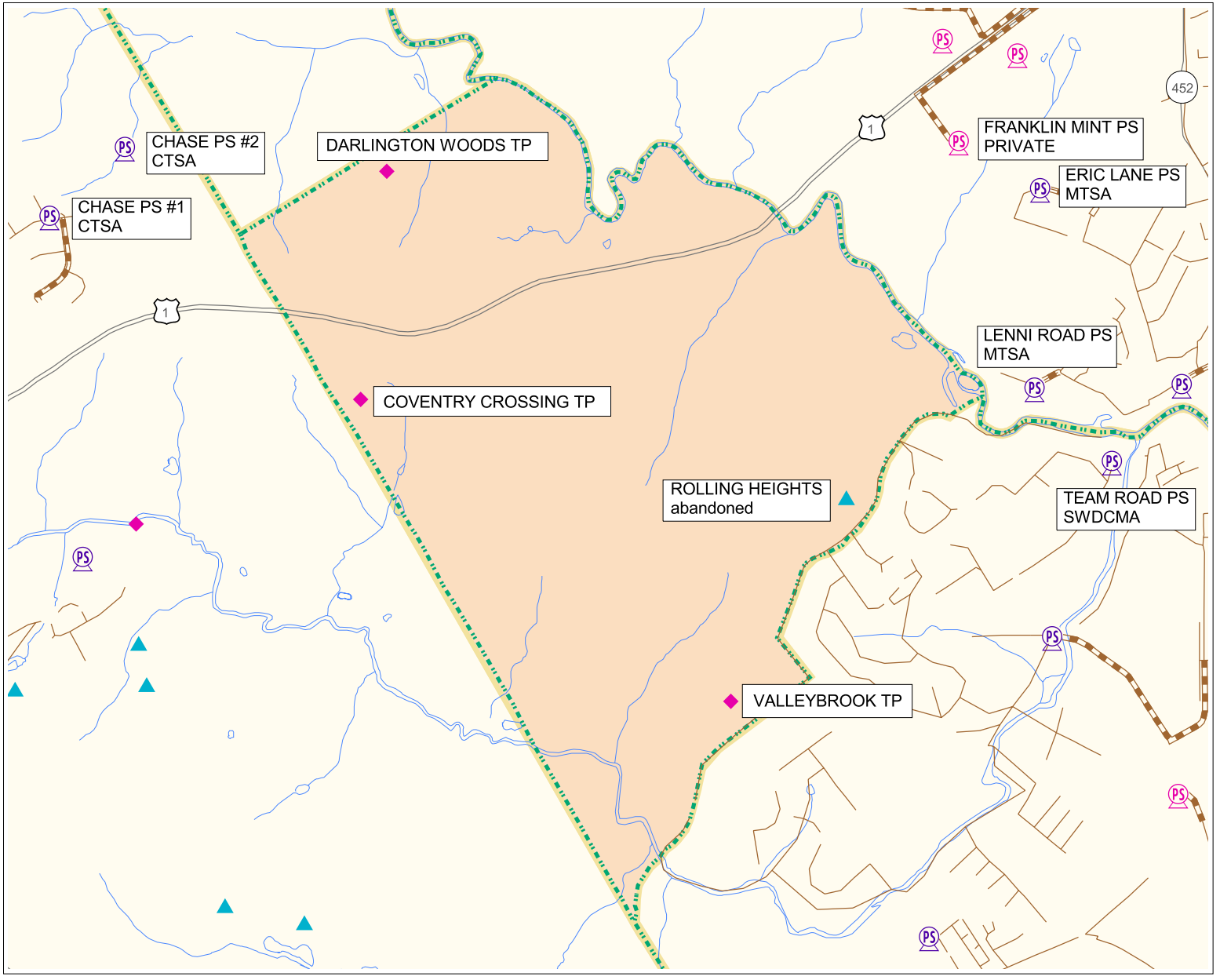
Newtown Township

There is currently one small community treatment system shown in Figure 3-10, Springton Pointe Estates Treatment Plant located in Newtown Township, which is a land application treatment system. An NPDES permit has been issued by DEP to Joyfor Joint Venture, located in Edgmont Township, to construct a 0.05 MGD wastewater treatment facility to serve a proposed shopping center and hotel located northeast of PA Route 3 and Providence Road in Newtown Township.

Similarly, an NPDES permit has been issued to Aqua Pennsylvania, Inc. to construct the 0.085 MGD Somerset Treatment Plant off of Gradyville Road to serve a proposed office building and a retirement community. However, a recent Act 537 Update proposes utilizing CDCA's disposal facility, which will eliminate the need for the Somerset facility and make it possible to abolish the existing Springton Pointe Estates Plant. The same plan also proposes construction of a new subsurface disposal facility, the Old Masters Golf Course STP.

FIGURE 3-14

Chester Heights Borough



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Chester Heights Township
- Municipal Boundary

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W E
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Scale in Feet

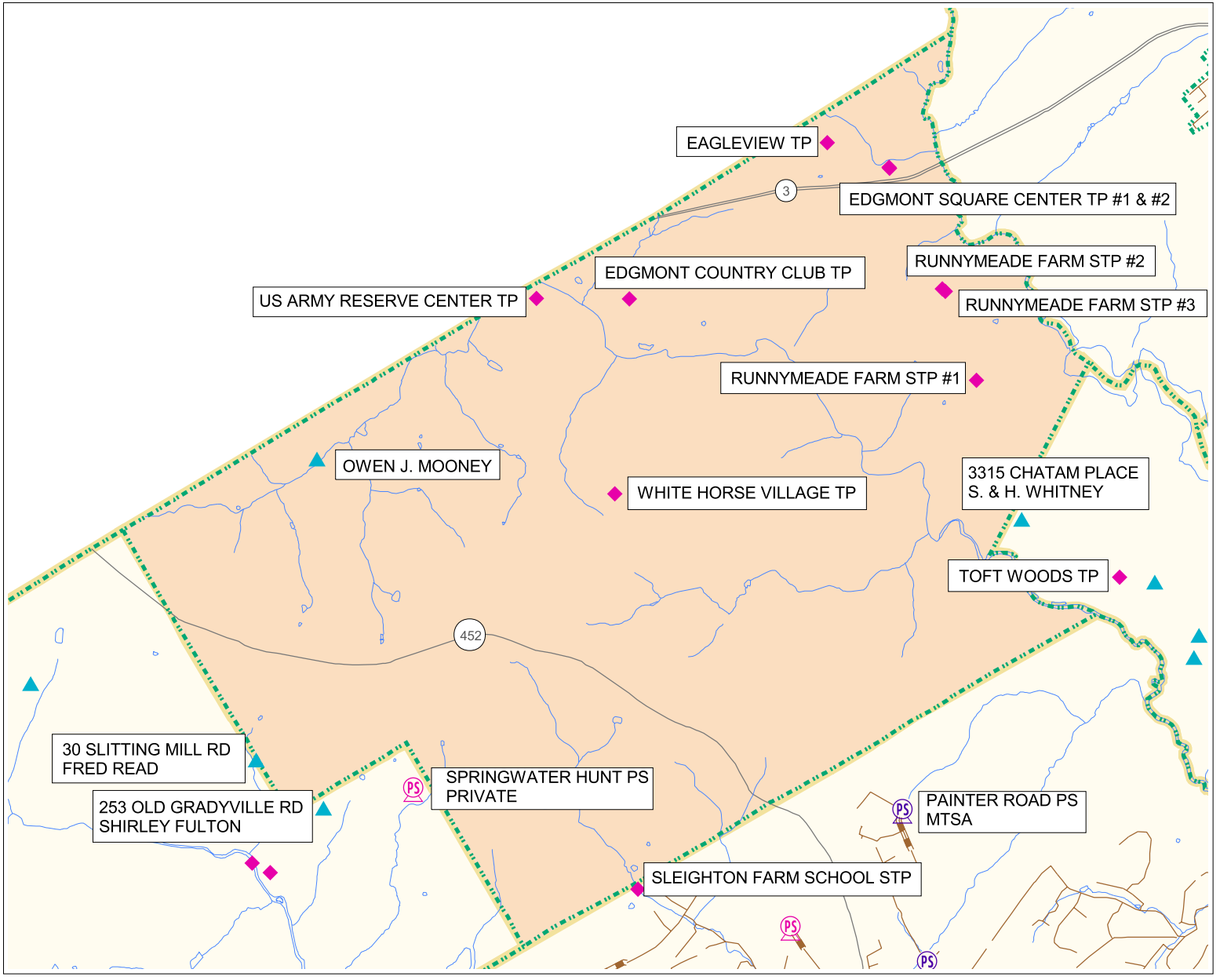
1000 0 1000 2000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

FIGURE 3-15

Edgmont Township



DELCORA

LEGEND

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Streams
- Roads
- Authority Boundary
- Edgmont Township
- Municipal Boundary

N
W E
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Scale in Feet

1500 0 1500 3000

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Thornbury Township

There are currently three small community treatment systems in Thornbury Township that have stream discharges. These treatment facilities, shown in Figure 3-7, are:

- Cheney University Treatment Plant
- Glen Mills School Treatment Plant
- Goddard School Treatment Plant

Upper Providence Township

There is currently one small community treatment system shown in Figure 3-12, Toft Woods Treatment Plant located in Upper Providence Township, that has a subsurface discharge.

Summary

There are currently thirty-four active and five proposed private treatment facilities operating in western Delaware County. There is only one private plant that is permitted at more than 0.35 MGD (Media – 1.8 MGD) and six plants permitted between 0.1 – 0.35 MGD. The remaining twenty-seven private plants are permitted at less than 0.075 MGD. Table 3-3 provides a summary of these plants.

TABLE 3-3

SUMMARY OF PRIVATELY-OWNED TREATMENT FACILITIES IN WESTERN DELAWARE COUNTY

Facility	Owner	Operator	NPDES or DEP Permit No.	Receiving Water	Permit Capacity (MGD)[1]
Chadds Ford Township					
Knight's Bridge WWTP	Knight's Bridge Corp.	American Water Services	PA0052663	Harvey Run	0.045
Pantos WWTP	Pantos Corp.	American Water Services	PA0047252	Harvey Run	0.070
Springhill Farms WWTP	Springhill Farms Wastewater Facility Assoc.	American Water Services	PA0052230	Unnamed trib. to W. Br. Chester Creek	0.100
Brandywine River Hotel WWTP	3 Tem Hotels, Inc.	D. Benner	N/A	Subsurface absorption	0.0048
Brandywine Summit WWTP	Brandywine Summit Partners	R. Eshelman	N/A	Subsurface absorption	0.006475
Raven's Crest WWTP	Raven's Crest Homeowners Assoc.	D. Benner	N/A	Subsurface absorption	0.005
Chester Heights Borough					
Coventry Crossing Treatment Plant	Pantos Corp.	American Water Services	PA0052434	Unnamed trib. to W. Br. Chester Creek	0.040
Darlington Woods Treatment Plant	Darlington Woods Homeowners Assoc.	American Water Services	PA0050237	E. Br. Chester Creek	0.150
Valleybrook Treatment Plant	Valleybrook Homeowners Assoc.	American Water Services	PA0040576	W. Br. Chester Creek	0.072

TABLE 3-3

SUMMARY OF PRIVATELY-OWNED TREATMENT FACILITIES IN WESTERN DELAWARE COUNTY (CONTINUED)

Concord Township					
Brinton Manor Sewage Plant	Genesis Eldercare	American Water Services	PA0044474	W. Br. Chester Creek	0.013
Concord Beverage Treatment Plant	Concord Beverage LP	self	PA0050431	Unnamed trib. to W. Br. Chester Creek	
Concord Country Club Sewage Plant	Concord Country Club	American Water Services	PA0031666	Unnamed trib. to W. Br. Chester Creek	0.0125
Concord Industrial Park Sewage Plant	Am. Commonwealth Management Services	American Water Services	PA0032301	W. Br. Chester Creek	0.020
Concordville Inn Sewage Plant	Concordville Inn	Brian Norris	PA0052744	Unnamed trib. to W. Br. Chester Creek	0.025
Fox Valley Sewage Plant	Fox Valley Community Services	TMH Environmental Services	PA0030431	W. Br. Chester Creek	0.074
Garnet Valley School District Sewage Plant	Garnet Valley School District	American Water Services	PA0031208	Green Creek	0.0222
Southco Sewage Treatment Plant	SOUTHCO, Inc.	American Water Services	PA0051161	W. Br. Chester Creek	0.013
State Farm Sewage Treatment Plant	State Farm Mutual Auto Insurance Co.	American Water Services	PA0051756	W. Br. Chester Creek	0.025

TABLE 3-3

SUMMARY OF PRIVATELY-OWNED TREATMENT FACILITIES IN WESTERN DELAWARE COUNTY (CONTINUED)

Facility	Owner	Operator	NPDES or DEP Permit No.	Receiving Water	Permit Capacity (MGD)[1]
Edgmont Township					
Runnymeade Farm Sewage Treatment Plant #1	Holloway Development Corp.		N/A	Subsurface absorption	0.053
Runnymeade Farm Sewage Treatment Plant #2	Holloway Development Corp.	American Water Services	2387424	Subsurface absorption	0.034
Runnymeade Farms Sewage Treatment Plant, phase 5	Holloway Development Corp.	Suburban Wastewater Services	2388416	Subsurface absorption	
Sleighton Farm School Sewage Treatment Plant	Sleighton School for Girls	Steve Cawley	PA0029980	Rocky Run	0.150
U.S. Army Reserve Center Treatment Plant	U.S. Government		N/A	Terminated discharge	0.00625
White Horse Village Treatment Plant	White Horse Village, Inc.	TMH Environmental Services	2300404	Ridley Creek	0.046
Eagleview Treatment Plant	Eagleview Homeowners		N/A	Subsurface absorption	0.0055
Edgmont Country Club Treatment Plant	Edgmont Country Club		N/A	Subsurface absorption	0.0088
Edgmont Square Center #1	Claude Debotton	Brian Norris	2398407	Subsurface absorption	0.0033

TABLE 3-3

SUMMARY OF PRIVATELY-OWNED TREATMENT FACILITIES IN WESTERN DELAWARE COUNTY (CONTINUED)

Facility	Owner	Operator	NPDES or DEP Permit No.	Receiving Water	Permit Capacity (MGD)[1]
Edgmont Square Center #2 (Regal Theater)	Claude Debotton	American Water Services	2396405	Subsurface absorption	0.0011
Edgmont Square Center #3	Proposed Facility		N/A	Subsurface absorption	
Media Borough					
Media Sewage Treatment Plant	Aqua Pennsylvania, Inc.	Aqua Pennsylvania, Inc.	PA0024121	Ridley Creek	1.800
Newtown Township					
Springton Pointe Estates Treatment Plant	Proposed Facility	Jim Byham	2394406	Subsurface absorption	0.350
Somerset	Aqua Pennsylvania, Inc.	Aqua Pennsylvania, Inc.	PA0058262	Hunter Run	0.085
Joyfor Joint Venture Proposed Facility	Proposed Facility		PA0057924	Wetlands to Reese's Run	0.05
Brandywine Operating Partnership (11 Campus)	Proposed Facility	Tom Cosgrove	2398405	Subsurface absorption	
Brandywine Operating Partnership (17 Campus)	Proposed Facility	Tom Cosgrove	2398406	Subsurface absorption	
Thornbury Township					
Cheney University Treatment Plant	Cheney University of PA	Jim Byham	PA0030970	E. Br. Chester Creek	0.270

TABLE 3-3

SUMMARY OF PRIVATELY-OWNED TREATMENT FACILITIES IN WESTERN DELAWARE COUNTY (CONTINUED)

Facility	Owner	Operator	NPDES or DEP Permit No.	Receiving Water	Permit Capacity (MGD)[1]
Glen Mills School Treatment Plant	Glen Mills School	American Water Services	PA0031747	E. Br. Chester Creek	0.150
Goddard School Treatment Plant	Goddard School	Steve Cawley	PA0056821	E. Br. Chester Creek	0.0025
Upper Providence Township					
Toft Woods Treatment Plant	Toft Woods Homeowners Assoc.			Subsurface absorption	0.015

[1] Design capacity for subsurface absorption disposal systems shown as appropriate.

Source: U.S. EPA EnviroFacts Database and DEP files

CHAPTER 4

EVALUATION OF WASTEWATER TREATMENT NEEDS

INTRODUCTION

One of the most important components of a sewage facilities plan is an analysis of sewage treatment needs. While some portions of western Delaware County have an extensive public sewer system, others continue to rely heavily on individual on-lot subsurface or community sewage treatment systems.

During spring 2000, DCPD conducted a survey to determine the extent and location of on-lot sewers in the western municipalities. Only eight of the fourteen municipalities responded to the survey, with two of them noting that less than 1% of homes and businesses within their municipal boundaries use on-lot disposal systems (OLDS). Information presented in this chapter was based on this survey as well as on additional interviews with municipal officials and SEOs conducted in December 2001 and January 2002.

ON-LOT SUBSURFACE SEWAGE DISPOSAL SYSTEMS

Location of On-Site Systems

Aston Township

Most of Aston Township is serviced by public sewers. Only about 1% of homes and businesses use individual on-lot systems. Community on-lot systems account for another 1% of residences and businesses. Most on-lot facilities are located in the northwestern part of the Township along Mount Road and in the southeastern part along Duttons Mill Road. These facilities do not show any signs of problems at the present time; however, the age of the systems is a concern.

Bethel Township

About 10% of homes and businesses in Bethel Township are serviced by individual on-lot systems, and there are no known community on-lot systems. According to the results of the SEO survey, reported malfunctions were caused by age, poor soils, and lack of proper maintenance. High groundwater tables are characteristic for parts of the Township, increasing the risk of subsurface water contamination.

Brookhaven Borough

No information provided.

Chadds Ford Township

No information provided.

Chester Heights Borough

About 75% of residences and businesses in Chester Heights Borough are serviced by individual on-lot systems. One community facility (Darlington Woods) holds an NPDES permit and discharges into the East Branch of Chester Creek. Two other community systems (Coventry Crossing and the Village of Valleybrook) have on-site disposal of treated wastewater and, thus, do not hold NPDES permits. On-lot systems that experience problems are typically located in low spots near streams. Soils in the Borough are generally acceptable for on-lot systems. Known on-lot system replacements included old septic tanks (installed prior to 1967) and those that were poorly maintained. The main threat to groundwater is posed by cesspools, which are generally a minimum of 8 feet deep.

Concord Township

Concord Township is currently experiencing a surge in development. At the present time, about half of the municipality's residences and businesses are still using individual on-lot sewage systems. One commercial and one residential development use community treatment plants. Several areas in the Township are experiencing on-lot problems. They include areas adjacent to Kirk Road and Shavertown Road and the Conestoga Farms development. Planning for public sewer installation is in progress to resolve some of these problems.

Edgmont Township

Edgmont Township relies entirely on on-lot systems. Some residential and business developments (Runnymeade, Edgmont Square Center) have privately maintained large volume community on-lot disposal facilities; however, most individual residences employ on-lot systems. These systems generally function well due to large lot size and good soil conditions. There are a few problem areas, such as the Castle Rock development, which is characterized by small lot sizes. One of Edgmont Square Center's facilities is currently hauling wastewater for off-site disposal due to compliance problems. The Township's general approach is to continue employing on-lot systems wherever possible, thus providing additional recharge to groundwater aquifers.

Media Borough

Media Borough is almost entirely built out. Current development is mostly limited to redevelopment of already sewered areas. Only three lots in the Borough, all located along West End Avenue, use on-lot systems. All three are experiencing overflow problems, mostly due to system age and soil limitations. Their small lot size restricts the types of repairs available.

Middletown Township

Most of Middletown Township is sewered, with only about 2% (about 300 homes) utilizing on-lot systems. There are no community on-lot systems. Some individual systems

are characterized by malfunctions, such as those along New Darlington and Valley Roads, due to location in low areas. Given the limited connections available to SWDCMA, some Middletown builders received permission to employ temporary on-lot systems. Tie-in of all residences located within 150 feet of public sewer connection will become mandatory, and temporary on-lot systems will be abandoned once capacity becomes available at SWDCMA.

Newtown Township

A significant number of residences in Newtown Township rely on on-lot systems for wastewater disposal. Several of these on-lot systems have historically or are currently experiencing malfunctions. Some problems have been eliminated by public sewer system extension (Newtown Heights/Elgin Park), while others are generally dealt with by repair, enlargement, upgrading, or installation of replacement systems.

Rose Valley Borough

Rose Valley Borough is nearly built out with only one property remaining with subdivision potential. Public sewers service most of the Borough, while only 10% of residences use individual on-lot systems. These pockets of on-lot systems remain primarily due to economic unfeasibility of extending public sewers to these areas. There are no on-lot systems within Rose Valley currently experiencing any problems. All maintenance issues are resolved promptly, and systems continue to operate effectively. One property directly adjacent to the Borough line but located in Nether Providence Township has experienced chronic on-lot problems, but the ability to make repairs is limited due to its small lot size.

Thornbury Township

Approximately 65% of the Township utilized on-lot disposal systems in the year 2000. Malfunctions were rare, and the cause of the failure varied. Most of the residences are located on at least 2-acre lots, which generally accommodate both an on-lot system and a well for water supply comfortably. Problems usually arise due to the age of the system or poor maintenance.

Upper Chichester Township

Upper Chichester is practically built out. Less than 1% of all residences and businesses are served by on-lot sewer systems, and there are no known community on-lot systems. Whenever existing on-lot systems are found to experience problems due to their age, poor soils, or lack of maintenance, they are connected to nearby public sewer where available. Very limited, isolated areas along the U.S. Route 322 corridor do not have direct access to public sewer. Many of these sections could connect if required through the use of grinder pumps with long lines, long gravity extensions, or extensive work within the state highway. However, this could prove costly for isolated single residences.

Upper Providence Township

Upper Providence Township is actively developing its public sewer system; however, approximately 45% of all residences still use an on-lot system for wastewater disposal. The municipal survey reported that some systems were experiencing malfunctions due to poor soils and small lot sizes. One area in particular, located adjacent to Old State Road, has been experiencing severe problems with on-lot systems. Most of the residences located in the northern part of the municipality (north of Route 1 – Media Bypass) are situated on large size lots and have suitable soils and, therefore, experience very few problems. Problems that do occur in the northern part of the Township are attributed to the age of the systems, and many of the disposal systems (up to 50%) were recently replaced with new ones due to strict home resale and system certification requirements. Several residents have installed small volume package plants on their properties. These plants are inspected annually by the Township, and reports are submitted to DEP.

On-Site System Management and Maintenance

None of the fourteen western municipalities with on-site systems noted that they had ordinances requiring septic tank maintenance or inspection at specified intervals. Upper Providence Township currently has a draft of such an ordinance pending approval. Few municipalities have any educational programs regarding on-lot system suitability and maintenance.

Survey responses indicated that septic tank cleaning and septage hauling services are privately contracted by homeowners. Sewage sludge in western Delaware County is generally hauled to SWDCMA, DELCORA, or PSWPCP for disposal. However, municipalities have no requirements on disposal destinations or hauling records.

SUITABILITY FOR ON-SITE SYSTEMS

In order to determine the suitability of areas for on-site systems, a number of physical factors must first be examined. This section addresses the factors most influential in the siting of on-site systems, including soil characteristics, slopes, floodplains, wetlands, topography, and geology.

This information is provided here for planning purposes only and is not intended for use as a basis for determining the suitability of subsurface systems for any given tract of land. For a preliminary determination of soil suitability, please consult the *Soil Survey of Chester and Delaware Counties* and any updates available from NRCS. Field testing observed or conducted by a certified SEO is needed for final determination of suitability.

Soils

The ability of soil to physically, chemically, and biologically renovate sewage varies with its soil characteristics affecting drainage and permeability, including depth to

bedrock and depth of the seasonal high water table. Water percolation rates are an important parameter that determines how fast wastewater will enter the soil below the drain field. If percolation is too slow, the septic system may back up; if percolation is too fast, poor treatment of the effluent may result. Current conventional on-lot system standards require a minimum depth of 20 inches of suitable soil for good renovation purposes. Therefore, a high water table and shallow bedrock must be avoided to achieve such standards and ensure proper treatment of effluent.

Soil characteristics information can be found in general form in the U.S. Department of Agriculture's *Soil Survey of Chester and Delaware Counties* and in the *DEP Technical Manual for Sewage Enforcement Officers*. However, older surveys should be used with caution since some data had been altered in recent years after additional research. The 1963 *Soil Survey of Chester and Delaware Counties* was based on the field data collected in the late 1940s and early 1950s. This field data often concentrated on potential agricultural uses of the soils, while limited information was provided for engineering applications such as septic systems. Additional data collected throughout the years was archived in Ames, IA in the Iowa State University Soil Survey Database. In 1995, new tables rating soil suitability for a variety of uses were generated. Depending on restrictions such as flooding, depth to bedrock, ponding, depth to high water table, permeability, and slope, limitations for septic systems were rated as slight, moderate, and severe. These new ratings differ from those in the 1963 *Soil Survey of Chester and Delaware Counties* in some cases, based on newly acquired information. Table 4-1 lists soils in western Delaware County and their limitations for septic system installation and specifies restrictions that defined the limitation. Soil limitations for on-lot disposal systems in western Delaware County are depicted on Figure 4-1. This latest suitability data will be incorporated into the new Delaware County Soil Survey, which is due to be published by 2007.

The suitability data provided by soil surveys and the State's soil survey database should be used for overview purposes only. Any developer or homeowner desiring to site a new or replacement on-site system should contact the respective municipal SEO for a determination as to the suitability for an on-site system at a specific location.

Slopes

Residential and commercial development in areas of steep slopes creates problems for the use of on-lot disposal systems. Sewage effluent may be difficult or impossible to control and may result in pollution of the surface and groundwater. The extra weight of buildings and effluent from on-lot systems, in combination with the erosion, flooding, and sedimentation that may take place from construction on steep slopes, may cause slope failure and slumping if the soil becomes saturated. This can cause damage to development both on the slope itself and on areas downslope. Shallow soils frequently encountered in areas of steep slopes make OLDS and drainage facilities difficult to install.

TABLE 4-1

SOIL LIMITATIONS FOR ON-LOT DISPOSAL SYSTEMS

Symbol	Soil Name	Limitations	Restriction 1	Restriction 2	Restriction 3
BeA	Beltsville silt loam	Severe	Wetness	Slow permeability	
BeB2		Severe	Wetness	Slow permeability	
BrB2	Brandywine loam	Severe	Poor filter		
BrC		Severe	Poor filter		
BrC2		Severe	Poor filter		
BrC3		Severe	Poor filter		
BrD		Severe	Poor filter	Slope	
BrD2		Severe	Poor filter	Slope	
BrD3		Severe	Poor filter	Slope	
BrE		Severe	Poor filter	Slope	
BsB	Brandywine very stony loam	Moderate	Slow permeability		
BsD		Severe	Slope		
BsF		Severe	Slope		
ByA	Butlertown silt loam	Severe	Wetness	Slow permeability	
ByB2		Severe	Wetness	Slow permeability	
CaA	Calvert silt loam	Severe	Wetness	Slow permeability	
CaB		Severe	Wetness	Slow permeability	
CaB2		Severe	Wetness	Slow permeability	
CdA	Chester silt loam	Moderate	Slow permeability		
CdA2		Moderate	Slow permeability		
CdB		Moderate	Slow permeability		
CdB2		Moderate	Slow permeability		
CdC		Moderate	Slow permeability	Slope	

TABLE 4-1

SOIL LIMITATIONS FOR ON-LOT DISPOSAL SYSTEMS (CONTINUED)

CdC2		Moderate	Slow permeability	Slope	
Ch	Chewacla silt loam	Severe	Flooding	Wetness	Poor filter
CkB2	Chrome gravelly silty clay loam	Severe	Depth to rock		
CkC2		Severe	Depth to rock		
CkC3		Severe	Depth to rock		
CkD2		Severe	Depth to rock	Slope	
CkD3		Severe	Depth to rock	Slope	
Cn	Congaree silt loam	Severe	Flooding		
CoA	Conowingo silt loam	Severe	Wetness	Slow permeability	
CoB2		Severe	Wetness	Slow permeability	
GeA	Glenelg channery silt loam	Moderate	Slow permeability	Large stones	
GeA2		Moderate	Slow permeability	Large stones	
GeB		Moderate	Slow permeability	Large stones	
GeB2		Moderate	Slow permeability	Large stones	
GeB3		Moderate	Slow permeability	Large stones	
GeC		Moderate	Slow permeability	Slope	
GeC2		Moderate	Slow permeability	Slope	
GeC3		Moderate	Slow permeability	Slope	
GeD		Severe	Slope		
GeD2		Severe	Slope		
GeD3		Severe	Slope		
GeE		Severe	Slope		
GeE3		Severe	Slope		

TABLE 4-1

SOIL LIMITATIONS FOR ON-LOT DISPOSAL SYSTEMS (CONTINUED)

GnA	Glenville silt loam	Severe	Wetness	Slow permeability	
GnB		Severe	Wetness	Slow permeability	
GnB2		Severe	Wetness	Slow permeability	
GnC2		Severe	Wetness	Slow permeability	
GsB	Glenville very stony silt loam	Severe	Wetness	Slow permeability	
Ma	Made land	Not classified			
Mc		Not classified			
Md		Not classified			
Me		Moderate	Slow permeability		
MgB2	Manor loam	Moderate	Slow permeability		
MgB3		Moderate	Slow permeability		
MgC		Moderate	Slow permeability	Slope	
MgC2		Moderate	Slow permeability	Slope	
MgC3		Moderate	Slow permeability	Slope	
MgD		Severe	Slope		
MgD2		Severe	Slope		
MgD3		Severe	Slope		
MhE	Manor loam and channery loam	Severe	Slope		
MhE3		Severe	Slope		
MkF	Manor soils	Severe	Slope		
MmD	Manor very stony loam	Severe	Slope		
MmF		Severe	Slope		
Mn	Melvin silt loam	Severe	Flooding	Wetness	

TABLE 4-1

SOIL LIMITATIONS FOR ON-LOT DISPOSAL SYSTEMS (CONTINUED)

MoB2	Montalto channery silt loam	Severe	Slow permeability		
MrD	Montalto very stony silt loam	Severe	Slow permeability	Slope	
NaA	Neshaminy gravelly silt loam	Severe	Slow permeability		
NaB2		Severe	Slow permeability		
NaC2		Severe	Slow permeability		
NaC3		Severe	Slow permeability		
NaD		Severe	Slow permeability	Slope	
NaD3		Severe	Slow permeability	Slope	
NsB	Neshaminy very stony silt loam	Severe	Slow permeability		
NsD		Severe	Slow permeability	Slope	
NsF		Severe	Slow permeability	Slope	
OtA	Othello silt loam	Severe	Wetness	Slow permeability	
SaA	Sassafras loam	Severe	Slow permeability		
SaB2		Severe	Slow permeability		
WaA	Watchung silt loam	Severe	Wetness	Slow permeability	
We	Wehadkee silt loam	Severe	Flooding	Wetness	
WnA	Woodstown loam	Severe	Wetness	Slow permeability	
WoA	Worsham silt loam	Severe	Wetness	Slow permeability	
WoB		Severe	Wetness	Slow permeability	
WoB2		Severe	Wetness	Slow permeability	
WsB	Worsham very stony silt loam	Severe	Wetness	Slow permeability	

Source: U.S. Department of Agriculture, *Soil Survey of Chester and Delaware Counties*, 1963

The steep slopes found in western Delaware County often parallel the County's stream channels. Extensive areas of slopes in excess of 15% are found in several locations throughout the County.

Floodplains

All of the major creeks that traverse Delaware County overflow their banks from time to time. The Federal Emergency Management Agency (FEMA) has prepared maps indicating areas that are inundated by a 100-year flood event. The FEMA map panels are available at the administration building in each municipality and at DCPD. They may also be purchased from the FEMA offices in Philadelphia or in Bethesda, Maryland. Due to such factors as a seasonal high water table and exposure to the flood hazard, floodplain soils generally pose moderate to severe limitations for development and OLDS.

Wetlands

Wetlands are generally low-lying areas with high water tables that are temporarily or intermittently filled with shallow water. The density of the soil particles in wetland soils results in low percolation rates, causing sewage to seep to the surface and producing wet, smelly, and unsanitary conditions. A high seasonal water table is generally indicative of lateral movement of water to adjacent water bodies, and any alteration of the water movement or water quality in these areas will have a direct impact on neighboring waters. Areas where the water table is at the surface are highly vulnerable to pollution. Therefore, wetlands are considered areas unsuitable for on-site systems. For more information on the location of wetlands, consult the *Soil Survey of Chester and Delaware Counties* for the presence of hydric soils or refer to the *National Wetlands Inventory* maps prepared by the U.S. Department of the Interior.

Topography

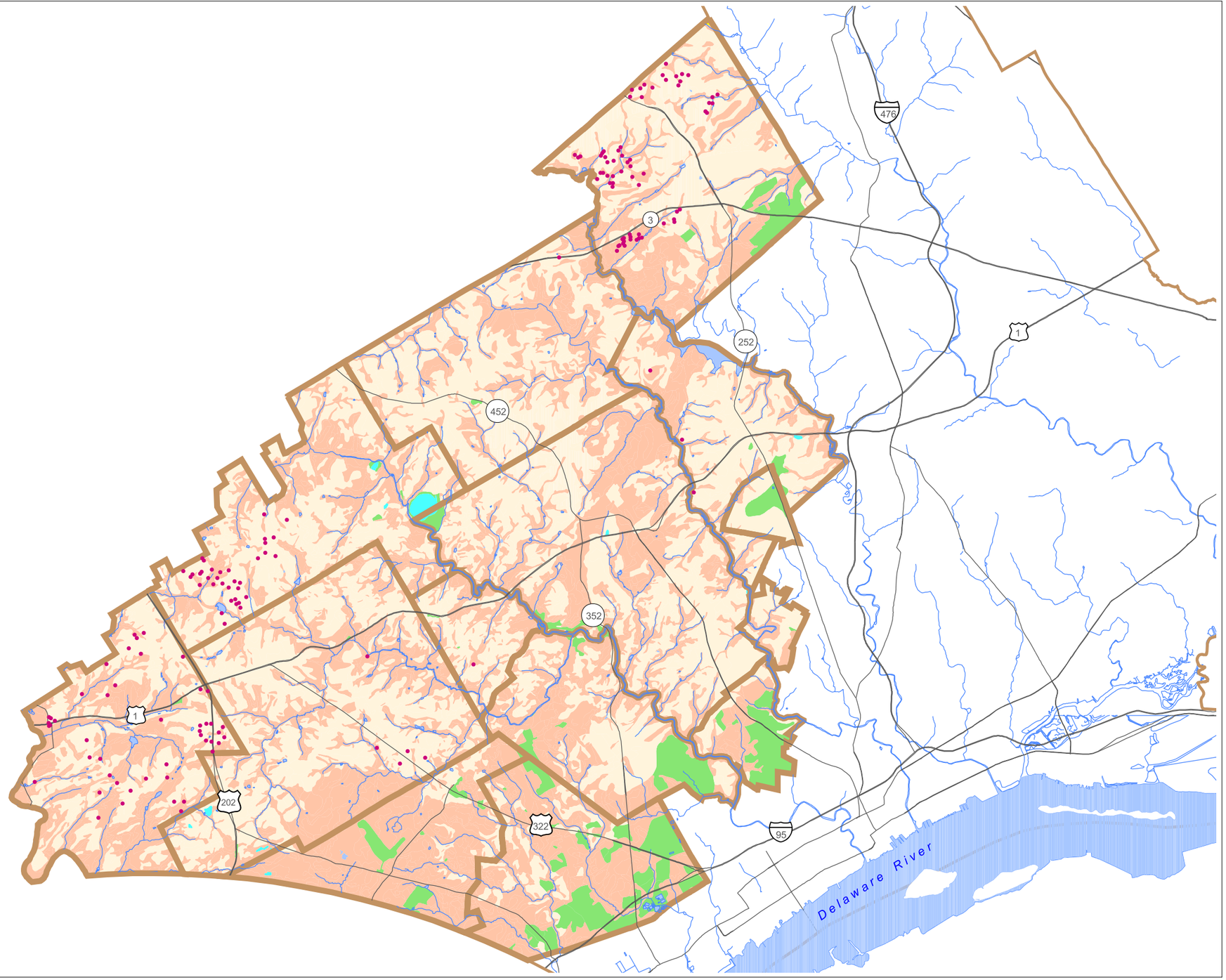
Since sewers are usually designed to make maximum use of gravity, topography is a major factor in evaluating various options for sewage conveyance and treatment. The U.S. Geologic Survey 1:24,000 topographic maps show general elevations of Delaware County, mapped as 10-foot contours. At this scale, the County appears to slope from its border with Chester County in the northwest down to the Delaware River along the southeast. The most prominent features are the major creek valleys and the ridges that divide them. These features become important in planning for the extension of existing public sewers or construction of new local sewage collection and treatment systems.

Geology

The Pennsylvania Geological Survey report entitled *Groundwater Resources of Delaware County, Pennsylvania* (1996) notes that Delaware County falls within two primary physiographic provinces. The northern two thirds, characterized by rolling terrain, lie within the Piedmont physiographic province. The other third of the County falls within the Atlantic Coastal Plain, which is the relatively flat, narrow band that parallels the

FIGURE 4-1

Soil Limitations for On-Lot Disposal Systems



DELCORA

LEGEND

- Problem Areas (per 2000 SEO Survey)
- Roads
- Streams
- Moderate Limitations
- Severe Limitations
- Made Land
- Water
- Quarries
- Municipalities, Western Project Area

N
W E
S

Scale in Miles

1 0 1 2 3

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

Delaware River (see Figure 4-2). *The Natural Areas Inventory of Delaware County, Pennsylvania* (1992) notes that the Piedmont area consists of folded and faulted metamorphic and igneous rocks that include marble, schist, gneiss, quartzite, granite, and serpentinite. The Coastal Plain is characterized by "unconsolidated to poorly consolidated layers of Quaternary-age sand, gravel, and clay."

The groundwater resources report notes that Delaware County has "limited water resources" and that "groundwater occurs mostly in the weathered zone above bedrock and in fractures to depths of about 300 feet below land surface," with the Wissahickon formation being most productive. It states that "none of the geologic formations in Delaware County yield enough water consistently for large public or industrial supplies; however, most wells should produce sufficient quantities for domestic purposes." It also states that water quality is "generally suitable for most uses."

ON-SITE SYSTEM PROBLEM AREAS

Location of Problem Areas

Several surveyed municipalities indicated reported malfunctions in on-lot systems. Many of the malfunctions were attributed to a combination of factors including lot size, poor soils, poor maintenance, and age of systems. In some municipalities, malfunctions were limited to a few individual lots, while in others, large areas were influenced. Problem areas, as indicated by SEOs in the 2000 Delaware County survey, are depicted in Figure 4-1.

Sewage Systems Malfunctioning to Groundwater

More than half of the municipal survey respondents indicated a possibility of groundwater contamination from malfunctioning on-lot systems. Older on-lot systems built in the 1950s and 1960s and functioning as cesspools were of particular concern. Due to stricter on-lot guidelines, many of these older systems are currently being replaced by modern facilities during the resale of residential properties.

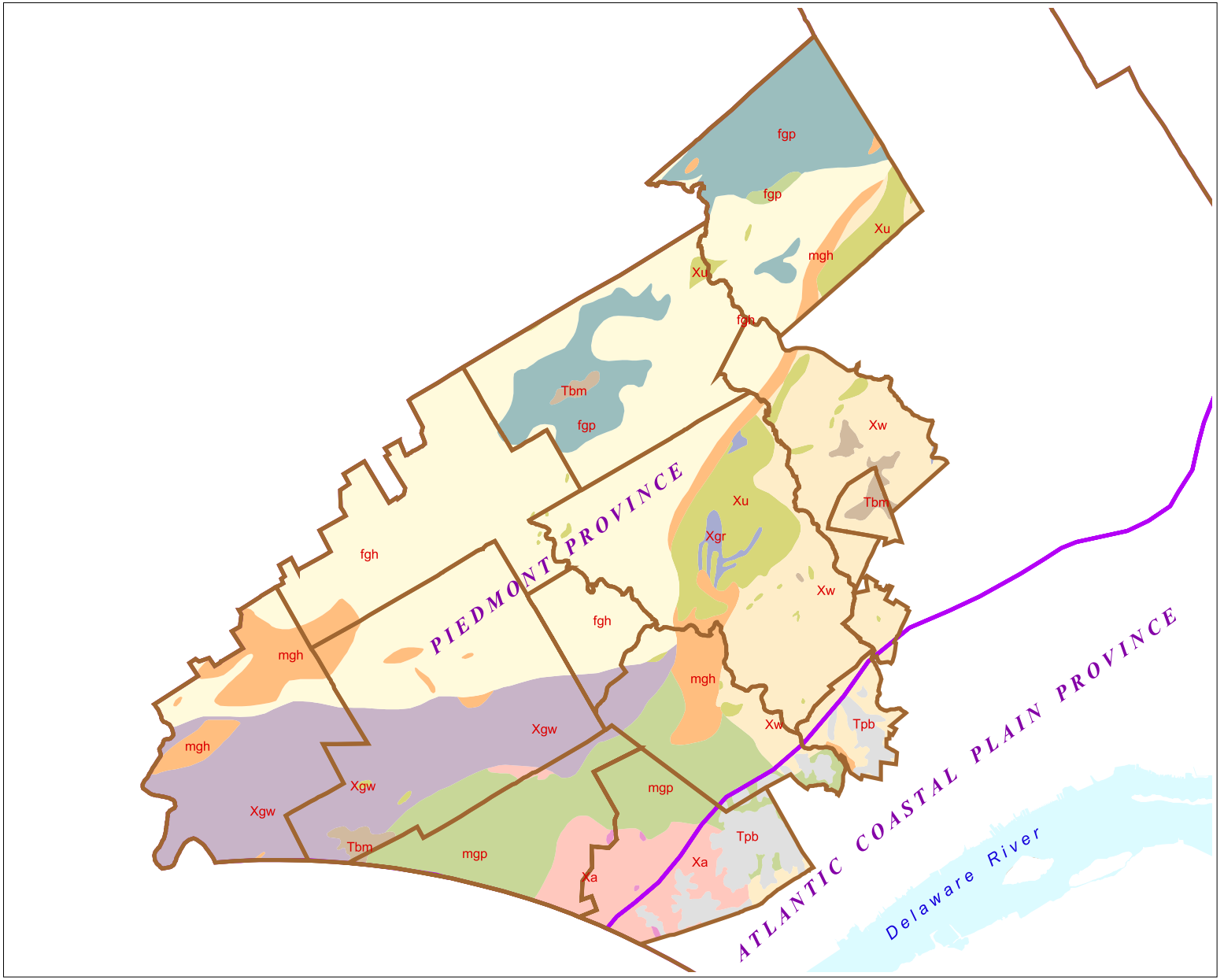
It is difficult to locate malfunctioning on-lot facilities discharging to groundwater without an extensive monitoring well system, regular sampling, or reported problems with potable water wells. In some instances existing monitoring wells do indicate groundwater contamination problems. For example, Edgmont Regal Movie Theater was required to install a holding tank for its wastewater after high levels of nitrates were detected in a nearby monitoring well. The holding tank served to reduce peak loading by discharging a lower flow for a longer period of time.

ILLEGAL SEWAGE DISPOSAL SYSTEMS

None of the municipalities surveyed indicated that they were aware of any wildcat sewers in their municipalities.

FIGURE 4-2

Physiographic Provinces and Geology



DELCORA

LEGEND

Municipal Boundaries, Western Project Area

Physiographic Province Boundary

Geology, Project Area

- Xa Anorthosite
- Tbm Bryn Mawr Formation
- fgh Felsic and intermediate gneiss
- fgp Felsic gneiss
- Xgw Glenarm Wissahickon formation
- Xgr Granitic gneiss and granite
- mgp Mafic gneiss - pyroxene
- mgh Mafic gneiss - hornblende
- Xpg Pegmatite
- Tpb Pensauken and Bridgeton Formations, undifferentiated
- Xu Ultramafic rocks
- Xw Wissahickon Formation

N W E S

Scale in Miles

1 0 1 2

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Data Source:
- Pennsylvania Spatial Data Access (PASDA) Web Site, http://www.pasda.psu.edu
- Delaware County Planning Department (DCPD)

CHAPTER 5

PLANNING OBJECTIVES AND NEEDS

INTRODUCTION

This update of the Delaware County Sewerage Facilities Plan follows a long history of wastewater facilities planning in Delaware County. Planning efforts have continued since each of the County's 49 municipalities adopted the *Delaware County Sewerage Facilities Plan* as their Official Act 537 Sewage Facilities Plan in 1971.

Land use, water supply, and stormwater plans with potential for impacting wastewater planning have also been prepared over the last thirty years, and municipalities have enacted zoning and subdivision/land development ordinances to carry out local planning objectives. Therefore, the purpose of this section is to identify, describe, and compare the planning that has taken place, report progress in implementation, compare various planning efforts to determine consistency or conflict, and define planning needs.

Wastewater planning documents discussed below are presented in historical context only. While many of the recommendations were implemented or are still valid, some are currently considered inapplicable due to changes in conditions unforeseen during development of those documents.

Wastewater Planning Previously Undertaken

Considerable wastewater planning has taken place since the approval in 1971 of the *Delaware County Sewerage Facilities Plan*. This planning has occurred at several levels of government including federal, regional, Countywide, and local municipal levels. Table 5-1 provides a brief history of wastewater planning affecting Delaware County.

Federal Wastewater Planning

At the federal level, EPA has provided incentives for regional and area-wide planning. The Construction Grants Program (Federal Water Pollution Control Act, P.L. 95-500, and its implementing regulations) provided funds for required area-wide facilities or "201" plans (Step 1) prior to funding wastewater facilities design (Step 2) and construction (Step 3). This program was subsequently delegated to the Pennsylvania Department of Environmental Resources (DER), now DEP. The program, with its related planning requirements, continued through amendments contained in the Clean Water Act (1977) and the Water Quality Act of 1987, although at lower funding levels than in previous years. The 1987 Act cut construction grant funding back even further, but at the same time added a new Section 601, "Grants to States for Establishment of Revolving Funds," which provides for loans to finance facility planning (and design and construction) and limited funds for area-wide planning. Today this program, as it has found its way to the state level, is known as the Pennsylvania Infrastructure Investment

TABLE 5-1

HISTORY OF WASTEWATER PLANNING IN DELAWARE COUNTY

Year	Event
1928	Delaware County Board of Engineers formed to evaluate the County's sewage facility needs.
1931	Board of Engineers' report recommends construction of six sewage systems: Darby Creek Joint, Muckinipates, Central Delaware County, Eddystone, City of Chester, and Marcus Hook. All recommendations were implemented by 1960.
1931-1967	Planning by individual municipalities leads to construction of the Radnor-Haverford-Marple (RHM), Tinicum, Media, Rose Valley, Brookhaven, and Southwest Delaware County systems.
1967	Passage of Act 537, the Pennsylvania Sewage Facilities Act. Requires all municipalities to prepare a ten-year sewage facilities plan to address their needs. Following a Pennsylvania Department of Health (PDH) recommendation, all 49 municipalities in Delaware County pass resolutions authorizing the Delaware County Planning Commission (DCPC) to prepare a County sewage facilities plan.
1971 (Jul)	Delaware County Sewerage Facilities Plan identifies needs and recommends a regionalized sewer system for as much of the County as possible.
1971 (Oct)	Delaware County Regional Water Quality Control Authority (DELCORA) is created by the Delaware County Commissioners to implement the recommended plan and is given the authority to finance, construct, and operate all interceptor systems, pumping stations, and treatment plants in the County except (1) the Upper Darby-Haverford system (which discharges directly to the City of Philadelphia network) and (2) the Bethel Township Sewer Authority system (which discharges to New Castle County). Municipal agencies retain control of local collection systems except for the Chester City, Parkside, and Upland collection systems operated by DELCORA.
1972 (Nov)	*Delaware County Regional Sewerage Project* report by Albright and Friel, division of Betz Environmental Engineers (analysis performed in 1971).
1972	Federal Water Pollution Control Act Amendments of 1972 (Clean Water Act) Extensive regulatory and grants program for planning, design, and construction of wastewater control facilities. Section 303 of this Act established water quality standards and the calculation of total maximum daily loads (TMDLs) that a water body can receive and still meet water quality standards.
1974	In response to the Pennsylvania Clean Streams Law, the Pennsylvania Department of Environmental Resources (DER) begins to develop the Comprehensive Water Quality Management Plan for Southeastern Pennsylvania (COWAMP).
1975	Governor designates the Pennsylvania portion of the Philadelphia SMSA as a 208 study area, making the region eligible for a federal area-wide waste treatment management planning grant. With receipt of federal funds, the COWAMP and 208 programs are merged to become the COWAMP/208 Plan, with a goal of comprehensive evaluation of water quality. Existing plans already being implemented for the Regional Sewerage Project were accepted as part of the COWAMP program.
1977	Clean Water Act: 1977 Amendments to the Federal Water Pollution Control Act. Provides additional funding authorization, institutional changes, and a shift in technical emphasis to favor new waste treatment technology and control of toxic pollutants.
1978	Draft *COWAMP/208 Water Quality Management Plan* completed. Suggests alternatives for addressing sewerage needs of the upper Ridley Creek and Crum Creek watersheds and the Chester Creek watershed, but no single alternative is selected.
1979	*Supplement No. 1 to COWAMP/208 Water Quality Management Plan for Southeastern Pennsylvania*. Contains post-publication additions and corrections to the COWAMP/208 plan, including several major changes in recommendations for Delaware County.
1985	EPA issued regulations that implemented Section 303(d) of the Clean Water Act.

TABLE 5-1

HISTORY OF WASTEWATER PLANNING IN DELAWARE COUNTY (CONTINUED)

1987	Water Quality Act of 1987: amends Federal Water Pollution Control Act. For Delaware County, some of the more significant provisions include creation of (1) a program providing grants to states for establishing water pollution control revolving funds, and 2) the National Estuary Program, with Delaware Bay given priority consideration.
1988	PENNVEST. State legislation creating a revolving fund to provide loans and grants for water and wastewater facilities. Referendum approved to provide funding.
1989	National Combined Sewer Overflow (CSO) Control Strategy was published by EPA as a first step in controlling CSOs.
1990	EPA Phase I of the NPDES Stormwater Program addressed the negative impact of stormwater runoff on water quality. Municipal separate storm sewer systems that serve populations of 100,000 or more, eleven categories of industrial activities, and construction activities disturbing 5 acres or more were required to obtain NPDES permit coverage.
1992	EPA issues current TMDL regulations that included a 2-year listing cycle for states to list impaired and threatened waters, a TMDL must include point and nonpoint sources, TMDLs are subject to public review, etc.
1994	CSO Control Policy issued by EPA to provide guidance that would coordinate the planning, selection, design, and implementation of CSO management practices and controls to meet the requirements of the Clean Water Act.
1999	Phase II of the NPDES Stormwater Program was published by EPA requiring permit coverage for certain small municipal separate storm sewer systems and construction activities between 1 and 5 acres.
2000	EPA published revised regulations for the implementation of TMDLs. In 2001, began to reexamine the published rule and after consulting with stakeholders, began to redraft the rule. On March 19, 2003, EPA withdrew "Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and Management Regulation" or what was referred to as the "July 2000" rule. It is unknown if EPA is planning to re-issue revised regulation changes.
2002	Proposed rule to reduce sanitary sewer overflows (SSOs) was published by EPA. Although it was later withdrawn, a minimally revised version is still pending. The proposed rule includes clarification of the Clean Water Act's prohibition of overflows, provisions to expand permit coverage to satellite systems (collection systems that discharge to another entity for wastewater treatment), and requirements for a collection system management program (CMOM – Capacity, Management, Operation, and Maintenance).

Source: DCPD, 2002; Weston Solutions, Inc., 2003

Authority (PENNVEST). Table 5-2 lists recent PENNVEST loans and grants in western Delaware County.

In 1974, DER began work on a Comprehensive Water Quality Management Plan for Southeast Pennsylvania (COWAMP) under Pennsylvania's Clean Streams Law. This work and federally initiated planning under Section 208 of the Water Pollution Control Act were merged, and the combined COWAMP/208 Plan was published in draft form in 1978 and supplemented in 1979. The plan was intended to serve as a guide to wastewater planning in southeastern Pennsylvania. While the plan was unable to reach consensus on recommended actions for specific geographic areas in Delaware County, other than to recommend additional "201" facilities planning studies, it did provide policy guidance. Although the plan recognized that public sewers would continue to be a viable solution for wastewater problems in many areas, its emphasis was also towards alternative "non-sewer" methods of wastewater disposal. Land application and the maintenance and management of OLDS were stressed as considerations for future planning.

Section 303 of P. L. 92-500 provided for planning for an even larger area, and the *Delaware River Basin Comprehensive Study* was partially funded by that program. With the 1987 amendments to the Act, the Delaware Estuary was given special attention, and planning efforts have begun to identify the full spectrum of needs related to this major water resource.

State/County Wastewater Planning

Act 537, the Pennsylvania Sewage Facilities Act, requires municipalities to prepare 10-year plans to address their sewage facilities needs. As recommended by PDH, all 49 municipalities in Delaware County passed resolutions authorizing DCPC to prepare a County sewage facilities plan on their behalf. The resulting 1971 *Delaware County Sewerage Facilities Plan* identified needs and recommended a regionalized sewer system for as much of the County as possible. Table 5-3 lists the plan's major recommendations and their current status. Each of the 49 municipalities adopted this plan (by resolution) as their Official Sewage Facilities Plan.

Delaware County Regional Sewerage Project

As a follow-up to the 1971 *Delaware County Sewerage Facilities Plan*, detailed engineering studies were undertaken for the County by Albright and Friel, a division of Betz Environmental Engineers, resulting in the 1972 report of the *Delaware County Regional Sewerage Project*. The report divides the County into two service areas: the predominantly sewered area east of Crum Creek and the western area that includes the Chester and Ridley Creek watersheds and the upper Crum Creek watershed above Geist (Springton) Reservoir. While the lower portions of the watersheds were largely sewered and included major wastewater producing industries, the upper portions were largely unsewered, with high growth potential.

TABLE 5-2

PENNVEST LOANS TO SEWER AUTHORITIES SERVICING WESTERN DELAWARE COUNTY (1996-2002)

Project Name	Project Type	Date of Approval	Amount	Project Description
Concord Township Sewer Authority	Municipal Authority-Sewer	3/24/99	$600,000	Public sewer extension to an area of 85 existing homes and four businesses
Delaware County Regional Water Quality Control Authority	Municipal Authority-Sewer	11/17/99	$5,009,000	Design and construction of an upgraded pump station and 3 miles of force main to divert existing flows from CDCA service area to DELCORA's WRTP
Southern Delaware County Authority	Municipal Authority-Sewer	7/18/01	$4,888,000	Construction of a new pump station and 2.5 miles of force main to convey flows from New Castle to DELCORA
Southwest Delaware County Municipal Authority	Municipal Authority-Sewer	7/15/98	$567,289	Rehabilitation and replacement of 1.6 miles of collection lines to eliminate raw sewage discharges into local streams
Southern Delaware County Authority	Municipal Authority-Sewer	7/15/98	$681,266	Rehabilitation and replacement of approximately 2 miles of collection lines and manholes to eliminate raw sewage discharges into Naamans Creek (West Branch and Main Branch Naamans Creek Interceptor lines)
Southern Delaware County Authority	Municipal Authority-Sewer	7/15/98	$642,800	Various sewer extensions into unsewered areas
Southern Delaware County Authority	Municipal Authority-Sewer	3/20/96	$510,535	Installation of approximately 1 mile of new collection lines to replace malfunctioning OLDS
Southwest Delaware County Municipal Authority	Municipal Authority-Sewer	3/24/99	$758,733	Rehabilitation and replacement of approximately 8,500 feet of sanitary sewer lines subject to I&I in various locations
Upper Chichester Township	Municipal-Storm-water	3/22/00	$559,000	Improvements and extension of stormwater collection system at various locations throughout the Township
Upper Chichester Township	Municipal-Storm-water	3/25/98	$900,000	Improvements and extension of stormwater collection system at various locations throughout the Township

Source: PENNVEST website, 2003

TABLE 5-3

1971 DELAWARE COUNTY SEWERAGE FACILITIES PLAN (ACT 537)

	Item	Recommendation	Status
1	Acceptance of the Plan	All municipalities in Delaware County should enact formal resolutions adopting this plan in accordance with the Pennsylvania Sewage Facilities Act.	Done
2	Municipal Sewerage Plans	Each of the municipalities should prepare a sewerage plan, including proposed expansion and/or modifications to sewage collections facilities. These municipal plans should be in agreement with this Sewerage Facilities Plan.	See review of Municipal Wastewater Planning for individual municipalities.
3	On-Site Disposal Systems	In order to alleviate or forestall any health problems caused by malfunctioning individual on-site disposal systems, all municipalities should adopt ordinances governing these systems, especially in areas having hazardous soil conditions. The ordinances should also cover the design, construction, and operation of on-site systems, as set forth in Act 537.	DEP currently has standards and model ordinances available for use.
4	Modifications to Sewerage Facilities Plan	The *Delaware County Sewerage Facilities Plan* should be routinely updated and/or modified as necessary, as development patterns warrant. In addition, the plan should be re-evaluated every 5 years or more frequently if needed.	In municipalities with unsewered areas, an SEO routinely reviews planning modules for proposed land development for consistency with the local Act 537 plan, and DCPD has an opportunity to comment before requests for plan revisions are approved by DEP. Most of the western study area municipalities have recently updated their own Act 537 plans. Upon completion of this document, western municipalities can choose whether to adopt the new plan. Eastern study area municipalities adopted the new Delaware County Act 537 Plan in 2002.
5	Regional Sewerage Project	Complete the *Delaware County Regional Sewerage Project*.	The study was completed in 1972. Most, but not all, of the study's recommendations have been implemented.
6	Radnor-Haverford-Marple Authority	Treatment facility to be phased out. Plant to operate until adequate treatment is available downstream.	Done. RHM now operates an interceptor which flows into the DCJA pump station for conveyance via DELCORA's interceptor to PSWPCP.
7	Upper Darby-Haverford (Philadelphia S.W.).	Continue to discharge to the Philadelphia system.	Flows still go to Philadelphia.

TABLE 5-3

1971 DELAWARE COUNTY SEWERAGE FACILITIES PLAN (ACT 537)

(CONTINUED)

8	Darby Creek Joint Authority	Continue present operation. Further analysis and evaluation during the Delaware County Regional Sewerage Project should determine the best mixture between expansion and/or bypass of flows to the Philadelphia Southwest treatment facility.	Following an interim solution of bypassing some flow to the Philadelphia Southwest plant, DCJA ceased treatment operations. DCJA has operated as a collection authority only since the 1976 expansion of the Philadelphia plant. In 1980, DELCORA constructed the Darby Creek Pump Station to pump flows to PSWPCP.
9	Muckinipates Authority	Upgrade treatment to achieve DRBC allocation and continue to operate.	This was not done. The plant was phased out and the Authority operates for the purpose of conveyance only. In 1980, DELCORA constructed the Muckinipates Pump Station to pump flows to PSWPCP.
10	Tinicum Township	Upgrade treatment to achieve DRBC allocation and continue to operate.	The plant is still operating.
11	Central Delaware County Authority	Continue present operation. The Regional Sewerage Project will determine whether plant expansion or diversion of the area's flow to a possible regional treatment plant is the best alternative.	The Central Delaware County treatment plant was phased out in 1980 and replaced by a DELCORA pump station/force main to PSWPCP. Construction is now near completion on a project to divert up to 12 MGD to DELCORA's WRTP.
12	Eddystone Borough Treatment Plant	Phase out and construct connection to City of Chester sewer system.	Done.
13	Media Borough Treatment Plant	Continue to operate as is. (Shown on map to be phased out by 1990.)	Still operating. Plant has been upgraded to permit increased flows.
14	Brookhaven Borough Treatment Plant	Phase out and construct connection to the Southwest Delaware County sewer system.	Still operating. Recently underwent upgrade.
15	Rose Valley Treatment Plant	Continue to operate until an interceptor is built along Ridley Creek (1975), then phase out plant.	During facility planning for the Ridley Creek Interceptor, Rose Valley indicated that it preferred to continue to operate its plant. It is still operating.
16	Southwest Delaware County Municipal Authority	Expand the Baldwin Run Pollution Control Facility to 4 MGD and upgrade treatment efficiency to meet proposed DEP effluent standards.	Plant has been expanded to treat flows up to 6 MGD.
17	Chester City Treatment Plant	Upgrade and expand to serve as regional treatment plant for Chester and Ridley Creek watersheds.	This is now the DELCORA WRTP. It has been expanded to 44 MGD and upgraded to secondary treatment.

TABLE 5-3

1971 DELAWARE COUNTY SEWERAGE FACILITIES PLAN (ACT 537)

(CONTINUED)

18	Marcus Hook Borough	Phase out Borough Treatment Plant and construct connection to City of Chester sewer system.	Done.
19	Chadds Ford Area	Construct interim sewage treatment plant. Phase out plant when interceptor is extended up the Brandywine Creek watershed (1985).	Studies (1973 and 1976) proposed a 0.25 to 0.30 MGD plant in Chadds Ford, with an interceptor up Harvey Run to serve the Route 1 – Painters Crossroads area, but funds were not available. Instead, a number of small treatment plants have accompanied development in the Painters Crossroads and Chadds Ford areas. CFTSA owns and operates the Ridings WWTP, which was constructed in 1994 and is permitted for flows up to 0.08 MGD.
20	Southern Delaware County Authority	Continue to discharge to New Castle County sewage system. Expand service area to include Bethel Township. Modify agreement with New Castle County to allow increased discharge up to 4.0 MGD.	Service area has been expanded in Bethel Township. Approximately 1.5 MGD of sewage formerly conveyed to the New Castle County Authority's system to be treated at the City of Wilmington Water Pollution Control Plant was diverted to the DELCORA Treatment Plant on March 20, 2002 (Naamans Creek Bypass). A new amendment to SDCA's 537 Plan was submitted to DEP in April 2002 and was approved in October 2002. The amendment diverted its Marcus Hook watershed 0.8 MGD flows from SWDCMA's Baldwin Run Pollution Control Facility to DELCORA's WRTP. Only about 613 EDUs from SDCA's collection system are treated at the SWDCMA plant. BTSA collects and conveys most of the flows through SDCA, with a small portion of the wastewater directed to New Castle County, Delaware.

Source: DCPD, 2002; Weston Solutions, Inc., 2003

The plan recommended conveying wastewater from RHM, DCJA, Muckinipates, Tinicum, and Central Delaware County Authorities to an expanded and upgraded PSWPCP for treatment. For the remaining portions of the County, it recommended conveying all wastewater to an upgraded and expanded plant at the existing Chester City plant site for treatment and gradually phasing out all other treatment facilities, including nineteen institutional plants. Implementation was to occur by 2020, in four stages. It recommended creation of a County-level sewer authority in Phase I to implement the recommended plan and assume responsibility for its continued operation. The resulting County-level authority was DELCORA. Following approval by the Delaware County Commissioners at a public hearing, DER accepted this report as a guide to the design of wastewater facilities in the study area. There is no record that individual municipalities adopted it as a revision to their Official Sewage Facilities Plan under Act 537.

Since that time, most of the municipalities located in the western portions of the County have prepared, adopted, and received DER/DEP approval for complete updates or major revisions to their Act 537 Plans. Until recently municipalities in the eastern portion of the County continued to rely on sewage facilities plans prepared in the 1970s. The new *Delaware County Act 537 Sewage Facilities Plan, Eastern Plan of Study* was fully adopted by the eastern municipalities in 2002 and received final approval in 2003.

Municipal Wastewater Planning

Since the preparation of the 1971 *Delaware County Sewerage Facilities Plan*, numerous sewerage feasibility studies and facilities plans have been prepared. The recommendations of these studies and plans and the responses of various local regional, state, and even federal agencies to those recommendations have shaped the specific components of the County's sewage facilities network over the past thirty years.

The following section summarizes local planning efforts in the western study area municipalities in the context of County and regional plans and in accordance with state and federal regulatory requirements.

WASTEWATER PLANNING IN THE WESTERN STUDY AREA

Details of Individual Municipal Wastewater Planning Documents in the West

The following is a brief description of previous and current planning documents created by municipalities in the western planning area. The *Delaware County Sewerage Facilities Plan*, prepared in 1971 by the County Planning Commission on behalf of all 49 municipalities to satisfy sewage facilities planning requirements under Act 537, contained the recommendations in Table 5-3.

Aston Township

Aston Township is almost entirely served by sewers owned by SWDCMA. The Township's Act 537 Plan (along with Upper Chichester Township and Chester Heights

Borough) was prepared by SWDCMA and approved by DEP in 1997. The plan addresses a new conveyance system in northwestern Aston Township. Intermunicipal cooperation among Aston, Chester Heights, and Upper Chichester and implementation of "sub-regional" public sewage facilities planning are also discussed. The most recent Act 537 survey is dated August 2000 and lists no future planning considerations. A corrective action plan was prepared in 2002 to alleviate overloading problems of the Baldwin Run Pollution Control Plant. The plan calls for general maintenance, a grouting program, and plant upgrades to help maintain the plant's flows within the permitted capacity of 6 MGD.

Bethel Township

Bethel Township initially adopted the 1972 *Delaware County Regional Sewerage Project.* The plan was amended in 1974 with a sewage feasibility study, which concluded that installation of sewers Township-wide was cost prohibitive. The plan was revised in 1987 proposing installation of public sewers in part of the Township. In 1995, the new plan was revised and adopted in conjunction with the BTSA Central District Project.

The Bethel Township Act 537 Plan was updated in 1998 along with the plan for Upper Chichester Township by SDCA. The plan provided for 1.5 MGD of wastewater flow treated at the Wilmington (New Castle County, Delaware) facility at the time to be diverted to the DELCORA WRTP. Flow diversion was to be achieved by the construction and operation of a 1.5 MGD pump station and 2.5 miles of force main to convey flows from the Naamans Creek Interceptor to DELCORA's system in Marcus Hook Borough.

The 1999 Bethel Plan Update found that sewage capacity was insufficient in portions of the Township due to increasing population growth. At the same time, limited capacity was available at the SWDCMA Baldwin Run Pollution Control Facility. Therefore, the alternative of choice was to convey a portion of the Township's flows to New Castle County, Delaware, with remaining flows being directed to the SDCA system. Also, according to the 2002 update to SDCA's Act 537 Plan, forty present EDUs and 125 future EDUs (from growth projections) will be by-passed from SWDCMA to DELCORA.

Brookhaven Borough

Several formal Act 537 Plans were adopted in Brookhaven Borough in the past thirty years, including one prepared in 1989 and submitted in 1990 as an appendix to the SWDCMA plan. The latest update to the Brookhaven Borough Act 537 Plan was approved by DEP in 1998. This update evaluated upgrading the Brookhaven WWTP as well as the possibility of treatment of additional flows by SWDCMA as possible alternatives for the improvement of wastewater management. Upgrade of the Brookhaven WWTP was selected as the most viable solution that is beneficial to Borough residents and the environment.

Chadds Ford Township

Chadds Ford Township (formerly Birmingham Township) prepared an Official Act 537 Plan Update in 1991. The plan addressed the increasing need for wastewater treatment due to intensified growth, particularly in the Route 1 corridor. The plan opposed centralized sewerage, which could enhance development in this rural community, subject Chadds Ford Township to large debt, and jeopardize its rural character. The plan also expressed concerns regarding the environmental impact of large quantities of wastewater disposal within the Brandywine Creek basin. The plan update acknowledged the existence of areas with malfunctioning OLDS.

The plan suggested continued use of on-lot disposal methods and exploration and implementation, where feasible, of land application methods. The plan also suggested that a planned treatment facility for a new development be built with excess capacity to accommodate additional flows from those areas experiencing wastewater disposal problems. In conjunction with the plan's recommendation, the Ridings WWTP was built in 1994. The only amendment to the 1991 Act 537 Plan was made recently to allow for a holding tank in place of a failed OLDS at a Route 1 and Heyburn Road shopping center.

Chester Heights Borough

The first Chester Heights Borough Act 537 Plan was, in fact, the 1972 *Delaware County Regional Sewerage Project*, adopted in 1976. This plan called for most of the Borough to be sewered following trunk lines along Chester Creek and the West Branch of Chester Creek. A majority of the recommendations of this plan were not implemented. The latest Act 537 Plan Update was prepared for Chester Heights Borough (along with Upper Chichester and Aston) by SWDCMA and approved by DEP in 1997. The plan recommended the extension of the SWDCMA service area to accommodate additional Chester Heights sanitary flow. The plan noted that Chester Heights Borough needs to play a larger role in sewerage facilities oversight (failure of individual disposal systems, for example), which could be partially achieved through participation in SWDCMA's "subregional" extensions of the public sewerage network.

Concord Township

Concord Township is undergoing a surge in development and is adjusting its wastewater planning in accordance with development plans. Long-term goals of the 1988 Concord Township 537 Plan were planning for a sewage plant in the lower reaches of the Township and/or possible connection to the DELCORA system. The 1992 update discussed construction of a 1.2 MGD WWTP. The CTSA WWTP was constructed in 1996 and is currently permitted for a 1.2 MGD flow. Several special studies addressed specific needs in developing areas of the Township, such as the 1999 studies of the Northwest area and the Smithbridge Road area. The Northwest study proposed the construction of the East and West Branch of the central trunk line to allow service to be extended into troubled areas. The Smithbridge Road area study suggested construction of

the gravity sanitary sewer extension along Smithbridge Road. Both extensions were implemented shortly thereafter.

The latest Concord Township Act 537 Update is currently being reviewed by DEP. The selected alternative suggests continued connections to the existing treatment plant. The Township intends to expand the existing plant from 1.2 to 1.8 MGD to provide "more than sufficient capacity for all projected public sewer connections for the next 10 years." The plan also provides for accepting flows from Thornbury Township, in conjunction with Thornbury's recent Act 537 Plan Update. The update also suggests continued connections to the Riviera STP for properties located in the Green Creek watershed.

Edgmont Township

Edgmont Township adopted the *Delaware County Sewerage Facilities Plan* of 1971. The Township found it was not feasible to provide sewage collection systems and instead resolved to adopt the County plan with provisions for individual on-lot disposal. In 1999, a portion of Edgmont Township (approximately 850 acres – 13.6% of the Township) was included in the Sanitary Sewage Flow Study within the Crum Creek watershed. The goal of the study was to determine the feasibility of extending the existing Crum Creek Interceptor service area to the Chester County border. The Township recently produced an Act 537 Plan. The plan reiterates the Township's determination to continue using on-lot systems for wastewater management. Several community facilities will be eliminated while wastewater will be directed to Newtown Township for treatment and subsurface release.

Media Borough

Media Borough adopted the *Delaware County Sewerage Facilities Plan* of 1971 for its wastewater planning. In 2000, the Borough prepared its own Act 537 Plan, which called for continuing operation of the Media STP, efforts on I&I reduction, and improvements to pumping and conveyance facilities. Most importantly, cost estimates showed the feasibility of the sale of the STP to a private utility company, which was accomplished in 2001. Philadelphia Suburban's Little Washington Wastewater Company (now Aqua Pennsylvania, Inc.) purchased the Media Borough Treatment Plant and collection system. The Borough entered into an oversight agreement with the new owner, which allows access for examination of operations and effectiveness of the system on an on-going basis.

Middletown Township

DCPD records show that the Middletown Township Act 537 Plan was last updated in 1998. In May 2000, Middletown Township Council authorized MTSA to update the Township's Act 537 Plan with special attention to the future demands on the interceptor sewers. The draft plan addresses growing sewer needs due to increasing population, I&I issues, and the unsuitability of many areas for OLDS. The plan also

questions the compatibility of the SWDCMA treatment facility with population forecasts in the area. Proposed alternatives include public sewer service where financially feasible and environmentally necessary, while continuing use of OLDS for single dwellings in remote low-density locations. The plan also addresses measures for I&I reduction.

Newtown Township

Newtown Township's Act 537 Plan was adopted in 2002 and approved by DEP on August 29, 2002. The current update recommends return to regional sewerage by conveying wastewater to CDCA through the Crum Creek Interceptor. This will reduce the Township's flow to the RHM and Media systems.

Rose Valley Borough

Rose Valley Borough adopted the *Delaware County Sewerage Facilities Plan* of 1971, which called for phasing out of the Borough STP. There has been very little development or redevelopment in the Borough, and officials have since concluded that there was no need to develop additional sewage planning documents. The Rose Valley STP continues to operate.

Thornbury Township

Thornbury Township adopted its latest revision to the Act 537 Plan in August 2001. The plan analyzes separately the eastern (eastern portion of Chester Creek watershed) and western (West Branch Chester Creek watershed) portions of the Township. The plan proposes construction of several pump stations, force mains, and gravity sewers to convey wastewater from subdivisions to the Thornbury Treatment Plant (eastern portion of the Township) and the Concord Township Treatment Plant (western portion of the Township).

Upper Chichester Township

Several current plans address sewer issues in Upper Chichester. The 1997 plan prepared by SWDCMA discusses additional flow and I&I issues and recommends extension of the SWDCMA Woodbrook PS service area in Upper Chichester Township. The plan also addresses intermunicipal cooperation in the area and recommends that it be continued and strengthened.

Two Upper Chichester Act 537 Plan Updates were prepared in 1998 due to the impending contract expiration with New Castle County and the City of Wilmington for conveyance and treatment of flows on December 24, 1998. Both were developed by SDCA on behalf of the Township to avoid the New Castle County sewer ban on new SDCA connections and allow for future growth. The first plan addresses the Marcus Hook Creek watershed and suggests bypassing SDCA sewerage services from New Castle County, Delaware, to SWDCMA. The second update concentrates on the Naamans Creek watershed area and proposes extension of the DELCORA service area to

accommodate approximately 1.5 MGD of additional SDCA flows from the Naamans Creek watershed.

SDCA was faced with service expansion constraints in 2001 due to DEP imposed new connection limitations at SWDCMA's Baldwin Run Pollution Control Facility. Once again, SDCA was forced to reevaluate its sewage planning on behalf of Upper Chichester Township in 2002. In October 2002, an Act 537 Plan Update that recommended bypassing additional SDCA flows from SWDCMA to DELCORA by means of existing infrastructure that allows for opposite direction flows was implemented. About 2,690 present EDUs and 200 future EDUs (projecting growth) are considered from Upper Chichester Township.

Upper Providence Township

Upper Providence Township's Act 537 Plan was adopted in 1999 and addresses issues related to the Media WWTP located in Upper Providence. The Township is currently in the process of updating the plan together with Newtown Township. The update is expected to recommend return to the regional sewerage by conveying wastewater to CDCA through the Crum Creek Interceptor. This will reduce the flows to the RHM and Media systems and provide additional capacity for anticipated growth.

Other Related Planning

Government and public organizations in the planning area prepared numerous reports that directly or collaterally address wastewater issues in the last several decades. Some reports were prepared pursuant to state regulations while others were dedicated to specific projects.

Stormwater management planning under Pennsylvania Act 167 has either been completed or is underway in many of Delaware County's watersheds. An Act 167 stormwater management plan (SWMP) for the Ridley Creek watershed was prepared in 1988, and a plan for the Chester Creek watershed was recently completed in 2003. Act 167 SWMPs for Darby-Cobbs and Crum Creeks are currently underway, and are expected to be completed by summer 2006 and summer 2007, respectively. All of the SWMPs with the exception of Ridley Creek, which was prepared before stormwater quality requirements took effect, require municipal adoption of a model ordinance that includes criteria for determining pre- and post-development runoff rates, performance standards for managing stormwater runoff, criteria for stormwater management system design, water quality control criteria, and groundwater recharge requirements.

Several studies were completed by private consultants on behalf of DELCORA. The first was prepared in 1999 and addressed sanitary sewage flows for portions of Edgmont, Newtown, and Upper Providence Townships within the Crum Creek watershed. The study estimated future wastewater flows to evaluate the feasibility of extending the existing Crum Creek Interceptor service area to the Chester County border.

A second study (1999) analyzed the "Western Region" (area of interest of this plan with the exception of Newtown, Upper Providence, and Media) growth and flow projections.

In February 2000, DELCORA completed a study of the forward liquid flow processes at WRTP. The resulting report, entitled *Western Regional Treatment Plant Process Improvement Project*, indicated that four different unit process parameters limit the ability of the WRTP to increase its permitted capacity to 50 MGD. The limitations are based upon DEP design guidelines for WWTPs found in the *Domestic Wastewater Facilities Manual* (DEP 362-0330-001).

The process limitations are:

1. The minimum hydraulic detention time (HDT) in the aeration tanks at average daily flow.
2. The maximum weir overflow rate in the primary clarifiers.
3. The maximum standard actual oxygen requirement (SAOR) in the secondary clarifiers.
4. The minimum ratio of oxygen supply (pounds of O_2) per pound of BOD_5 in the aeration tanks is 1.1 lbs. of O_2 per lb. of BOD_5 at peak flow according to the DEP design guideline. DELCORA is currently preparing the design of an aeration system upgrade at WRTP that will meet this DEP guideline while providing power savings at WRTP.

DELCORA recently completed Phase 1 of the WRTP re-rate process with the evaluation of solids processing at WRTP, development of an approach for addressing each unit process limitation, and meeting with DEP to present the approaches developed. DELCORA used the projected flows developed for the 50 MGD future loading at the WRTP to estimate the solids loading anticipated at 50 MGD. These loadings were compared to the solids handling treatment process capacities and the DEP guidelines. DELCORA found that the projected solids loadings would not exceed the current solids handling treatment process capacities.

DELCORA is executing work to support deviation from DEP guidelines for weir overflow rate in the primary settling tanks, hydraulic retention time in the aeration tanks, and surface overflow rate in the secondary clarifiers under the proposed re-rate condition (50 MGD average daily flow).

LAND USE PLANNING AND REGULATION

To ensure proper development and alleviate growth pressures, municipalities are "enabled" to adopt planning documents pursuant to the MPC, Act 247 of 1968, as amended. These planning documents include comprehensive land use plans, zoning ordinances, and subdivision/land development regulations.

One of the main reasons for examining these documents while preparing the sewage facilities plan is to establish the interrelationships between the need for sewers

and the existing and proposed land uses within each municipality. Conversely, one might expect that many of the proposed land uses within a municipality would be predicated upon the availability of sewage collection and treatment facilities. While this was once the case in remote areas, it now appears that a lack of existing public infrastructure can be overcome through both innovative technology as well as private funding for new sewage facilities.

As previously discussed, Act 537 requires municipalities to adopt sewage facilities plans for the provision of adequate sewage facilities as well as to protect water supplies. These plans should allow for a variety of treatment techniques based upon their availability, efficiency, and cost. Therefore, the task in this section is to analyze the correlation between documents adopted under Act 247 and Act 537.

Comprehensive Planning

County Planning

Act 247 requires all counties to prepare and adopt a comprehensive plan within three years of the effective date of the Act and that adopted municipal comprehensive plans be generally consistent with an adopted county plan. The existing unofficial County comprehensive plan, *Delaware County Land Use Plan 2000* (issued January 1976), was largely a compilation of municipal comprehensive plans and is, therefore, consistent with those plans. Only the policies section of the *Open Space, Parks, and Recreation Study* (1978), which was developed pursuant to the plan, was ever officially adopted by the County. DCPD is currently in the process of preparing a County comprehensive plan that will meet state requirements and provide the necessary guidance to both County agencies and municipalities regarding future growth, development, and redevelopment in the County. The plan will restate the objectives of maintaining the existing public sewer network and providing capacity for extension to areas in need of connection. The need for viable wastewater treatment alternatives in the developing parts of the County will be emphasized. The plan will take into account that these goals should be approached while encouraging sustainable development practices and preserving and enhancing the environment.

Municipal Planning

All of the western Delaware County municipalities have an adopted comprehensive plan. The land uses and densities recommended in these plans were based, to a great extent, on soil suitability for OLDS and the availability of public sewers. Plans prepared in the early 1970s tend to be consistent with the County's 1971 Act 537 Plan, while some of the later plans either advocate additional sewerage studies or refer to studies already in progress.

Municipal Zoning

In developing areas, municipal zoning has a great impact on density, ultimate build-out, and need for sewers to serve development that occurs in accordance with the zoning. Needed facilities to serve the various types of development depend on a number of factors, only one of which is zoning.

In developed areas of western Delaware County, such as Media Borough, Rose Valley Borough, Brookhaven Borough, and Upper Chichester Township, zoning is not a driving force in sewage facilities decision-making since most of these areas are already publicly sewered. Therefore, any infill, redevelopment, or even new development in these municipalities is within a relatively short distance of a public sewer system and is expected to connect to the nearest system.

The majority of western Delaware County, however, is undergoing or has the potential for additional residential, commercial, and industrial development. This particularly applies to municipalities located in the northern and western part of western Delaware County. In these municipalities, zoning regulations have a significant effect on development patterns, thus influencing the development of sewage systems. Many zoning ordinances include restrictions on lot sizes based on availability of public utilities.

Planning Documents in the Western Study Area

As noted previously, with the exception of a few areas adjacent to the more urbanized eastern part of Delaware County, nearly all of western Delaware County still has development potential. DCPD records indicate that all of the municipalities in the western portion of the County have comprehensive plans; however, some of them date back to the early 1970s. These plans address issues of land planning; residential, commercial, industrial, and institutional development; transportation; community facilities and service; utilities; and environmental and economic resources. Most municipalities have zoning and land development ordinances, many of which were developed or revised in the 1990s. Lot sizes in western Delaware County vary from fairly small ones in developed areas to multi-acre lots in some areas of the developing western and northern municipalities. Table 5-4 summarizes these regulations in the western study area.

Details of Individual Municipal Planning Documents in the West

The following is a brief description of the zoning/build-out potential as well as the sewage facility-related zoning provisions of the municipalities noted previously.

Aston Township

Aston Township's zoning ordinance allows for a number of land uses including residential, commercial, planned business campus, shopping center, limited industrial,

TABLE 5-4

LAND USE DOCUMENTS FOR WESTERN DELAWARE COUNTY MUNICIPALITIES

Municipality	Date (Status)	Summary	Min lot size dependent on sewerage?	Inconsistencies
Aston Township	Ordinance – October 17, 1990 as amended through 1997 Map – May 19, 1997 Comprehensive Plan – June 1987 Act 537 Survey Plan Map – August 2000	All homes served by public sewer with exception of approx. 50 that are scattered throughout the Township. Planning and zoning code requires installation of capped sewers where plans for public sewers are approved and a permit has been secured to provide connection within a 5-year period. Mobile home parks are required to be served by public sewer.	R1 minimum = 20,000 sq.ft. Increases to 30,000 if no public sewer and water. R2 minimum = 10,000 sq.ft., 30,000 if no public sewer and water, 15,000 if no public sewer or water.	June 1987 comprehensive plan contains outdated statements about increasing minimum lot sizes from 20,000 sq. ft. to 1 acre. The minimum lot size has been increased to 30,000 sq.ft. in the planning and zoning code. June 1987 comprehensive plan contains outdated statements about development in the northwestern and north central portions of the Township projected to be low intensity and served by OLDS. The August 2000 Act 537 Survey Plan shows that the only unsewered roads are sections of Pennell Road and Mount Road in the northeastern portion of the Township.
Bethel Township	Subdivision and Land Development Regulations – 1977 1972 Planning Study Zoning Ordinance – June 12, 2001	S&LD regulations contain requirement for installation of capped sewers in all cases where sanitary sewers are not yet available. Requires connection to sewers when they are available. Zoning ordinance says that the Township Engineer must approve all methods of sewage disposal. Mobile home parks, PRDs, C-1, and R-4 are required to be served by public sewer.	In R-1 and C-1, minimum lot size of 40,000 sq.ft. is reduced to 30,000 sq.ft. with public sewer and water.	

TABLE 5-4

LAND USE DOCUMENTS FOR WESTERN DELAWARE COUNTY MUNICIPALITIES (CONTINUED)

Brookhaven Borough	Comprehensive Plan – 1991 Planning and Zoning Code as amended through 2001.	Comprehensive plan calls for revision of the zoning ordinance to increase the minimum lot size of 3,500 sq.ft.	No – All of Borough is served by public sewer.	Comprehensive plan recommends closing the Brookhaven STP (Brookhaven and Bridgewater Roads). This has not yet occurred.
Chadds Ford Township	Zoning Ordinance amendments through 2001. Comprehensive Plan – May 1973.	States that mobile home parks must comply with the Act 537 Plan of 1966 as amended. Requires new development to tie into public sewer systems where they are available. All districts require sewage disposal in accordance with requirements specified by state, county, and township officials. Ord.84A (2001) requires improved properties to connect to public sewers within 60 days of written notice to do so.		.
Chester Heights Borough	Subdivision and Land Development Ordinance, 1997. Zoning Ordinance – July 5, 1983 as amended through Oct. 14, 1997 Comprehensive Plan - 1971	PRDs must be served by community or public sewers. Mobile home parks are required to be consistent with Act 537 Plan and to connect to public sewer "if available." PRDs must have approval of Borough Engineer for sewage treatment system.	No	

TABLE 5-4

LAND USE DOCUMENTS FOR WESTERN DELAWARE COUNTY MUNICIPALITIES (CONTINUED)

Concord Township	Zoning Ordinance - September 2001 Comprehensive Plan Update – June 6, 2000 Complete Township Code – December 25, 2001	Specifies that industrial pre-treatment facilities be permitted. All stream discharges must comply with the Clean Streams Law. Requires planned active adult communities and PRDs to connect to public sewer. States that PRDs must be consistent with the comprehensive plan. Mobile home parks are required to be consistent with Act 537 Plan and to connect to public sewer "if available." Chapter 136 of Township Code contains detailed specifications for sewers. Requires DEP approval of community treatment system, improved properties to connect to public sewer within sixty days of notice, and installation of capped sewers where public sewers are planned.	No	Comp plan recommends future examination of the feasibility of providing public sewer service to existing neighborhoods that are currently unsewered.
Edgmont Township	Comprehensive Plan – September 20, 2000 Zoning Ordinance – December 17, 1997 Subdivision and Land Development Ordinance – December 17, 1997	S&LD regulations contain requirement for installation of capped sewers in all cases where sanitary sewers are not yet available. Requires connection to sewers when they are available. Zoning requires PRDs to be served by public sewer.	No	The comprehensive plan recommends the continued use of the existing community STPs. Recommends evaluation of providing community STPs to areas of future development as part of the Act 537 Plan Update.
Media Borough	Zoning Ordinance – September 21, 2000 General Code Ch. 237 – Sewerage Ordinance 135 – March 2, 1926 Comprehensive Plan - 1986	Sewerage ordinance requires connection to public sewer. S&LD ordinance requires installation of sanitary sewers and laterals before planned roads are built.	No	

TABLE 5-4

LAND USE DOCUMENTS FOR WESTERN DELAWARE COUNTY MUNICIPALITIES (CONTINUED)

Middletown Township	Zoning Ordinance – December 1990 Subdivision and Land Development Ordinance – November 20, 1996 Comprehensive Plan – March 26, 2001	Developments required to connect to public sewers if available. OLDS must have DEP approval. PRDs must be served by public sewer. Comp plan says 98% of dwellings serviced by public sewer. Comp plan has zoning strategies to guide development to areas of existing infrastructure.	R-2, R-3, R-4 minimum lot size is 1 acre if not served by public sewer, 0.25 acre if served by both public sewer and water, and 0.5 acre if served by public water or sewer.	
Newtown Township	Subdivision and Land Development Ordinance – 1995, as amended September 25, 2000 Comprehensive Plan – October 25, 2001 Zoning Ordinance – as amended September 9, 2003	SL&D ordinance requires new development to connect to public sewer if accessible. OLDS have to conform to state requirements. Capped sewer systems to the right-of-way line are required if trunk line extension is anticipated within ten years. Zoning ordinance requires R-4 townhouse developments and conditional uses under special use districts to be served by public sewer and water.	No	Comprehensive plan recommends oversight of the increasing trend toward package plants and that the Act 537 Plan Update include evaluation of OLDS failures due to age.
Rose Valley Borough	Subdivision and Land Development Ordinance – November 1964 Comprehensive Plan – November 1971 Zoning Ordinance – February 22, 1983	No mention of sewage in zoning ordinance. Comprehensive plan talks about small numbers of homes not able to be served by Rose Valley STP. At the time of the study, they were on OLDS.	No	

TABLE 5-4

LAND USE DOCUMENTS FOR WESTERN DELAWARE COUNTY MUNICIPALITIES (CONTINUED)

Thornbury Township	Code of Ordinances Revised through April 5, 2000 Subdivision and Land Development Ordinance – April 5, 2000 Comprehensive Plan – May 1993 Zoning Ordinance – April 5, 2000	Requires connection of existing structures to sewer extensions as they are installed. SL&D ordinance required new developments to connect to public sewer if accessible. Zoning requires public or community systems for apartments. Comp plan says 1972 Health Department Study concluded that 10% of OLDS in study area had problems. Recommends continuation of use of on-lot package plants. Recommendation that planned developments be required to provide public or community sewers is consistent with zoning.	Commercial district minimum lot size of 12,000 sq.ft. increases to 30,000 if not served by public sewer.	
Upper Chichester Township	Comprehensive Plan – December 1990 Subdivision and Land Development Ordinance – 1994 Zoning Ordinance – 1991	PRDs must be served by public sewer. SL&D ordinance requires community systems if public sewers are not available and OLDS are not feasible.	R-1 minimum area increased from 20,000 to 30,000 sq.ft if public sewer and water are not available. R-2 minimum area increased from 11,250 to 15,000 sq.ft. if public sewer or water are not available, and 30,000 sq.ft. if neither is available.	Comprehensive plan says that areas not presently serviced are planned to be sewered within five years.
Upper Providence Township	Planning and Zoning Code Ordinance 198 – December 14, 1989 Comprehensive Plan – October 1989	Requires connection to public sewer if accessible. Requires installation of sewers in conformance with Act 537 Plan. Ch. 1052 regulates community on-lot systems. Comp plan notes problems with many failing OLDS.	No	

Source: Municipal zoning ordinances, 2003

institutional, and open space. Residential zoning includes low-density, medium-density, high-density, townhouse, apartment, and mobile home districts. Lot sizes range from 5,000 sq. ft. to 20,000 sq. ft. for detached residential dwellings. Densities for townhouses, apartments, and mobile homes range from 6 to 12 units per acre.

The Township's subdivision and land development ordinance requires that "the developer shall provide the most effective type of sanitary sewage disposal consistent with the natural features, location, and proposed development of the site." Connection to a public sewer is listed as a preferred method of disposal, followed by the provision for a community disposal system or treatment facility by the developer, followed by capped sewers with approved OLDS. On-lot sewage disposal is listed as acceptable but the least desirable method of disposal.

Aston Township's Act 247 comprehensive plan of 1987 outlined future land use, which is consistent with the current zoning maps. The plan recommended additional regulations for floodplain and steep slope development. While the plan recommends open space provisions, they are not reflected on the Township's zoning map. The plan also proposes additional public sewer lines, including a new interceptor along Chester Creek tying into the Middletown sewer system.

Bethel Township

Bethel Township's zoning code allows for a variety of land uses. They include different density residential districts, light industrial districts, and commercial districts. Significant areas of land are assigned "tank" zoning and accommodate tank farms for local refineries. For any new construction, the Township requires 40,000 sq. ft. lots in its R-1 district for those areas where public water and sewer are not available. When public utilities are available, the lot size can be decreased to 30,000 sq. ft. High-density development lots range from 2,000 sq. ft. for townhouses to 4,000 sq. ft. for single-family semi-detached homes.

The subdivision and land development ordinance of 1977 requires developers to connect to public sewers, where available. For areas where public sewers are not available, the following methods are acceptable, listed in order of desirability: community sewer and treatment plant, capped sewers with temporary OLDS, on-lot facilities of various types, or other disposal methods. The ordinance requires soil percolation tests to determine soil suitability for OLDS. All proposed connections to a public sewer system and OLDS must be certified by the Township.

The latest planning study for Bethel Township was completed in 1977. This study indicated the necessity of public sewers in all but low-density residential districts due to "unsatisfactory subsurface conditions." The study called for future land development to be coordinated with public sewer development. To minimize the Township's costs for sewers, the Future Land Use Plan chapter of the study suggests guiding development into patterns that can be most efficiently sewered. The plan also suggested tying any future sewers in some areas south of Naamans Creek Road to the

New Castle County, Delaware sewer system and sewers in the easternmost part of the Township to the sewer system in Upper Chichester.

Brookhaven Borough

Brookhaven Borough's zoning ordinance allows for a wide range of zoning districts and associated residential and nonresidential densities. Single dwelling residential districts allow for lots ranging from 10,800 sq. ft. to 3,500 sq. ft. Residential zoning also includes several types of apartment, special, and townhouse districts with densities ranging from 4 to 17 units per acre. Other districts recognized by zoning ordinances are commercial districts of various densities, a special use district, a park-recreation district, and a floodplain district.

The Borough's comprehensive plan was prepared by DCPD in 1991. The plan indicated that as of 1990, the Borough of Brookhaven was almost entirely developed. Therefore, there was no anticipated increase in sewer volumes, at the time conveyed to three facilities: the Borough's own Brookhaven STP, the SWDCMA plant in Aston, and DELCORA's plant in Chester City. The plan recommended formalizing plans for bypassing the Brookhaven STP due to possible future problems resulting from the age of the facility. The plan also recommended that Brookhaven Borough apply for a PENNVEST loan to correct defects and problems in the existing sanitary sewer system.

Chadds Ford Township

The Chadds Ford zoning map of 1985 indicates that the majority of the Township is dedicated to low-density (2-acre lots) residential districts. The only notable exceptions are areas along Route 1 and Route 202, which allow for some higher density residential, multi-family residential, office, business, and light industrial districts. Residential developments served by a public sewer system are allowed to reduce lot sizes to 1 acre Districts served by both public sewer and water have a minimum lot size of 0.5 acre. Apartment district density is no more that 12 units per acre. In addition, areas along Brandywine Creek and tributaries are designated as floodplains.

The Chadds Ford Township (at the time Birmingham Township) comprehensive plan of 1973 proposed that 67.5% of the Township's land use be dedicated to low-density residential developments, with 11.5% to floodplains, 7.7% to commercial, 4.1% to protected open space, 3.2% to medium-density residential, and 3.1% to historical areas. The remaining 2.9% were to be distributed between transportation and utilities, light industrial, and high-density residential uses. The plan indicated that the Township's soils have limited ability for OLDS and, therefore, suggested investigation of package plants. The plan warned against development patterns that would "needlessly increase the installation cost of these future utilities or precipitate their premature and uneconomic installation."

The Chadds Ford Township subdivision and land development ordinance of 1985 requires that developments be connected to a public sanitary sewer system where

accessible and available. Where systems are not yet available but are planned in the future, the developer shall install and cap sewer lines and provide other facilities necessary for future connection. When no such options are available community or private OLDS are permitted. The ordinance requires developers to submit an objective description of the proposed on-site system. The description has to include soils and percolation test data.

Chester Heights Borough

Chester Heights Borough's zoning ordinance allows for a wide range of zoning districts and associated residential and nonresidential densities. Single dwelling residential districts allow for lots ranging from 1.5 acres to 0.75 acre. Residential zoning also includes apartment, mobile home, and PRD districts. Mobile home parks are required to have a maximum of 4 units per acre. Other districts recognized by the zoning ordinance are business, laboratory/light office use, church, school, cemetery, and communications facility overlay.

The Borough's comprehensive plan was adopted in 1971. The plan recommended utilization of small package plants for apartment and PRD zones (i.e., multi-family dwellings) until public sewage treatment becomes available. Single-family zoning was to be based on no less than 1-acre lot size to meet state objectives for proper on-lot disposal.

The Chester Heights Borough subdivision and land development ordinance of 1997 requires developers to provide the "highest type of sanitary sewage disposal facility consistent with existing physical, geographical, and geological conditions."

Concord Township

Concord Township's zoning ordinance allows for a wide range of zoning districts, including a variety of single-family, apartment, PRD, planned active adult community, and mobile home districts. Residential lot sizes range from 15,000 sq. ft. to 1 acre. Other districts recognized by the zoning ordinance are planned business and commercial, business park, light industrial, planned industrial park, special use (swimming club), and planned laboratory office.

The Township's comprehensive plan was adopted in 2000. The plan describes the existing sewage system and indicates which areas can expect public sewer service. The plan indicates the possibility of future extension of public sewer services to existing neighborhoods that are currently lacking it. Future development is encouraged to occur in close proximity to existing utility lines.

Concord's subdivision and land development code requires that all lots be connected to public sewers where accessible and available. Where systems are not yet available but are planned in the future, the developer shall install and cap sewer lines and provide other facilities necessary for future connection. When no such options are available, community or private OLDS are permitted. The developer is required to

provide evidence of feasibility and satisfactory operation of the system to be utilized. OLDS are to be installed no closer than 200 feet from any adjacent property line. Soil suitability and percolation tests are required.

Edgmont Township

Edgmont Township's zoning ordinance of 1997 distinguishes several types of residential districts including rural/agricultural, rural, suburban, retirement, and planned. Lot sizes vary from 4 acres for the rural/agricultural district R-1 to 20,000 sq. ft. in the suburban residential district R-4. Retirement district R-5 is no more than 3.5 units per acre. PRD areas allow for lot sizes as small as 7,500 sq. ft. for the PRD-3 district, designed for single-family detached, duplex, or twin units. Other uses permitted by the zoning ordinance are neighborhood commercial, highway commercial, planned commercial/light industrial, planned office center, light industrial, and outdoor recreation.

The Township's subdivision ordinance requires "dwellings and/or lots within a subdivision or land development [to be] connected with a public sanitary sewer system where accessible and available." Where sewage facilities are planned but not yet available, the developer must install facilities including laterals, force mains, capped sewers, etc. to each lot. When sanitary sewers are not to be constructed, OLDS are permitted, provided that they are installed in accordance with state and local regulations. The landowner or developer is required to provide evidence of feasibility and satisfactory operation of the system to be utilized.

Edgmont Township's comprehensive plan of 2000 states that public sewer service areas in relation to existing needs and planned growth areas is one of its objectives. However, the plan also affirms the Township's determination to continue relying primarily on on-lot or other alternative systems for domestic waste disposal, especially in the western areas. Edgmont Township's strategy for reaching the latter goal is to "minimize infrastructure expansion on the western side of Ridley Creek State Park by relying primarily on … on-site and other approved alternative systems for domestic waste disposal," which in its turn helps to "promote groundwater recharge." The plan's recommendations are consistent with the objectives and strategies stated above and promote utilization of existing sewage systems or alternative OLDS.

Media Borough

Media Borough is almost entirely built out at the present time, and any future growth can only involve redevelopment of existing districts. Present zoning layout allows for several residential densities, educational, recreational, and community use, office use, retail/office/apartment use, highway business office use, and industrial use. Residential lots range from 1,750 sq. ft. for a multi-family dwelling to 6,600 sq. ft. for single-family detached homes. The zoning ordinance also delineates historic districts within the Borough.

The Borough's comprehensive plan dates back to 1986 and, due to the nature of the area, it concentrates mainly on redevelopment and revitalization rather than new development. No changes to wastewater handling were recommended at the time.

Middletown Township

Middletown Township's zoning ordinance allows for a wide range of zoning districts including a variety of single-family residential, planned retirement community, and PRD. Lot sizes range from 0.25 acre to 1 acre. Minimum lot size in the same zoning district can vary depending on availability of public sewer and water. Other districts recognized by zoning ordinances are institutional, outdoor recreation, special use, business, neighborhood shopping center, major shopping center, planned business center, office, office campus, and manufacturing/industrial. Zoning also allows for transferable development rights (TDR), a program that directs growth to preferred locations by the sale and purchase of a property's development rights.

The Township's subdivision and land development ordinance, revised in 1982, requires that all subdivisions or land developments be connected to public sewers where available and accessible. If public sewers are not available immediately but are planned in the future, all necessary laterals shall be installed and capped. In areas with no plans for public sewer systems, a separate on-site sewage disposal facility shall be provided for each lot.

Middletown Township's comprehensive plan of 2001 notes that the Township's public sewer system is tied into an intermunicipal system with shared facilities. The plan's recommendations proposed studies of current and future demands on the major interceptors and pump stations, implementation of an I&I elimination plan, assistance to neighborhoods in extending public sewer service to areas where it is currently lacking, and extension of the treatment agreement with SWDCMA. The comprehensive plan outlines strategies to promote a balance of developed and open areas. A low-intensity residential development category assigned to vacant parcels within areas of residential development is intended to guide housing development to areas where lots and infrastructure already exist.

Newtown Township

Newtown Township's zoning ordinance, (Chapter 172 as amended September 9, 2002) allows for minimum lot sizes that range from 60,000 sq. ft. in the R-1 residence district to 12 units per acre in the A-O apartment office district. Lots without public water are required to be a minimum of 12,000 sq. ft. There are no requirements in the zoning ordinance that address minimum lot sizes for developments that are not served by public sewer. Nonresidential districts permitted by the ordinance include office, commercial, special use, and industrial.

Newtown Township's subdivision ordinance of 1995 (Chapter 148 as amended September 25, 2000) requires lots where both water and sanitary sewage disposal are

provided by OLDS to have a minimum area of 30,000 sq. ft. and a minimum width, measured at the building line, of 150 ft. The ordinance requires each property to be connected "to a public sewer system if accessible by gravity." In areas where sewers are not currently available but are probable within ten years, new developments must include capped sewers. On-site sewer systems are permitted in conformance with state and Township regulations where they can be accommodated safely. Soil percolation tests are required in these cases. The ordinance includes a general statement that the proposed method of sewage disposal shall be in accordance with the Township's Act 537 Plan.

The Newtown Township comprehensive plan was prepared in 2001. The plan notes soil limitations for subsurface disposal in western and northern portions of the Township. Public sewers in the Township convey wastewater to RHM and DCJA. The sewer mains responsible for this transport reached their hydraulic capacity in the mid 1990s. Despite that, some development has proceeded in the northern and southern portions of the Township employing both individual and community on-lot wastewater disposal methods.

In recent years new developments have increasingly used small package plants for their wastewater needs. This trend allows planning for development in areas where public sewers are not available and soils are not suitable for subsurface disposal. The comprehensive plan recommends exploring centralized sewer options, such as extension of DELCORA's Crum Creek Interceptor into the Township. A limited number of package plants should be planned for the future. Careful monitoring of subsurface systems is necessary, with possible connections to package plants and a central sewer in case of future failures.

Rose Valley Borough

Rose Valley Borough is almost entirely built out, with only one property remaining with subdivision potential. Rose Valley's zoning ordinance distinguishes only three types of residential development: Zone A (1-acre lots), Zone B (0.5-acre lots), and Zone C (30,000 sq. ft. lots). There are no commercial or industrial properties in the Borough, and the only open space along Ridley Creek is assigned a wildlife preserve status.

Due to the fact that scarcely any development occurred in the Borough in the past decades, the latest planning document in Rose Valley dates back to 1971. The comprehensive plan found the Rose Valley STP adequate at the time and projected its continued use for the next ten to fifteen years. The plan acknowledged County recommendations for the future phasing out of that facility. As of today, the Borough's plant is still in operation.

Thornbury Township

Thornbury Township's zoning ordinance allows for several types of residential developments, planned apartment and residential developments, institutional,

institutional/residential, limited industrial, commercial, and mobile home park districts. Lot sizes in residential areas vary from 87,000 sq. ft. for the R-1 district to 7 units per acre in the planned apartment district. The zoning map also indicates two large areas taken up by quarries.

The Township's subdivision and land development ordinance of 2000 calls for provisions by the developer of the "highest type of sanitary sewage disposal facility consistent with existing physical, geographical, and geological conditions and in conformance with all applicable Township ordinances and state and County regulations."

Thornbury Township's comprehensive plan of 1993 identified areas with significant limitations for OLDS. At the time of the plan's publication, Thornbury was largely unsewered and relied primarily on OLDS. No municipality-owned facilities existed in the Township. The plan recommended centralized sewer facilities to be designed to correspond with the proposed land development. It also suggested continuation of on-site disposal for most sites with small package plants in all new large-scale developments.

Upper Chichester Township

The zoning ordinance of Upper Chichester Township distinguishes several types of residential developments, such as low-density, medium-density, high-density, townhouse, apartment, mobile home, and planned retirement community. Minimum lot sizes are 20,000 sq. ft. in the R-1 district, 11,250 sq. ft. in the R-2 district, and 5,000 sq. ft in the R-3 and mobile home districts. Density for the townhouse district and apartment district is not to exceed 7 units and 12 units per acre, respectively. Zoning maps also show neighborhood and highway commercial districts, an industrial commercial district, and an industrial district.

The Township's subdivision and land development ordinance requires developers to provide the "most effective type of sanitary sewage disposal consistent with the natural features, location, and proposed development of the site." The preferred method of disposal is a connection to a public sewer system, followed in order of preference by provision of a community treatment facility, capped sewers with temporary on-lot facilities, and OLDS. The Township requires the connection of failed OLDS within 250 feet of public sewer.

The comprehensive plan for Upper Chichester Township was prepared in 1990 and identified areas to be sewered in the near future. The plan suggested tying those areas into the SDCA system.

Upper Providence Township

Minimum residential lot sizes specified in Upper Providence Township's zoning ordinance range from 43,560 sq. ft. in the R-1 district to 5,000 sq. ft. for single-family residences and 2,000 sq. ft. for apartments in the R-6 district. Lot sizes are not predicated

on the availability of public water or sewer. Nonresidential districts include business, limited industrial, planned office campus, recreational, and open space.

Upper Providence Township's subdivision ordinance requires each property to be "connected to a public sewer system, if accessible." When sewers are not available but are planned for extension, the developer is required to install capped sewer laterals.

The Upper Providence Township comprehensive plan was developed in 1989. The plan recommended regulation of the intensity of new development in order not to exceed the capacity of sewer facilities. The plan also drew attention to OLDS and the necessity for proper design of new subsurface discharge systems and for addressing problems of existing systems. The plan suggested investigation of opportunities for extending sewer lines to cluster tracts in the Ridley Creek watershed and the possibility of utilizing the Crum Creek Interceptor.

Major Inconsistencies

During the review of the existing municipal ordinances, inconsistencies noted are included in Table 5-4.

OTHER ENVIRONMENTAL PLANS

Water Quality Requirements

Pennsylvania regulations specifically address water quality standards in 25 Pa. Code § 93. Chapter 93 sets statewide water uses for all surface water as shown in Table 5-5. Waterbody-specific uses for Delaware County are shown in Table 5-6.

Chapter 93 water quality criteria are associated with the statewide water uses listed previously and apply to all surface waters unless otherwise indicated. The criteria specify such parameters as pH, temperature, dissolved oxygen, color, bacteria count, nutrients, priority pollutants, and others.

Clean Water Act Section 305(b) requires a report on all impaired waters of the Commonwealth. Section 303(d) further evaluates these findings to determine which waters still would not support specified uses even after the appropriate required water pollution technology has been applied. Section 303(d) also establishes the total maximum daily load (TMDL) program. In 1997, EPA and DEP agreed to a 12-year schedule to develop TMDLs for 575 impaired 303(d) list water segments. In 1998, 403 more water bodies were added to the 303(d) list.

None of the streams in Delaware County have approved TMDLs as of 2002. Several tributaries of Chester Creek are currently proposed for de-listing from the 303(d) list. Section 303(d)/305(b) streams in western Delaware County by major watersheds as listed in DEP watershed notebooks are presented in Table 5-6.

TABLE 5-5

STATEWIDE WATER USES

Symbol	Use
Aquatic Life	
WWF	Warm Water Fishes
Water Supply	
PWS	Potable Water Supply
IWS	Industrial Water Supply
LWS	Livestock Water Supply
AWS	Wildlife Water Supply
IRS	Irrigation
Recreation	
B	Boating
F	Fishing
WC	Water Contact Sports
E	Aesthetics

Source: Pennsylvania Code, Title 25,
Chapter 93.4, Table 2

State Water Plan

The Pennsylvania State Water Plan was originally developed in the 1970s and divided the state's major river basins into twenty smaller units (subbasins) for planning purposes. Most of these subbasins were further divided into watershed areas that range in size from 100 to 1000 square miles. Western Delaware County is located in Subbasin 3 (Lower Delaware River). Watershed Area G (Darby-Crum Creeks) covers most of the area, while a small portion of the County bordering Chester County falls into Watershed H (Brandywine Creek).

The State Water Plan for Subbasin 3 was published in 1983. It addressed a general understanding of water resources and examined problems and viable solutions. The plan identified high water usage in the area and noted rapid population growth in Delaware County. The growing problem of community development in floodplains was also addressed. Adverse effects of municipal and industrial discharges as well as erosion and sedimentation on surface water quality were discussed. Chester Creek and Ridley Creek were specifically identified as those affected by inadequately treated waste discharges and malfunctioning septic tanks. Water quality in Crum Creek and the upper reaches of Darby Creek was rated good and excellent, respectively, while the lower reaches of Darby Creek received only poor marks. Elevated nutrient levels from agricultural runoff affected water quality in Red Clay Creek and White Clay Creek while water quality in the upper reaches of the East and West Branches of Brandywine Creek was rated as good. The plan identified upgrades of municipal wastewater treatment facilities as one of the major solutions to water quality problems in these watersheds.

TABLE 5-6

303(D)/305(B) LISTED STREAMS IN DELAWARE COUNTY

Stream	Protected Water Uses	Drainage Area (sq. mi.)	Miles Impaired	Miles Attained	Causes	Sources of Impairment	Comments
Streams in Subbasin 03G							
2-Darby Creek	CWF, MF, TSF	77.2	10.09 Main stem; 3.55, 4 UNTs	10.01 Upper main stem; 12.01, 16 UNTs	Habitat modifications/ alterations; siltation & water/flow variability	Urban runoff/ storm sewers	*CWF, MF above Rt. 3, TSF, MF below Rt. 3*
3-Little Darby Creek	CWF, MF	3.61	1.73	1.01	Water/flow variability	Urban runoff/storm sewers	
4-Julip Run	CWF, MF	0.66		1.16			
4-Abrahams Run	CWF, MF	0.32		0.7			
4-Wigwam Run	CWF, MF	0.32		0.64			
3-Camp Run	CWF, MF	0.26		0.72			
3-Miles Run	CWF, MF	0.24		0.57			
3-Foxes Run & 2 UNTs	CWF, MF	1.49		3.49			
3-Ithan Creek & 2 UNTs	CWF, MF	7.39		4.93			
4-Browns Run & one UNT	CWF, MF	0.33		1.01			
5-Hardings Run	CWF, MF	1.16		0.98			
4-Kirks Run	CWF, MF	0.5		0.92			
4-Meadowbrook Run & 3 UNTs	CWF, MF	2.37		3.58			

TABLE 5-6

303(D)/305(B) LISTED STREAMS IN DELAWARE COUNTY (CONTINUED)

5-Valley Run	CWF, MF	0.6		1.07			
4-Langford Run	WWF, MF	1.41	1.73		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
3-Whetstone Run & one UNT	WWF, MF	1.1	1.46		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
3-Cobbs Creek & 4 UNTs	WWF, MF	22.3	18.75		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers, & municipal point sources	
4-Indian Creek	WWF, MF	3.96	0.66		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
5-East Branch Indian Creek	WWF, MF	1.75	2.64		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
5-West Branch Indian Creek	WWF, MF	1.75	2.72		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
3-Hermesprota Creek	WWF, MF	1.83	2.15		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
3-Muckinipates Creek & 2 UNTs	WWF, MF	4.29	7.3		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
3-Stony Creek & one UNT	WWF, MF	2.97	6.04		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
2-Crum Creek	HQ-CWF, CWF, WWF	38.3	7.62 Main stem; 3.30, 3 UNTs	13.81 Upper main stem; 27.4, 32 UNTs	Excessive algal growth from AG, habitat modifications/alterations, siltation	Urban runoff/storm sewers, flow/water regulation/ modification	*HQ-CWF upper basin in Chester Co., WWF below Springton Res.*
3-Preston Run	CWF	0.68		1.42			
3-Hunter Run & 2 UNTs	HQ-CWF	1.6		3.51			
3-Trout Run & 4 UNTs	WWF	2.79	5.45		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	

TABLE 5-6

303(D)/305(B) LISTED STREAMS IN DELAWARE COUNTY (CONTINUED)

3-Hotland Run	WWF	1.01	0.32 Main stem; 0.9, 1 UNT	0.77, 1 UNT	Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
3-Dicks Run	WWF	0.9		2.01			
3-Little Crum Creek	WWF	3.3	3.68		Habitat alterations, siltation, water/flow variability	Habitat modification, urban runoff/storm sewers	
2-Ridley Creek & 60 UNTs	HQ-TSF, TSF, WWF, MF	37.9		75.64			*HQ-TSF upper basin above Media Water Intake*
3-Hunters Run	HQ-TSF	1.76		1.51			
3-Dismal Run & 2 UNTs	HQ-TSF	1.63		3.67			
3-Spring Run at Media & 1 UNT	HQ-CWF	0.79		1.79			
3-Vernon Run & 1 UNT	HQ-CWF	0.79		2.31			
2-Chester Creek	HQ-CWF, CWF, TSF, MF, WWF	66.4	12.4 Main stem; 2.88, 5 UNTs	8.79 Main stem; 22.64, 26 UNTs	Habitat alterations, siltation, water/flow variability	Flow regulation/modification, municipal point source, urban runoff/storm sewers	*CWF, TSF above Duttons Mill Rd., WWF below Duttons Mill Rd.*
3-East Branch Chester Creek & 7 UNTs	TSF	35.6		17.15			
3-Rocky Run & 4 UNTs	HQ-CWF, MF	3.13		6.27			
3-West Branch Chester Creek & 25 UNTs	TSF, MF	19.1		28.95			
4-Green Creek	CWF, MF	4.18	0.36, 1 UNT	3.52 Main stem; 5.75, 7 UNTs	Organic enrichment/low DO, nutrients, suspended solids	Package plants	

TABLE 5-6

303(D)/305(B) LISTED STREAMS IN DELAWARE COUNTY (CONTINUED)

3-Chrome Run & 4 UNTs	TSF, MF	1.78		4.89			
3-Baldwin Run	WWF, MF	1.85					
2-Stoney Creek	WWF	0.8		2.83			
2-Marcus Hook Creek & 5 UNTs	WWF	5.22	10.21		Land disposal-metals, siltation	Urban runoff/storm sewers	
2-Naamans Creek & 2 UNTs	WWF	7.88		4.94			
3-Spring Run at Gardendale	WWF	0.95		1.78			
3-East Branch Naamans Creek & 1 UNTs	WWF	1.82		4.57			
3-West Branch Naamans Creek & 1 UNT	WWF	1.78		3.94			
Streams in Subbasin 03H: 303d/305b Listings							
3-Brandywine Creek	HQ-TSF, MF	304	1.28, one UNT	24.88 main stem & 22 UNTs	Nutrients		
4-Brinton Run	WWF, MF	1.53					
4-Harvey Run & 8 UNTs	WWF, MF	3.88		8.77			
4-Beaver Creek at Granogue, DE, & 4 UNTs	WWF, MF	4.17		6.61			

Notes:
HQ – High Quality
UNT – Unnamed Tributary
CWF – Cold Water Fishes
TSF – Trout Stocking
WWF – Warm Water Fishes
MF – Migratory Fishes

Source: Adapted from Pennsylvania's 2000 303(d) list

These issues are still somewhat relevant to western Delaware County twenty years later. Positive changes since 1983 include major improvements to existing treatment facilities and construction of new ones, more efficient OLDS, and better control of erosion and sedimentation and nonpoint pollution runoff. However, these positive effects were offset by increasing volumes of wastewater and urban runoff due to population growth, aging and failing OLDS, and I&I in municipal sewers resulting in overflows and capacity problems for treatment facilities.

Watershed G, known as the Darby-Crum Creeks watershed, has an approximate drainage area of 231 square miles and also includes Ridley Creek, Chester Creek, and other tributaries flowing directly into the Delaware River Estuary from Tinicum to Marcus Hook. The watershed is characterized by a combination of point and nonpoint pollution sources including urban runoff, stormwater management, streambank erosion, hydromodification, CSOs, heavy industry, and commercial development. Many developments in this watershed are encroaching on floodplains, creating a flooding hazard during storm events. For example, severe flooding occurred in the lower portions of the watershed during record rainfall from Hurricane Floyd in 1999.

Watershed H, known as the Brandywine Creek watershed, covers about 301 square miles and also includes White and Red Clay Creeks and the headwaters of the Christina River in Delaware. Water quality in this watershed is subject to factors similar to those of Watershed G. There is currently a "no fish consumption" advisory for parts of Brandywine Creek due to the presence of the pesticide Chlordane.

The Pennsylvania Water Resources Conservation and Protection Act is proposed legislation that will direct DEP to complete an update of the State Water Plan in three years and produce regular updates every five years thereafter. The Act will also require the water plans to identify critical water planning areas, create a water conservation program, and set water well construction standards.

WESTERN DELAWARE COUNTY SEWAGE FACILITY PLANNING NEEDS

General Sewage Facilities Needs

The sewage facilities needs of western Delaware County are widely varied and are addressed specifically in the individual municipal Act 537 plans. However, the needs can be generally categorized into four groups for this plan based upon two criteria: the availability of existing public sewage facilities (both conveyance and treatment) covering the majority of the municipality and projected growth through the planning horizon to 2025. A matrix shown in Table 5-7 depicts the four categories and the category of each municipality in the western planning area.

Category A municipalities currently have a well-developed sanitary sewer collection system covering most of the municipality (thus few OLDS) and are projected to have significant growth by 2025. In general, the sewage needs of this area would be

TABLE 5-7

SEWAGE FACILITIES NEEDS CATEGORIZATION MATRIX

Criteria	Category A	Category B	Category C	Category D
Availability of Existing Public Sewage Facilities	Yes	Yes	No	No
Projected Population Growth Greater than 25%	Yes	No	Yes	No
Municipalities	Bethel Twp.	Aston Twp. Brookhaven Boro Media Boro Middletown Twp. Rose Valley Boro Upper Chichester Twp. Newtown Twp.	Chadds Ford Twp. Chester Heights Boro Concord Twp. Edgmont Twp. Thornbury Twp.	Upper Providence Twp.
Needs	Treatment capacity Collection system capacity	Treatment capacity Collection system capacity	Treatment capacity Collection system capacity Maintain OLDS treatment capacity	Treatment capacity Collection system capacity Maintain OLDS treatment capacity

Source: Weston Solutions, Inc., 2003

sufficient treatment capacity for existing and future flows and sufficient collection capacity to transport the existing and future flows to treatment facilities.

Category B municipalities also currently have a well-developed sanitary sewer collection system covering most of the municipality (thus few OLDS) and are **not** projected to have significant growth by 2025. In general, the sewage needs of this area would be sufficient treatment capacity to meet existing demand and maintaining sufficient collection capacity to convey these flows to treatment facilities.

Category C municipalities currently do not have a widely developed public sanitary sewer collection system, and the residential population is expected to grow significantly by 2025. In this category, the sewage needs of this area are widely varied. Some municipalities in this category have community treatment systems (package treatment plants), some have public sanitary sewer and treatment systems, and others have a high percentage of OLDS. The sewage needs for this category include sufficient public treatment and collection capacity for existing and future flows, sufficient treatment capacity for community systems, and sufficient treatment capacity for both existing and proposed areas served by OLDS including failing OLDS either individually or on a community-wide (single development) basis.

Category D municipalities currently do not have a widely developed public sanitary sewer collection system serving the municipality, and the residential population is **not** expected to grow significantly by 2025. These municipalities typically have developed residential communities served by OLDS, and remaining lands available for development are limited. The sewage needs for this category would include sufficient public treatment and collection capacity for existing flows, sufficient treatment capacity for community systems, and sufficient treatment capacity for existing areas served by OLDS including failing OLDS either individually or on a community-wide (single development) basis.

Municipality Specific Sewage Facilities Needs

Sewage needs based upon anticipated residential population and employment growth have been projected by DVRPC from the Census 2000. Table 5-8 estimates the increase in sewage demand generated by the projected increases in population and employment. The 2000 and 2025 Residential Sewage Demand columns were estimated by multiplying the census residential population for 2000 and the 2025 projection (Table 2-3) by the residential demand rate of 95 gallons per day (gpd)/person based on flow records from SWDCMA and SDCA. The 2000 and 2025 Commercial/Light Industrial Sewage Demand columns were estimated by multiplying the projected 2000 and 2025 employment (Table 2-5) by the commercial/light industrial demand based on 20 gpd/employee. The Residential Sewage Demand Increase column was estimated by subtracting the 2000 residential sewage demand from the projected 2025 residential sewage demand. The Commercial/Light Industrial Sewage Demand Increase column was estimated by subtracting the 2000 commercial/light industrial demand from the projected 2025 commercial/light industrial demand.

The next column is the percentage of OLDS in each municipality based upon the DCPD survey of SEOs. The project sewage demand assumes that the percentage of OLDS in each municipality will remain unchanged, and, thus, a similar portion of the projected residential sewage demand will be served by OLDS. Therefore, the final column is computed by adding the commercial/light industrial demand increase to the portion of the residential sewage demand increase that is not served by OLDS.

The previous table was provided as a reference point for the sewage needs of western Delaware County in terms of an estimate of current (2000) sewage demand and the projected demand. The ultimate responsibility, however, for providing sewage facilities planning lies at the local municipal level. Thus, the most detailed information on sewage facilities planning can be found in the individual municipal Act 537 plans. Several western municipalities are currently conducting major revisions to their individual plans. While specific details are not currently available, information should be forthcoming within the next year.

TABLE 5-8

SEWAGE DEMAND GROWTH ESTIMATE FOR PUBLIC SEWAGE SYSTEMS BY MUNICIPALITY

Municipality	2000 Residential Sewage Demand[1,2] (gpd)	2000 Com/Lt. Ind. Sewage Demand[3,4] (gpd)	2025 Residential Sewage Demand[1,2] (gpd)	2025 Com/Lt. Ind. Sewage Demand[3,4] (gpd)	2025 Residential Sewage Demand Increase[1] (gpd)	2025 Com/Lt. Ind. Sewage Demand Increase[3] (gpd)	Percent of Mun. Served by On-Lot Systems[5]	2025 Projected Sewage Demand Increase[6] (gpd)
Aston Township	1,539,285	128,600	1,829,700	189,400	290,415	60,800	1	348,311
Bethel Township	609,995	21,200	906,300	37,000	296,305	15,800	10	282,475
Brookhaven Borough	758,575	47,400	756,200	59,000	-2,375	11,600	0	9,225
Chadds Ford Township	301,150	143,200	452,200	259,600	151,050	116,400	50	191,925
Chester Heights Borough	235,695	42,000	379,050	64,800	143,355	22,800	75	58,639
Concord Township	1,067,705	98,600	1,607,400	160,400	539,695	61,800	50	331,648
Edgmont Township	372,210	30,400	606,100	56,200	233,890	25,800	75	84,273
Media Borough	525,635	227,200	480,700	240,200	-44,935	13,000	0	-31,935
Middletown Township	1,526,080	214,200	1,680,550	241,400	154,470	27,200	2	178,581
Newtown Township	1,111,500	161,800	1,153,300	219,800	41,800	58,000	30	87,260
Rose Valley Borough	89,680	2,600	95,950	2,600	6,270	0	10	5,643
Thornbury Township	549,765	50,000	788,500	80,400	238,735	30,400	65	113,957
Upper Chichester Township	1,599,990	62,800	1,933,250	81,200	333,260	18,400	1	348,327
Upper Providence Township	998,355	61,600	1,089,650	76,600	91,295	15,000	45	65,212
Western Municipalities	**11,285,620**	**1,291,600**	**13,758,850**	**1,768,600**	**2,473,230**	**477,000**	**N/A**	**2,073,541**

Notes: [1]Residential demand based on 95 gpd/person.

[2]Residential demand is cumulative including areas served by public sewers and OLDS.

[3]Commercial / light industrial demand based upon 20 gpd / employee.

[4]Does not include any heavy industrial users.

[5]Based upon SEO survey conducted by DCPD.

[6]Does not include OLDS.

Source: DVRPC, Bulletin No. 73, March 2002; Weston Solutions, Inc., 2003

CHAPTER 6

PLANNING AND FACILITIES ALTERNATIVES AND EVALUATIONS

INTRODUCTION

A large body of information concerning existing public and private sewage facilities, sewage infrastructure needs, and planning efforts to date has been provided in previous sections of this document. The purpose of this chapter is to use the information gathered to develop alternatives and to evaluate and recommend improvements that can be made to the existing sewage collection, conveyance, and treatment systems serving western Delaware County.

Municipal and local initiatives are the key to wastewater planning in western Delaware County. Therefore, this chapter provides only general recommendations, while emphasizing the importance of local and intermunicipal planning, communication, and cooperative services. In remarks delivered at EPA's Forum on Closing the Gap: Innovative Responses for Sustainable Water Infrastructure on January 31, 2003, the Assistant Administrator of the Office of Water, G. Tract Mehan, III, stated that EPA has found that cost savings can be achieved by small systems through consolidating ownership or management with other small systems. While consolidation is not always an option, cooperative management can "achieve a more sustainable level of technical, financial, and managerial capacity." DEP increases levels of cost reimbursement for programs that are shared by more than one municipality.

In addition to significant cost savings and increased program expense reimbursement, shared service programs provide consistent standards for design, operation, and violation enforcement. Consistent application of standards ensures that developers cannot "shop" for a municipality where environmental regulations are lax. They can also assure the public that all situations are treated the same regardless of the involved parties.

Public Facilities

Although a significant portion of wastewater collection, conveyance, and treatment in western Delaware County is provided by public facilities, issues facing municipalities cannot be generalized because they vary greatly due to the diverse history of wastewater planning and development in the study area. Eastern portions of the study area, which historically had public treatment facilities, deal with many problems similar to those explored in other developed urban/suburban areas. These problems include aging of the systems and I&I. Act 537 updates for municipalities such as Aston, Bethel, Brookhaven, Middletown, Upper Chichester, and Upper Providence noted I&I as a problem at least for a part of their systems.

Centrally located facilities are facing capacity limitations resulting from old infrastructure and growing population. The most prominent example is the SWDCMA,

which is experiencing many difficulties typical of older systems while coping with increasing population in parts of the Authority's service area. The difficulties have necessitated the development of a corrective action plan.

The newer public facilities are located in or are being planned for the western part of the study area. Recent population growth and future projections are forcing municipalities to plan for new collection and treatment systems. New treatment technologies and modern infrastructure differentiate these systems from those at the older facilities, and newer facilities typically have fewer operational problems. However, municipal cooperation and distribution of flows beneficial to the entire region are still lacking. Only recently have some western municipalities started developing agreements that will allow for such cooperation, including Concord and Thornbury; Newtown, Upper Providence, and Edgmont; SWDCMA, Middletown, Upper Chichester, Brookhaven, Chester Heights, Chester Township, and Aston; and SCDA and DELCORA.

Every publicly-owned facility is required to comply with state and federal regulations. Annual reports, often referred to as Chapter 94 Reports, after Pennsylvania Code Chapter 94 Municipal Wasteload Management, must be submitted to DEP by March 31 each year. These reports include monthly average flows, monthly average organic loading, future projections for flows and organic load, all sewer extensions built in the previous year, a discussion on the condition of the facility, as well as repair and maintenance programs and report of industrial discharges into the system.

Public wastewater collection, conveyance, and treatment facilities are gaining in importance as a treatment option for western Delaware County even though there are challenges in establishing them in suburban communities. Some of these challenges include assimilative capacity of receiving streams, disruptions for the installation of sewers, siting of treatment facilities, etc.

Private Facilities

Many businesses, communities, and individual homeowners in western Delaware County do not have access to public sewer systems, and, due to soil limitations, lot sizes, or other problems, they cannot use OLDS. Nonmunicipal (private) surface discharge facilities are widely used in the western parts of the study area where public sewer availability is limited. Many communities and businesses in municipalities such as Chadds Ford, Chester Heights, Concord, and Thornbury rely on private treatment facilities.

Some municipalities also find it economically feasible to contract operation of their treatment facilities to a private company while maintaining some control over monitoring of facility maintenance and performance. For example, the treatment plant owned by Media Borough was sold to Philadelphia Suburban's Little Washington Wastewater Company (now Aqua Pennsylvania, Inc.) in 2001. The Borough still has regular access to the facility for inspections.

Privately-owned treatment facilities fall under the same regulations as publicly-owned plants. Under Pennsylvania Code Chapter 92 National Pollutant Discharge Elimination System Permitting, Monitoring, and Compliance, each person who discharges pollutants, with the exception of sewage discharges from single-family residence sewage treatment plants, may be required to monitor and report all toxic, conventional, non-conventional, and other pollutants in its discharge, at least once a year, and on a more frequent basis if required by a permit condition. The results of this monitoring are submitted to DEP as required by a permit condition. There are no annual reporting requirements (like Chapter 94 for public facilities) for private facilities unless specifically stated in the facility NPDES permit.

Alternatives related to private facilities are typically institutional in nature in that the municipality will be providing oversight, inspection, and record keeping functions. These alternatives are discussed in more detail in Chapter 7.

ALTERNATIVES TO ADDRESS THE CONDITION OF EXISTING PUBLIC INFRASTRUCTURE

Western Delaware County occupies a unique urban fringe area between the dense urban areas of eastern Delaware County and the City of Philadelphia and the rural area of southern Chester and Lancaster Counties. Its location between these vastly different land uses is creating strong development pressure in the western municipalities. The study area faces the dual challenge of upgrading older systems and at the same time adding capacity to service an increasing population. This section provides alternatives to address the condition of the existing public infrastructure in the area.

Correct Inflow and Infiltration Problems

Parts of western Delaware County rely on older collection systems and face problems similar to eastern Delaware County municipalities. I&I increases treatment costs, and significant I&I severely limits the capacity of conveyance and treatment systems to accept flow from new development. Areas affected include Aston, Brookhaven, Bethel, Media, Middletown, Newtown, Rose Valley, and Upper Chichester. Capacity problems at the SWDCMA treatment facility are partially due to I&I issues.

Inspection and Maintenance Programs

Some municipalities opt to delegate operation and maintenance of public facilities to private companies. For example, the Borough of Media entered into an oversight agreement with the new owner of the STP which allows access for examination of operations and effectiveness of the system on an on-going basis. Scheduled inspections and maintenance can assure the public that contract-operated plants do not pose a threat to public health and the environment.

No Action

The final option for addressing the condition of existing wastewater collection, conveyance, and treatment facilities is to do nothing.

ALTERNATIVES TO DEVELOP INFRASTRUCTURE TO SERVE GROWTH AREAS

In the Municipality Specific Sewage Facilities Needs section of Chapter 5, projections of residential and industrial/commercial growth were used to estimate the demand for public treatment facilities in western Delaware County. Table 5-8 projected a need of over 2 MGD of increased capacity at public treatment facilities by 2025. Some of this treatment capacity may be obtained from I&I elimination programs in older service areas and from reduced demands in eastern Delaware County; however, a majority of the additional capacity for new service areas will likely be obtained by expansion of existing facilities or new facilities, given the distance to the public treatment facilities serving eastern Delaware County.

Increase Conveyance and Treatment Capacity at Existing Facilities

Accordingly, one alternative is to conduct a capacity analysis of each public treatment facility serving the western planning area. The goal of these studies would be to identify those facilities that currently have available capacity beyond their current permit, requiring a re-rating study, and those facilities that can economically provide additional capacity through expansion.

Increase Conveyance and Treatment Capacity with New Facilities

Another alternative to address capacity limitation problems is the construction of new conveyance and treatment facilities. As shown in Chapter 2, especially Figure 2-2, significant population growth, on-going and expected in some areas of western Delaware County, as well as conversion from OLDS or other methods of disposal to public sewers may require additional conveyance and treatment capacity in those areas impacted by failing OLDS.

Regional Balancing of Facilities' Capacity

Efficient use of existing or planned treatment capacity on the regional level can provide increased capacity to areas in need. Construction of additional conveyance systems would be required from areas without sufficient treatment capacity to a treatment facility with excess capacity. Some municipalities are already addressing regional issues in their latest Act 537 plan updates. As an example, the Newtown and Upper Providence Act 537 Plan Updates suggest joining CDCA in order to satisfy their growing wastewater treatment needs. Thornbury has an agreement with Concord to accept flows from the western portion of Thornbury Township. Feasibility of shared infrastructure can be

evaluated based on costs of construction of new treatment facilities, taking into account public health and the environment.

Reuse of Reclaimed Water

One issue associated with the expansion of treatment facilities is the ability of small receiving streams to assimilate the discharge without significantly changing the ecosystem of the stream. One way to minimize the impact to local stream ecology is the reuse of reclaimed water. Reuse of treated effluent is a direct method to reduce the surface water discharge; another is the minimization of flow to the treatment facility by the reuse of gray water. While Pennsylvania regulations do not define gray water, the State of Arizona does provide an easy-to-understand legal definition:

> R18-9-701(4) "Gray water" means wastewater collected separately from a sewage flow that originates from a clothes washer, bathtub, shower, and sink but does not include wastewater from a kitchen sink, dishwasher, or toilet."

There are many potential reuses of reclaimed water for non-potable purposes including:

- Irrigation of public parks, landscaped areas surrounding commercial/industrial developments, and golf courses
- Dust control and concrete production on construction projects
- Fire protection
- Evaporative cooling water
- Industrial process water
- Boiler-feed water
- Agricultural and nursery irrigation
- Groundwater recharge

This alternative would evaluate reuse options as part the local land development process for a new significant water user or during the planning phase for a treatment facility expansion.

No Action

The final option addressing the issues of developing infrastructure to serve growth areas is to do nothing and require developers to provide adequate disposal for their developments.

ALTERNATIVES TO COORDINATE LAND USE AND SEWAGE FACILITIES PLANNING

All of the municipalities in western Delaware County have comprehensive plans although many are more than fifteen years old. Up-to-date comprehensive plans foster

consistent land development that reflects residents' vision for their community and provides guidance for municipal ordinances in support of this vision. Comprehensive plans can also provide recommendations for municipal ordinances that promote conformance with other planning documents such as municipal Act 537 plans.

Align and Update Municipal Planning Documents

The detailed review of existing planning documents conducted for Chapter 5 revealed that many municipalities have out-of-date comprehensive plans, and some have ordinances and plans that conflict. Since these are important land planning and development tools in local development policy, this alternative recommends updating and aligning the documents, including requirements for sewage disposal.

Updating municipal planning documents will require some funds, but there are monies available to assist in the document preparation. The short-term financial impact of this work needs to be balanced against the desires of the municipalities to ensure that the visions for their communities are fulfilled.

There are two programs that may provide funding for local land use planning. The Community Development Block Grant (CDBG) Program provides funding from the U.S. Department of Housing and Urban Development (HUD). While typically used for infrastructure improvements in low-moderate income areas, some funds could be used for planning. The Delaware County Office of Housing and Community Development or DCPD should be contacted for more information. The second program, Land Use Planning and Technical Assistance Program (LUPTAP), provides grants and technical assistance, but one of the program's main goals is to promote and encourage the sharing of municipal services, joint planning and zoning, and the application of advanced technology at the local level. The Department of Community and Economic Development (DCED) in Harrisburg or DCPD should be contacted for more information.

No Action

The final option addressing the issues of developing infrastructure to serve growth areas is to do nothing and address each development as it is submitted. This may lead to scattered and patchwork sewage facilities that may lead to great difficulties in the future.

TECHNICAL AND ECONOMIC EVALUATION OF ALTERNATIVES TO ADDRESS THE CONDITION OF EXISTING PUBLIC INFRASTRUCTURE

Correct Inflow and Infiltration Problems

I&I studies should be prepared for older systems in the study area. These studies would identify and prioritize areas where I&I problems are reducing capacity in the systems. Based on the results of the I&I studies, action can be taken to reduce I&I. Reduction of I&I will produce a number of benefits to the authorities and the individual municipalities which include:

- Increased sewer infrastructure capacity for other uses.
- Reduced treatment and operation and maintenance costs associated with treating the I&I flow.
- Reduction or elimination of potential public health hazards resulting from sewage overflows in areas with overtaxed facilities.

Physical corrective actions can include:

- Regular sewer cleaning
- Regular inspection and maintenance
- Manhole inserts
- Roof leader/sump pump disconnects
- Manhole frame repairs
- Slip lining of stream crossings
- Chemical grouting
- Manhole repairs
- Slip lining of other segments
- Inlet disconnects
- Sewer replacement

Public education and implementation of an I&I monitoring program are institutional measures that can also be employed to reduce I&I problems. The previously noted physical corrective actions are listed in approximate order of cost, with sewer replacement being the most expensive. System repairs require lower capital costs than replacing the system. Other advantages associated with correction of identified problems include extended service life of the system and reduced annual conveyance costs, including increased return on investment made to repair the system. One of the foremost advantages to implementing a corrective action plan is that the environment is protected from leakage into the groundwater and from potential contamination of waterways through sewer overflows. Not only is the environment protected, but the overall health and welfare of the public is protected.

The disadvantages to repairing the system include moderate capital costs, some public resistance to the expenditures to repair the system, and temporary public inconvenience while repairing the system. When compared to the high monetary and public health costs and inconvenience associated with failure of the systems, repair costs seem reasonable.

The municipal-specific economics of I&I repair work will need to be developed as part of the study and considered when preparing the corrective action plan. Economic analyses produced as part of the extensive I&I studies conducted in eastern Delaware County clearly indicated a positive return on investment based solely on reduced treatment costs. Additional savings can be garnered through reduced need for additional treatment facilities.

Inspection and Maintenance Programs

Such programs can be particularly beneficial for small-flow sewage treatment facilities, where control is often minimal. Scheduled inspections and maintenance can assure the public that small flow plants do not pose a threat to public health and the environment.

As a disadvantage, the municipality will need to make a financial commitment to conduct these inspections and maintain records. It may be possible to offset the expense of this program by instituting a recurring "registration fee" required for the systems to be inspected.

No Action

Although a prescribed alternative, the no action alternative is not a viable option given the existing and proposed regulatory requirements of DEP and EPA. While doing nothing requires no funding, deteriorating sewage facilities will need to be repaired to meet regulatory commitments. With respect to economics, the no action alternative will be more expensive in the long term because of increased costs of repairs and the more extensive nature of the repairs due to further deterioration.

TECHNICAL AND ECONOMIC EVALUATION OF ALTERNATIVES TO DEVELOP INFRASTRUCTURE TO SERVE GROWTH AREAS

Increase Conveyance and Treatment Capacity at Existing Facilities

Before constructing new treatment facilities, it is usually most economical to maximize the capacity of existing facilities. This would include an I&I elimination program and sewer cleaning program to maximize conveyance capacity. I&I elimination programs typically provide three benefits: reduced treatment costs, extended service life of the collection system, and available treatment capacity at existing facilities. These benefits often exceed the cost of repairs.

Every treatment facility is an assembled collection of individual components or processes. Each of these processes has its own capacity limitation with the most limiting process driving the permit discharge limit. Expansion of existing treatment facilities can often be achieved by adding to the portion of the treatment process that limits the capacity of the facility. This can typically be accomplished at a lower cost than building a new plant. The first step in this process is a capacity evaluation of the facility including an assessment of the structural condition of the treatment processes.

Increase Conveyance and Treatment Capacity with New Facilities

There are a number of advantages to constructing additional capacity. Initially, the construction of additional facilities would improve some of the conditions that contribute to environmental degradation, thus improving public health and welfare.

Newer system components require less repair and maintenance. They also could be sized to eliminate current capacity limitations and provide additional capacity to serve new development.

The disadvantages to constructing additional capacity to serve growth areas include a very high capital cost. With the high cost comes major public resistance to the expenditure and major inconvenience as streets and stream corridors are opened up to either replace or add components parallel to the existing system. Annual operating and maintenance costs will increase as more conveyance and treatment is required. Also, unless all of the lines are replaced with new ones (which would be both cost prohibitive and physically impossible), the old problems and issues associated with the existing aging and leaking sewer lines must still be addressed.

Regional Balancing of Facilities' Capacity

Efficient use of existing or planned facilities is the greatest advantage of a regional balancing approach. Areas in need can gain access to those facilities that have additional capacity to offer. Both parties can benefit financially: areas in need can avoid construction of separate treatment facilities, and capacity providers can charge connection fees, gain revenue from new rate payers, and reduce the per gallon cost of treatment. Benefits to public health and the environment include less discharge into local surface and subsurface waters and more efficient treatment systems than are usually available at larger facilities.

Construction of additional conveyance lines and pump stations needed to transport wastewater to existing treatment facilities is the main disadvantage. Construction activities are expensive and cause significant disruption of traffic. Construction of transmission lines can be less expensive over the life of the project in terms of capital and operating/maintenance expenses than constructing new treatment facilities. Some municipalities are concerned about reduced groundwater recharge if most of the wastewater is taken to a remote facility instead of being discharged locally into the subsurface. Recharging wastewater directly to groundwater can cause other difficulties depending upon the local geology, and any such proposed facility would need a detailed hydrogeologic study to confirm that the area is suitable for the projected flows of the project.

Reuse of Reclaimed Water

Recent years have seen severe drought conditions present in southeastern Pennsylvania. These conditions have resulted in Commonwealth-mandated water conservation measures. While most measures eliminated "quality of life" uses such as watering lawns, washing cars, etc., some neighboring states were contemplating further reductions that would impact industrial users by cutting allowance for manufacturing processing. The reuse of reclaimed water can aid significantly in reducing potable water demand for certain industrial applications, thus minimizing drought impacts.

There are drawbacks to using reclaimed water. Some level of treatment may be required based upon the reuse. For example, it has been documented that gray water can contain considerable amounts of both total coliforms and fecal coliforms. These pathogens can multiply rapidly and can cause serious health risks if not properly handled and treated.

Pennsylvania currently has no specific guidelines or regulations on water reuse, and it handles each application on a case-by-case basis. Many other states and EPA have guidelines that can be followed in developing reclaimed water projects.

No Action

The no action alternative would ignore the fact that the areas with older sewer lines are taking on water and/or potentially leaking to groundwater as well. Doing nothing means that municipalities and conveyance authorities will continue to collect and pay to convey and treat excess water in their sewer systems. Doing nothing may also mean that small treatment facilities and OLDS will continue to be the primary source of wastewater disposal. The management challenges discussed in Chapter 7 would become very important. Existing problems continue to grow and will be more expensive to remediate in the future.

CHAPTER 7

INSTITUTIONAL ALTERNATIVES AND EVALUATIONS

PERFORMANCE OF EXISTING WASTEWATER TREATMENT AUTHORITIES

Chapter 3 lists eight existing wastewater authorities/public entities that provide wastewater treatment to the western planning area. These public organizations are:

- Brookhaven Borough
- CFTSA
- CTSA
- DELCORA
- Rose Valley Borough
- SWDCMA
- Thornbury Township Board of Supervisors
- City of Wilmington, DE

Brookhaven Borough

The Borough of Brookhaven owns and operates a WWTP located at 2 Cambridge Road. Recent upgrades have included a 400,000-gallon tank to control peak flows and a new primary treatment tank. The plant has historically experienced flows in excess of twice its permitted capacity of 0.192 MGD during wet weather events. During 2000, the average annual flow was 0.169 MGD or 88% of permitted capacity, and the 3-month maximum average daily flow was 0.201 MGD, which was greater than permitted. It is clear that the Borough's collection system is experiencing severe I&I that is impacting the ability of the WWTP to meet permit requirements.

Chadds Ford Township Sewer Authority

CFTSA currently owns and operates the Ridings WWTP located at Ridge Road and Ridings Boulevard. In 2000, the plant was operating at approximately 25% of its permitted capacity of 0.08 MGD and is experiencing no operational problems.

Concord Township Sewer Authority

CTSA currently owns and operates the Central STP located at 664 Concord Road. In 2000, the plant's annual average flow was only 32% of its 1.2 MGD permitted capacity, and it has reported no operational problems.

Delaware County Regional Water Quality Control Authority

DELCORA owns and operates the WRTP located in Chester. In 2000, the plant's annual average flow was 71% of its 44 MGD permitted capacity and has reported no

operational problems. Plans are currently underway to request a re-rating of the plant to 50 MGD since process improvements completed in recent years make this flow possible.

Rose Valley Borough

The Borough of Rose Valley currently owns and operates the STP located off of Long Point Lane. In 2000, the plant's annual flow was 58% of its permitted capacity of 0.13 MGD, and its maximum 3-month average was 79% of the permitted capacity. Plans are currently underway to overhaul the plant.

Southwest Delaware County Municipal Authority

SWDCMA owns and operates the Baldwin Run Pollution Control Plant located at Gamble and Park Lanes in Aston. Aston Township, Brookhaven Borough, Chester Township, Chester Heights Borough, Concord Township, Middletown Township, Upper Chichester Township, and Upper Providence Township contribute flow to SWDCMA's plant. In 2000, the plant's annual average flow was 92% of its 6.0 MGD permitted capacity, and its maximum 3-month average was 6.24 MGD, thus exceeding its permit. On October 5, 2001, SWDCMA was notified by DEP that it was to prohibit new connections and was directed to begin planning, design, financing, and construction of measures to meet anticipated demand. SWDCMA submitted a corrective action plan that was approved by DEP in June 2002.

Thornbury Township

Thornbury Township owns and operates the sewage treatment plant located on Thornton Road. In 2000, the plant's annual average was 47% of its 0.12 MGD permitted capacity, and its maximum 3-month average flow was 52% of its permitted capacity. An expansion to 0.18 MGD is currently planned to meet anticipated future demands.

City of Wilmington

The City of Wilmington Department of Public Works owns and operates the Wilmington Water Pollution Control Facility. This facility receives wastewater from Bethel Township. The plant has a capacity of 134 MGD but experiences storm related flows in excess of capacity with a peak flow of 250 MGD reported in 2000. This facility serves an area of Wilmington that has combined sanitary and storm sewers designed to overflow directly to surface waters during precipitation events.

EXISTING LOCAL AGENCY PROGRAM EVALUATION

Feasibility of a Regional Local Agency Program at the Multi-municipal or County Level

Western Delaware County is very diverse in both socioeconomic breakdown and the level of wastewater systems development. While some municipalities located in the

eastern portion of the study area are cooperating in wastewater collection and treatment (DELCORA and SDCA, contributing municipalities of SWDCMA), western municipalities are just now identifying the benefits of such a regional approach. Such regional agreements are developing between Concord and Thornbury and Newtown, Upper Providence, and Edgmont Townships. This regional approach should be encouraged and possibly applied in other municipalities. Cooperation on institutional and technical levels, such as shared SEOs and inspection and maintenance personnel, can be financially beneficial to municipalities and can provide a uniform approach to the management of wastewater disposal systems.

Technical and Administrative Training Needs

SEO training currently occurs on the state level and is fairly uniform. Other technical and administrative personnel involved in sewage facilities management can benefit from similar training programs. Small flow and private plant operators as well as maintenance and inspection personnel should receive standardized training and, possibly, certification. Administrative staff needs help in creating community awareness and public educational programs in line with state requirements.

Joint Municipal Management of Municipal Sewage Programs

Joint municipal management of municipal sewage programs can be beneficial to municipalities, communities, the environment, and public health. Standardized requirements for on-lot and small flow systems should be applied in all municipalities. Joint educational programs can help create public awareness and encourage cooperation. Shared SEOs can be both technically and financially beneficial due to incentives provided by the State. The SEO Reimbursement Program currently covers 50% of the cost for a municipal SEO, while costs for a shared SEO are 85% reimbursed. Uniform training and a standardized program can also increase effectiveness of on-lot and small flow systems inspections and maintenance, particularly if shared crews are used.

ALTERNATIVES TO ADDRESS THE CONDITION OF EXISTING PRIVATE INFRASTRUCTURE

Inspection and Maintenance Programs

Most owners opt to delegate operation and maintenance of private facilities to private companies. Such programs can be particularly beneficial for small-flow sewage treatment facilities where control is often minimal. Scheduled inspections and maintenance can ensure that small flow plants do not pose a threat to public health and the environment.

Public Ownership of Private Treatment Facilities

Public control of private facilities can help to facilitate long-term planning and expansion of service to areas in need of sewage facilities. The Ridings WWTP in Chadds

Ford is an example of public ownership of a treatment plant that was constructed as a private facility. Public ownership, particularly for private systems with significant discharge, can ensure proper operation and maintenance and protect surface waters and public health.

Another advantage of public ownership is increased control over compliance with permit requirements as well as state and federal regulations. Public ownership would also include the annual planning requirements of the Chapter 94 reporting process.

No Action

The final option for addressing the condition of existing wastewater collection, conveyance, and treatment facilities is to do nothing.

ALTERNATIVES FOR PROTECTION OF THE ENVIRONMENT FROM OVERLOADED OR MALFUNCTIONING ON-LOT DISPOSAL FACILITIES

Utilization of OLDS varies greatly across western Delaware County. While some municipalities primarily use centralized sewer collection and treatment systems (Aston, Bethel, Brookhaven, Media, Middletown, Rose Valley, Upper Chichester), others rely heavily on individual or community subsurface disposal (Edgmont, Chester Heights). "Transitional" municipalities plan on continued use of OLDS while developing their wastewater collection and treatment infrastructure in the future (Concord, Thornbury, Newtown, Upper Providence).

OLDS must be installed in compliance with state laws and regulations. *PA Code Chapter 73, Standards for On-lot Sewage Treatment Facilities*, addresses issues ranging from site suitability to mechanical details for various types of OLDS. The SEO, an individual trained and certified by DEP, verifies site suitability tests, inspects installation, and issues permits for new or replacement OLDS. Operation of OLDS is minimally regulated. DEP does not require permitting (with flow limitations or constituent concentration limitations in wastewater discharged into the subsurface) as it does with surface discharge. However, evidence exists that individual and community OLDS can impact on groundwater quality.

While large community subsurface disposal systems are generally well maintained, regular upkeep of individual systems is left to homeowners. As a result, many individual systems are not maintained properly, problems are not detected in a timely manner, and they can become a threat to public health and the environment. None of the municipalities in the study area have ordinances in place requiring septic tank maintenance or inspection at specified intervals. Upper Providence Township currently has a draft of such an ordinance pending approval. Sludge disposal is performed by private parties contracted by individual homeowners. Municipalities do not regulate destinations of this waste or require hauling frequency records. Few municipalities have educational programs regarding OLDS suitability and maintenance.

Mandatory System Requirements

Currently available soil surveys (see Chapter 4, Soils Section) have stated that all Delaware County soils have either moderate or high limitations to on-site wastewater disposal systems use. Installation of new OLDS should be allowed on a case-by-case basis and only after successful soils evaluation and percolation tests are approved by the municipal SEO. Alternative systems should be considered for new or replacement systems in problem areas. Legislatively, municipalities should adopt and strictly enforce ordinances authorizing inspections, requiring maintenance, and prohibiting malfunctioning systems.

Management Programs

A key to consistent and sound OLDS performance is inspection and maintenance. In order to effectively administer a program that addresses all of the OLDS in a municipality, a management program must be developed that requires regular inspections and maintenance and provides public awareness education. These key functions are needed to reduce the potential for threats to public health and the environment from private OLDS in western Delaware County.

The management program can be implemented at the local or intermunicipal level with the program being operated by municipal employees, a service contractor, or a regional authority. Intermunicipal programs are eligible for higher levels of reimbursement from DEP than those that serve single municipalities.

Public Ownership of Community On-Lot Facilities

Municipal ownership of community OLDS can assure the public that these facilities are properly operated and maintained.

No Action

The final option addressing the issues of OLDS is to do nothing.

TECHNICAL AND ECONOMIC EVALUATION OF ALTERNATIVES TO ADDRESS THE CONDITION OF EXISTING PRIVATE INFRASTRUCTURE

Inspection and Maintenance Programs

Such programs can be particularly beneficial for small-flow sewage treatment facilities where control is often minimal. Scheduled inspections and maintenance can assure the public that small flow plants do not pose a threat to public health and the environment.

As a disadvantage, municipalities need to make a financial commitment to conduct these inspections and maintain records. It may be possible to offset the expense

of this program by instituting a recurring "registration fee" required for the systems to be inspected.

Public Ownership of Private Treatment Facilities

Public ownership can be municipal, a local authority, or a regional authority. Public ownership, particularly for private systems with significant discharge, can assure the public of proper operation and maintenance and thereby protect surface waters and public health. Another advantage of public ownership is increased control over compliance with permit requirements, as well as state and federal regulations. Public ownership would also include the annual planning requirements of the Chapter 94 reporting process. Better performing facilities also mean benefits to public health and the environment. Public ownership of these facilities does allow the use of any excess capacity in these facilities to serve residents outside of the community for which it was originally built. Cost savings can be obtained through the shared managerial costs of a multi-municipal organization.

Disadvantages can include increased responsibility, which many municipalities are not willing to accept. Financial incentives should be offered to those municipalities willing to accept the responsibility.

No Action

Although a prescribed alternative, the no action alternative is not a viable option given the existing and proposed regulatory requirements of DEP and EPA. While doing nothing requires no decision making or funding, deteriorating sewage facilities will need to be repaired to meet regulatory commitments. With respect to economics, the no action alternative will be more expensive in the long term because of increased costs of repairs and the more extensive nature of the repairs due to further deterioration.

TECHNICAL AND ECONOMIC EVALUATION OF ALTERNATIVES FOR THE PROTECTION OF THE ENVIRONMENT FROM OVERLOADED OR MALFUNCTIONING ON-LOT DISPOSAL FACILITIES

Mandatory System Requirements

While system design requirements (issued by DEP) are already in place for new OLDS, it will be beneficial to introduce consistent maintenance standards for existing systems as well. Advantages include systems that are more efficient, environmentally safe, easier to maintain, and easier to inspect/manage.

A disadvantage is increased cost to the owners when system repair or replacement is required. Low-cost financing through loans is available from PENNVEST. See Appendix B for more information.

Management Programs

Advantages of this alternative include efficient and well-functioning OLDS, sludge disposal reporting, and fewer incidents of malfunctions. All of the advantages decrease the threat to human health and the environment and limit the public nuisance caused by overflowing septic systems. There are internet-based data tracking systems that provide maintenance information management. The type of information collected can include owner, occupant, type of system, date of service, name of service provider, any deficiencies noted, any repairs made, date of inspection, date for next service, etc. These systems make it possible for a private sludge hauler to enter the information for residents it services, thus eliminating data entry tasks for the municipality.

The main disadvantage is the cost of implementing the program. Financial incentives should be put in place for those municipalities taking the initiative in implementing such programs. These programs can be funded by homeowner registration fees for OLDS and/or a private sludge hauler registration fee. The dual fee structure helps remind homeowners that they need to perform regular maintenance on their systems and ensures that only reputable haulers are allowed to operate in the municipality. Intermunicipal programs operated by municipal employees, a contractor, or a regional authority are eligible for higher DEP reimbursement levels than those that serve a single municipality.

The implementation of a management system similar to that described has been recommended in previous planning documents. For example, the Chester Creek Conservation Plan prepared by the Chester-Ridley-Crum Watersheds Association and the Pennsylvania Environmental Council recommended that "septic system registration and maintenance programs" be implemented along with "fines or other approaches" to ensure that proper maintenance is conducted. The plan also recommended that educational materials be made available to homeowners with OLDS so that they may understand their systems and the impact on neighbors if the system fails. Examples of available public educational and information documents from DEP and EPA are provided in Appendix C.

Public Ownership of Community On-Lot Facilities

Like public ownership of private surface discharge facilities, municipal ownership can ensure proper operation and maintenance and protect groundwater and public health, particularly for subsurface systems with significant discharge. Public ownership of these facilities does allow the municipality to use any excess capacity in these facilities to serve residents outside of the community for which it was originally built. Disadvantages can include increased financial and legal responsibility, which many municipalities are not willing to take.

No Action

Taking no action will ignore existing problems with OLDS in western Delaware County. Overflowing systems and threats to groundwater quality and public health are just a few of the on-going problems that will continue to persist if no action is taken.

CHAPTER 8

RECOMMENDED ALTERNATIVES

INTRODUCTION

The potential alternatives for public facilities discussed in Chapters 6 and 7 cover a wide range of options and costs. Given the regulatory focus that infrastructure has been receiving in recent years, the No Action Alternatives are not viable. Ultimately, the recommended solution for western Delaware County will be the application of several of the alternatives on a case-by-case basis in each municipality.

The issues surrounding private facilities focus more on the need to ensure continued proper operation. Accordingly, it is recommended that communities with privately owned and operated facilities establish inspection and oversight programs. The purpose of these programs is to ensure that small treatment facilities are receiving proper maintenance and that they do not pose a threat to public health and the environment.

Public ownership of privately owned and operated facilities is listed as an alternative, but it should be used only in cases where there is no other option to ensure that public health and the environment are not threatened.

RECOMMENDED PUBLIC SEWAGE FACILITIES ALTERNATIVES

Correct Inflow and Infiltration Problems

In the areas of western Delaware County that have older sewer systems, it is important to begin a program to quantify the structural conditions of the system and thereby address I&I issues. This program will need to begin with a detailed assessment of the system to evaluate the appropriate corrective actions needed. As demonstrated in eastern Delaware County, savings can be found in the cooperative purchasing of goods and services (i.e., manhole inserts, sewer slip lining), and it is recommended that the municipalities consider developing a program of their own or participate in the program developed by DELCORA for eastern Delaware County municipalities. Some western Delaware County municipalities and authorities have already participated in the purchase program including BTSA, Brookhaven Borough, SDCA, and SWDCMA.

In areas with younger systems, the recommendation is to begin the formulation of an asset management system that incorporates periodic I&I evaluations and implementation of appropriate corrective measures on an as-needed basis. This type of system has been promoted by EPA in its CMOM requirements. Although these requirements are not yet mandated by EPA, many states have begun to implement these provisions under their own regulatory authority.

Section 122.42 (f) of the federal Clean Water Act may soon require municipalities with sanitary sewer systems to obtain permits for these systems. The General Standards subsection requires permittees to:

(i) properly manage, operate, and maintain, at all times, all parts of a collection system over which the permittee has operational control;

(ii) provide adequate capacity to convey base flows and peak flows for all parts of the collection system that the permittee owns or over which it has operational control;

(iii) take all feasible steps to stop and to mitigate the impact of sanitary sewer overflows in portions of the collection system that the permittee owns or over which it has operational control; and

(iv) provide notification to parties with a reasonable potential for exposure to pollutants associated with the overflow event.

(v) develop a written summary of the permittee's CMOM program and make it, and the audit under section (5), available to any member of the public upon request.

This legislation may require municipalities to develop a management program to comply with the items noted. Elements of the program are to include legal mechanisms (ordinances, agreements, and other documents) for implementation, responsible parties for implementation of various measures required under the program, an overflow response plan, a system evaluation and capacity assurance plan, and provisions for audits and communication.

By voluntarily implementing the recommendations presented in this Act 537 plan, municipalities will help to satisfy the regulatory requirements that will be imposed on them under the CMOM program. For more information regarding some of the specifics of the required plan, refer to Appendix D.

Uniform Inspection and Maintenance Program for Privately-Operated Public Facilities

In areas where private contractors are hired to operate and maintain public facilities, annual or biennial inspections should be conducted to ensure that proper operation and maintenance has been performed.

Increased Conveyance and Treatment Capacity Studies

Increasing conveyance capacity is a necessary component of population growth and development. Each municipality needs to assess its own development planning with respect to the long-term use of collection systems and the capacity that these systems will need to transport.

Increasing treatment capacity through the development of new facilities is very expensive and should be considered as a last alternative. Before treatment capacity expansion is undertaken, it is recommended that other alternatives be developed to the fullest extent including I&I elimination and the regional balancing of facilities' capacity. This alternative will require the examination of several issues in addition to cost including:

- Capacity of existing conveyance and treatment facilities.
- Assimilative capacity of the receiving streams.
- Effectiveness of existing sludge disposal practices.
- The need to modify the existing sludge management program.
- Alternative of choice for sludge management as well as facilities for adequate treatment and disposal of sludge.
- Institutional, regulatory, and management modifications needed.

Before any decisions can be made, a comprehensive understanding of all public sewage facilities serving the study area must be developed. Accordingly, it is recommended that a process capacity analysis be conducted. Some analyses may have been completed in recent years and remain valid. In those cases where the process capacity study shows that the plant has available capacity beyond the current permit, a re-rating study is recommended.

Regional Balancing of Facilities' Capacity

The regional balancing of treatment facilities' capacity should be examined in detailed regional studies. Treatment capacity exists at certain facilities that could service the other parts of the study area. It may be more cost effective to construct additional conveyance systems and transfer flow to those facilities with capacity. Additionally, it may be more cost effective to add additional limited capacity at select facilities than to construct new plants. The studies recommended in this chapter's section on Increased Conveyance and Treatment Capacity Studies will provide key information for balancing long-term sewage needs.

Reuse of Reclaimed Water

As part of an ongoing strategy to manage future wastewater treatment needs, reclaimed water reuse should be evaluated as part of a wastewater treatment facility expansion and as part of the local land development process for new significant water users.

RECOMMENDED PLANNING ALTERNATIVES

Updating Comprehensive Plans

All of the municipalities within the planning area have comprehensive plans, although many are outdated (see Chapter 5). Some of the newer comprehensive plans contain innovative strategies for steering new land development toward areas of existing infrastructure. For example, Middletown Township's 2001 comprehensive plan outlines zoning requirements to promote a balance of developed and open areas. A low-density residential development category assigned to vacant parcels within areas of residential development is intended to guide housing development to areas where lots and infrastructure already exist. The zoning code allows for TDR, a program that directs growth to preferred locations through the sale and purchase of a property's development rights.

It is recommended that municipalities with comprehensive plans that are older than ten years develop current plans that address existing and projected development trends. These plans should contain strategies to encourage development near existing utilities and that preserve contiguous open spaces, such as the Middletown plan described above. This type of strategy can also be used to encourage redevelopment of declining areas by rezoning these parcels in a way that will attract more suitable land uses.

The draft Delaware County comprehensive plan contains objectives and policies that include:

- Repair and maintain the existing public sewer network to ensure its continued life and to provide capacity for extension to areas in need of connection to public sewer service.
- Promote coordinated planning and land use management in order to balance natural preservation with the economic and social needs of the County.
- Promote environmental resources protection through municipal and citizen education regarding existing environmental resources and their value to the community.
- Promote, where feasible, techniques for sewage treatment that involve infiltration or other means to restore and protect the local water regime.
- Adopt programs to manage existing and future on-lot, community, and public treatment systems.

Consistency of Municipal Ordinances with Comprehensive Planning

The revised municipal comprehensive plans should be consistent with the County's comprehensive plan and with updated municipal Act 537 plans. The comprehensive plans should consider the proliferation of small package plants and make recommendations for oversight of the operation of these facilities.

Comprehensive plan revisions need to reflect the current and future vision of the municipality. Zoning and subdivision and land development ordinances or other municipal ordinances that are not consistent with the comprehensive plan and Act 537 plan should be modified to remove outdated statements and reflect current planning. If the existing comprehensive plan is so outdated as to be of little or no value to existing municipal planning efforts, then an entirely new plan should be developed.

RECOMMENDED INSTITUTIONAL ALTERNATIVES

Experiences in other areas of Delaware County and Chester County demonstrate that shared resources and services are cost effective. Therefore, the sharing of resources and staff to perform wastewater management services is recommended.

Uniform Inspection and Maintenance of Private Facilities

In municipalities where an extensive inspection program is currently not already being implemented, it is recommended that all private facilities be inspected at a minimum biennially and preferably annually. The inspection should focus on condition and maintenance of the facilities as well as proper disposal of biosolids. A uniform maintenance program should be developed as a guideline for the contractor/consultant performing these tasks.

Management of On-Lot Disposal Facilities

OLDs are in widespread use in western Delaware County, and the marginal soils in the County can cause these systems to fail. Some communities have already been forced to address failing systems and to develop long-term solutions to replace them.

As with other private disposal facilities, a level of oversight is needed to ensure that they receive the preventative maintenance needed for continued safe operation. It is recommended that an inspection and maintenance tracking program be developed. This program, which could be shared by several municipalities, should include registration of all OLDs, annual submission of maintenance records, and periodic inspections to ensure compliance. Early detection of problems in an area can provide the municipality with valuable time in which to develop a cost-effective long-term solution to failing systems.

An important facet of this program will be a public information/education program. This program will focus on providing the homeowners with clear guidelines on the proper operation and maintenance of their OLDS. Examples of available public educational and information documents from DEP and EPA are provided in Appendix C.

RECOMMENDED ALTERNATIVES BY MUNICIPALITY

The recommended alternatives cover a wide range of issues over the entire study area but are not applicable to every municipality. Table 8-1 summarizes the alternatives that are recommended for each municipality.

TABLE 8-1

SUMMARY OF RECOMMENDED ALTERNATIVES BY MUNICIPALITY

Alternative / Municipality	Correct I&I Problems and Develop CMOM Program	Private Facility Uniform Inspection & Maintenance Program	Conveyance & Capacity Studies	Regional Balancing	Reuse of Reclaimed Water	Comprehensive Plan Update (>10 years old)	Municipal Ordinance Consistency with Comprehensive Plan	OLDS Management Program
Aston Township	✓		✓	✓	✓	✓	✓	✓
Bethel Township	✓		✓		✓	✓	✓	✓
Brookhaven Borough	✓		✓	✓	✓	✓	✓	
Chadds Ford Township	✓	✓	✓	✓	✓	✓	✓	✓
Chester Heights Borough	✓	✓		✓	✓	✓	✓	✓
Concord Township	✓		✓	✓	✓		✓	✓
Edgmont Township	✓	✓		✓	✓		✓	✓
Media Borough	✓	✓	✓		✓	✓	✓	
Middletown Township	✓		✓	✓	✓		✓	✓
Newtown Township	✓	✓		✓	✓		✓	✓
Rose Valley Borough	✓		✓	✓	✓	✓	✓	✓
Thornbury Township	✓	✓	✓	✓	✓	✓	✓	✓
Upper Chichester Township	✓		✓	✓	✓	✓	✓	✓
Upper Providence Township	✓	✓		✓	✓	✓	✓	✓

Source: DELCORA, 2003

CHAPTER 9

IMPLEMENTATION OF RECOMMENDED ALTERNATIVES

INTRODUCTION

The purpose of this chapter is to provide a framework and schedule for the implementation of the recommended alternatives highlighted in Chapter 8 of this document. The alternatives are widely varied between municipalities depending upon individual needs; therefore, the implementation schedules vary among the municipalities. For example, the comprehensive plan update alternative will require significant municipal focus to accomplish; however, evaluating reclaimed water use as part of industrial/commercial land development is a relatively simple modification to existing ordinances.

IMPLEMENTATION SCHEDULE

Individual Municipal Schedule

The first step in this process is for each municipality to assess its own individual priorities and to develop a schedule to suit its needs and complement existing individual Act 537 planning. Each municipality should accomplish this assessment during the first year following adoption of this plan. Once priorities and schedules are outlined, funding for longer-term programs can be developed, and mechanisms can be put in place to provide the needed funds when required.

Regional Alternatives Implementation

Several alternatives include multi-municipal programs or special studies. While not every community may rank these alternatives at the top of their list, their implementation can provide benefits for all Delaware County residents. Accordingly, it is recommended that a feasibility study for a regional OLDS management program be undertaken by interested parties beginning early in Year 2 after adoption of this plan.

A second regional alternative involves a study of regional treatment balancing. This study logically follows the individual conveyance and capacity studies, and its schedule will be driven by the individual municipal schedules. The conveyance and capacity studies are also a component of the CMOM program and will likely need to be conducted within three years of implementation to meet anticipated regulatory requirements. Accordingly, the regional balancing study could begin during Year 3 following adoption and should be completed by the beginning of Year 5.

MODEL RESOLUTION FOR ADOPTION

The following is a model resolution for municipal adoption of this Act 537 Sewage Facilities Plan Update.

RESOLUTION ADOPTING THE DELAWARE COUNTY SEWAGE FACILITIES PLAN, WESTERN PLAN OF STUDY

RESOLUTION OF THE (Commissioners/Supervisors/Council) OF _____ (Township/Borough), DELAWARE COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, require the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

WHEREAS, the Delaware County Planning Department, acting upon authorization from the Pennsylvania Department of Environmental Protection, did offer assistance to the municipalities in meeting their Act 537 requirements on a sub-County basis; and

WHEREAS, the (Township/Borough) of _____ did by formal resolution dated _____, authorize the County of Delaware to prepare the sewage facilities plan on its behalf; and

WHEREAS, the appropriate municipal officials of the (Township/Borough) have reviewed the findings and recommendations of that plan and find it to conform to applicable zoning, subdivision, and other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED THAT THE (Commissioners/Supervisors/Council) of (Township/Borough) hereby accept(s) and adopt(s) the *Delaware County Act 537 Sewage Facilities Plan Revision, Western Plan of Study*, prepared by the Delaware County Planning Department, April 2004, as an official plan revision for sewage facilities in compliance with the Pennsylvania Sewage Facilities Act of 1966. The (Township/Borough) hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act, as amended).

I, _____, Secretary, _____ (Township/Borough) (Commissioners/Supervisors/Council) hereby certify that the foregoing is a true copy of the (Township's/Borough's) Resolution No. _____, adopted _____, 2004.

AUTHORIZED SIGNATURE TOWNSHIP/BOROUGH SEAL

_____

ACRONYMS

BOD_5	Biochemical oxygen demand (5-day test)
BTSA	Bethel Township Sewer Authority
CDBG	Community Development Block Grant
CDCA	Central Delaware County Authority
CFTSA	Chadds Ford Township Sewer Authority
CMOM	Capacity, Management, Operation, and Maintenance
COWAMP	Comprehensive Water Quality Management Plan for Southeastern Pennsylvania
CSO	Combined sewer overflow
CTSA	Concord Township Sewer Authority
CWF	Cold water fishes
DCED	Department of Community and Economic Development
DCJA	Darby Creek Joint Authority
DCPC	Delaware County Planning Commission
DCPD	Delaware County Planning Department
DELCORA	Delaware County Regional Water Quality Control Authority
DEP	Pennsylvania Department of Environmental Protection
DER	Pennsylvania Department of Environmental Resources
DRBC	Delaware River Basin Commission
DVRPC	Delaware Valley Regional Planning Commission
EDU	Equivalent dwelling unit
EPA	U.S. Environmental Protection Agency

ACRONYMS
(Continued)

FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
gpd	Gallons per day
gpm	Gallons per minute
HDT	Hydraulic detention time
HUD	U.S. Department of Housing and Urban Development
HQ	High quality
I&I	Inflow and infiltration
LF	Linear feet
LS	Lift station
LUPTAP	Land Use Planning and Technical Assistance Program
MF	Migratory fishes
MGD	Million gallons per day
MPC	Municipalities Planning Code
MTSA	Middletown Township Sewer Authority
NPDES	National Pollutant Discharge Elimination System
OLDS	On-lot disposal system
PDH	Pennsylvania Department of Health
PENNVEST	Pennsylvania Infrastructure Investment Authority
PRD	Planned residential development
PS	Pump station

ACRONYMS
(Continued)

PSWPCP	Philadelphia Southwest Water Pollution Control Plant
RHM	Radnor-Haverford-Marple Sewer Authority
S&LD	Subdivision and land development
SAOR	Standard actual oxygen requirement
SDCA	Southern Delaware County Authority
SEO	Sewage Enforcement Officer
SMSA	Standard metropolitan statistical area
SSO	Sanitary sewer overflows
STP	Sewage Treatment Plant
SWDCMA	Southwest Delaware County Municipal Authority
SWMP	Stormwater Management Plan
TMDL	Total Maximum Daily Load
TDR	Transferable Development Rights
TSF	Trout stocking fishes
UNT	Unnamed tributary
UPTSA	Upper Providence Township Sewer Authority
WRTP	Western Regional Treatment Plant
WWF	Warm water fishes
WWTP	Wastewater Treatment Plant

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APPENDIX A

GEOGRAPHIC INFORMATION SYSTEM (GIS) MAPPING

APPENDIX A

GEOGRAPHIC INFORMATION SYSTEM (GIS) MAPPING

Preparation of both the eastern and western Act 537 plans involved the collection, storage, manipulation, and analysis of a great deal of information. Through the use of GIS technology available at DCPD, planning staff were able to compile and evaluate a number of data layers, some of which include zoning (for western build-out analysis), soils (to determine suitability for on-lot septic systems), and most importantly, existing sewage facilities. The degree to which each of these layers was utilized for analysis in the eastern and western areas was a function of the planning issues relative to those areas.

Sewage Facilities Mapping

One of the most significant, and ultimately most useful, products of this Act 537 planning effort is an up-to-date map of the County's sewage facilities. Therefore, as part of this planning effort, DCPD undertook a project to prepare a sewage facilities coverage for the entire County. Since expansion of the sewer system in the West and repair and replacement of the sewer lines in the East are on-going, maps prepared for this effort can be considered a 1999-2000 snapshot of the County's sewer systems.

Through the use of GIS to compile and catalog municipal and authority sewer line maps, the GIS sewer coverage serves as a dynamic tool which can, with periodic updates, serve both local government and the private sector for years to come. While only selected sewer features have been provided in "hard copy" in the document, full access to the sewage facilities coverage and associated attribute tables is available in digital form.

The following is a brief description of the methodology for mapping the sewage facilities for the eastern and western study areas.

East

Most portions of eastern Delaware County have been served by public sewers for many years. There is an extensive regional network of sewer lines and interceptors responsible for collection and conveyance of flows to the two major regional plants (located in the City of Philadelphia and the City of Chester) for treatment of wastewater generated in the eastern study area. For the purposes of GIS mapping, the area was considered almost fully sewered, and decisions made regarding level of detail for the maps were based on issues associated with sewer line extension, maintenance, and repair of the existing system.

Since varying sizes of sewer lines run below almost every residential street in much of eastern Delaware County, a decision was made early in the process to limit the number of sewer lines to be mapped (based in part on cost for digitizing). Generally speaking, all individual gravity lines ten inches or larger and force mains of all sizes were mapped. Attributes relating to size, material, and flow direction of the various lines were

also entered into the GIS database. Large expanses of sewered areas containing lines smaller than ten inches are indicated by shading. All manholes were mapped, and attribute tables containing placeholders for entry of additional data in the future were included as part of the GIS coverage. Pump stations and sewage treatment plants were mapped, and attribute tables containing their associated specifications were attached to the GIS.

Sewer authority boundaries were mapped based on information provided by DELCORA and the various conveyance authorities serving the area. When discrepancies arose between sewer authority maps, a decision was made to delineate the boundaries based on a number of factors including topography, the location of lines, and direction of flow within those lines.

The problem areas coverage for the eastern study area was based on the results of the individual I&I studies conducted by the municipalities and the various sewer authorities. In most cases, the problems are associated with individual lines or line segments. Such areas have been identified on individual municipal maps contained in the document. More information on the specific nature of the various problems can be found in digital form.

West

As noted previously, a major rationale for dividing the County into two study areas was the availability of public sewer service to serve the various municipalities. A secondary issue, not discussed in any detail, was the nature and scope of the sewer network serving each of the study areas (i.e., number of areas utilizing on-lot systems, number of individual municipal sewage treatment authorities, etc.). The western study area is not served by any single regional sewer system. The ages of the various sewer systems, as well as their geographic extent, vary greatly. Many portions of the study area are almostly completely unsewered.

Issues associated with the western study area are varied. However, most of the issues are associated with growth and development and the provision of adequate sewage facilities to serve this development. In many of the far northern and western reaches of the County, zoning density and soil suitability for on-lot systems needs to be balanced with water resources and the ability to expand or construct new sewer systems to individually or locally serve the needs of expected development.

In light of the need to fully evaluate the nature and extent of the various sewage facilities serving the western study area, the decision was made to map all of the sewer lines (without size limitation), pump stations, and treatment plants. As with the eastern study area, all sewer authority boundaries have been indicated, and attribute tables are attached to the various features. However, in contrast to the eastern study area, the problem areas mapped are those with on-lot septic systems or other related malfunctions. Information associated with the nature of the various problem areas indicated on the map is available in digital form.

Access to Municipal Sewage Facility Maps

Each municipality and sewer authority will receive the following upon request:

- A CD containing a JPEG version of its sewage facilities for distribution to the public, developers, etc.
- A digital (shapefile) or paper display copy of the map for updating by the appropriate party (municipality, municipal engineer, etc.)

  Please contact DCPD's GIS & Information Services section (610-891-5200) to indicate the format you wish to have. At the same time, you may also request data on sewage facilities in adjacent municipalities for analysis purposes.

For acquisition of the digital parcel layer generated and maintained by the County's Board of Assessments GIS Unit, contact Norma Cairo at 610-891-4793, cairon@co.delaware.pa.us. The cost will depend on the density of the linework in the municipality, i.e., the number of megabites per tile. The County's soil layer may be accessed from the following website: http://mcdc.cas.psu.edu.

DCPD will be updating the Countywide sewage facilities map approximately every two years. At that time, staff will be requesting a copy of each municipality's current sewage facilities map for inclusion in the Countywide map.

APPENDIX B

LOW-COST FINANCING FOR ON-LOT DISPOSAL SYSTEMS

APPENDIX B

LOW-COST FINANCING FOR ON-LOT DISPOSAL SYSTEMS

Pennsylvania Infrastructure Investment Authority (PENNVEST) provides low-cost financing for wastewater systems across the Commonwealth. In some parts of the Commonwealth, particularly rural areas, it may be more cost effective for individual homeowners to use their own OLDS rather than incur the high costs of constructing long collection lines to service widely scattered properties. As with larger systems, however, these individual OLDS may require improvement, repair, or replacement to meet public health and environment standards.

PENNVEST does have the following requirements and restrictions on the use of these funds:

Eligibility

- All citizens of the Commonwealth, with limited exceptions. Detailed information on eligibility requirements can be obtained from any of the agencies involved in the program by either sending in an information request form or by calling the numbers listed in this section. Alternatively, eligibility information can be obtained from a participating local lending institution or your local SEO.
- Family income must not exceed 150% of the statewide median household income, adjusted annually for inflation. The applicable maximum through December 31, 2001 is $57,993.
- All areas are eligible for project location unless a community wastewater collection and treatment system is either in place or will be constructed in the next five years.

Eligible Uses

- Rehabilitation, improvement, repair, or replacement of an existing system located on a single-family, owner-occupied property which is the primary residence of the owner.
- Project costs may include construction fees and expenses, permit fees, loan origination fees, and legal fees.

Ineligible Uses

- Construction may **NOT** begin on a repair or replacement project before receiving approval of the loan. Projects will be ineligible for funding from this program if construction starts prior to approval.

Amounts

- Loans up to a maximum of $25,000.
- Loans at an interest rate of 1% annum.
- Loans must be secured through financial ability to repay the loan, as demonstrated by credit worthiness.

Terms and Conditions

- Loans must be secured by a mortgage on the borrower's home.
- The maximum term of a loan is twenty years, and loan repayment commences within sixty days after the date of loan closing.
- A loan must be immediately repaid in full if the property on which the project is located is either sold or transferred.
- Loan origination and servicing fees will also be charged in connection with a loan.
- A basic requirement of the program is that you keep your upgraded or new OLDS in good repair, have it pumped out regularly, and ensure that it does not malfunction and fail to adequately treat wastewater or cause a public health hazard. A pumping frequency schedule and reporting requirements will be included in your loan agreement.

APPENDIX C

EXAMPLES OF PUBLIC INFORMATION/EDUCATIONAL DOCUMENTS

Fact Sheet
Commonwealth of Pennsylvania • Department of Environmental Protection Act 537 #1

UNDERSTANDING SEPTIC SYSTEMS

What is a septic system?

Septic systems (also called "onlot" disposal systems or OLDS) are sewage systems located on the property of the homeowner. They treat and dispose of domestic sewage through natural processes. Liquid waste from a treatment tank percolates through the soil, where it is neutralized and broken down further. Septic system operation and maintenance is the responsibility of the homeowner. In contrast, a centralized sewage system collects and treats sewage from many homes and/or businesses and disposes it off site. Centralized systems often use complex mechanical and chemical treatment methods.

Who uses septic systems?

For many Pennsylvanians, centralized sewage disposal is not an option. In fact, one-third of Pennsylvania residents currently depend on septic systems to treat their sewage. In some cases, this is because many rural areas have no central sewage facility. In other cases, a central facility may have reached capacity due to development, requiring new homes to use septic systems on an interim basis.

How do I obtain a septic system permit?

Anyone who intends to install a septic system with a flow of less than 10,000 gallons per day must use the following generalized process:

1. The lot owner or an agent for the owner applies for a permit through the local agency* Sewage Enforcement Officer (SEO);
2. The SEO for the local agency conducts soil profile examination and percolation tests to determine site suitability;
3. The lot owner or agent completes the permit application by including a septic system design based upon the results of the site suitability testing;
4. The SEO approves or denies the permit within seven days of receipt of a completed application; and
5. If approved, the SEO issues a permit. Installation of a system may begin. If denied, the SEO notifies the applicant and provides opportunity for an appeal hearing.
6. The SEO may oversee any step of installation and must inspect the completed system before coverage and use.

What is an SEO and what are his/her duties?

Certified Sewage Enforcement Officers working for local governing bodies handle the septic system permitting process. This includes the review of soil profiles (deep probes) and percolation tests and the issuance of permits.

What is DEP's role in the permitting process?

DEP can review, monitor and assist local agencies' administration of the permitting process.

What is a deep probe test?

The first test on the site is a deep probe test. In this test, a backhoe pit is dug as deep as eight feet. The SEO enters this pit to examine the make up of the soil (soil profile). From this, the SEO will determine the suitability of the soil for a septic system. If the soil is determined suitable for a type of system (standard or alternate), then a percolation test will be performed. If the soil is determined unsuitable, no permit will be issued.

What is a percolation test?

A percolation ("perc") test measures the rate at which water moves through soil. The test is to determine if the soil will allow water to drain quickly enough to support a properly working septic system. The following process is used to perform a percolation test:

1. A minimum of six holes are dug in the area of the proposed absorption field;
2. The soil is soaked before the actual test to reproduce wet season operation;
3. The day of the test, a final soaking is completed for one hour; and
4. The actual test then begins with a series of measurements of water level drop done at 10 or 30 minute intervals. This test may take as long as four hours or as little as 40 minutes, depending upon the type of soil. (Very sandy soils usually take less time to test than soils with a lot of clay.)

It is very important to realize that although the effluent from a septic or aerobic tank is partially treated, it still contains substances that can affect the groundwater, such as viruses, pathogens and nitrates. The soil is a critical component of an efficiently running system. Regular maintenance of the system also is necessary to ensure long-term operation.

* The local agency may be the municipality, a multi-municipal organization, county or joint county Department of Health.

There are several variations to the standard septic system depending on soil, site and operational conditions. They are:

1. Standard trench
2. Seepage bed system
3. Subsurface sand filter
4. Elevated sand mound
5. Individual residential spray irrigation system (IRSIS)

For more information on these variations, please contact your local SEO (obtain address/phone number from your municipality's government office).

How does a septic system function?

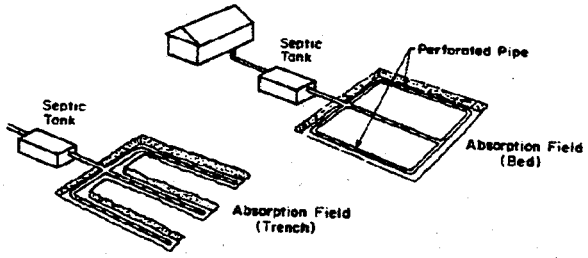


Figure A: Gravity Distribution Systems

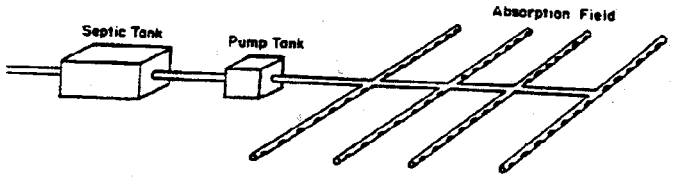


Figure B: Pressure Distribution Systems

1. Sewage, both human waste and water used for bathing and washing, flows to the **septic tank**. Here, primary treatment of the sewage takes place. The heaviest matter falls to the bottom of the tank forming **sludge**. Lighter matter (**scum**) floats on top of the liquid (**effluent**). Sludge and scum must be pumped out regularly.
2. Septic tank effluent then flows to a **distribution box** or a **solid header** in gravity flow systems (see Figure A) or to a **pump tank** in pressurized systems (see Figure B).
3. In both types of systems, the septic tank effluent is then directed to an **absorption area** constructed of pipe placed within a layer of gravel, and percolates through the soil for additional treatment. The soil neutralizes many of the contents of the wastewater and converts the others to different forms.

How often must my septic tank be pumped?

Up to 50 percent of the solids retained in the tank decompose; the remainder accumulate in the tank. A septic tank should be pumped out at least every three to five years, or according to your local sewage management program which may require more frequent pumping.

Under current Pennsylvania law, a 900-gallon septic tank must be used for a home with three bedrooms or fewer. If six people reside in a three-bedroom house, the tank should be pumped every 1.3 years. If the same system serves a family of two, the tank would be pumped every 5.2 years. Systems installed before 1971 may have septic tanks smaller than 900 gallons. These tanks may need to be pumped more than once a year.

What if my lot conditions do not meet the requirements for a standard septic system?

If your particular lot conditions do not allow the installation of a standard septic system, some alternates may be available. Your local SEO can help find the best system for you depending on your specific site, soil and operational conditions.

How do state and local actions protect Pennsylvania's public health and water quality?

The Pennsylvania Sewage Facilities Act (Act 537) was enacted in 1966 to set uniform standards for the construction or repair of any sewage disposal facility. The two main goals of Act 537 are to correct existing disposal system problems and to prevent future problems. To reach this goal, Act 537 requires the planning of all sewage facilities and the permitting of on-lot sewage disposal systems.

Provisions of Act 537 administered by DEP include:

1. Training and certifying SEOs;
2. Providing technical assistance;
3. Reviewing official sewage plans and revisions;
4. Awarding planning grants to local agencies; and
5. Reimbursing local agencies for permitting expenses.

Where can I obtain more information on septic-related questions?

For more information on onlot sewage disposal systems, contact your local SEO or the DEP regional office serving your county.

Fact Sheet

Commonwealth of Pennsylvania • Department of Environmental Protection **ACT 537 #4**

PROCESS FOR RESOLVING COMPLAINTS ABOUT MALFUNCTIONING ONLOT SEWAGE DISPOSAL SYSTEMS

Under the Pennsylvania Sewage Facilities Act (Act 537 of 1966, as amended), local governments have substantial powers and primary responsibilities for administering and enforcing major portions of the Act 537 sewage facilities program. Among the many responsibilities:

- A municipal government (such as township board of supervisors, borough council or city council) must develop and implement an approved official sewage facilities plan that addresses existing sewage disposal needs or problems, accounts for future land development and provides for future sewage disposal needs of the entire municipality. The official plan must be revised when new subdivisions are proposed or when the plan becomes outdated for various reasons.
- A local agency must handle the permitting program for the installation or repair of individual and community onlot sewage disposal systems with a flow of 10,000 gallons or less each day. ***The local agency, through its Sewage Enforcement Officer (SEO), must investigate complaints about malfunctioning onlot systems and, if necessary, take enforcement actions to ensure proper repairs.***

This fact sheet provides information on the roles and responsibilities of local agencies and their SEOs in handling and resolving complaints about malfunctioning onlot sewage disposal systems. (Onlot systems are more commonly referred to as septic systems.)

What is a Local Agency?

A local government that is able to administer its onlot sewage disposal permit program is called a local agency. To qualify as a local agency, the local government must employ a certified Sewage Enforcement Officer (SEO) to perform activities including: 1) issue, deny or revoke septic system permits in accordance with state regulations and standards; 2) inspect newly-installed systems to ensure proper installation; and 3) investigate and resolve septic system malfunction problems. The certified SEO is employed by and works for the local agency, not the PA Department of Environmental Protection (DEP).

Qualifying local agencies can be one of the following:

- A single municipality;
- A combination of municipalities acting jointly; or
- A county or joint-county Department of Health.

Local agencies, usually through their SEOs, are by law responsible for investigating complaints of malfunctioning septic systems and ensuring that the malfunctions are properly repaired. Where system repairs are not made voluntarily, local agencies must take enforcement actions against responsible property owners. (The local agency also is responsible for taking action against property owners with illegal septic systems that were installed without prior permit approval.)

Where and how should septic system malfunctions be reported?

Complaints about malfunctioning septic systems should be reported directly to the local agency, SEO or the local government officials (township, borough or city officials) with jurisdiction in the municipality where the malfunction exists. Depending on each municipality's rules and procedures, complaints may have to be made in writing. Complaints received by DEP's service representatives will be directed to the appropriate local agency and/or SEO.

What should happen once a complaint is received?

When a certified SEO or local official receives a complaint, the local government should take certain steps, including:

- Local official may issue a letter notifying the property owner of the alleged malfunction and allowing for voluntary compliance if a malfunction exists. Some local agencies bypass this step and first require the certified SEO to conduct an initial site investigation to document the conditions. If there is a malfunction, the SEO will try to determine the causes of the malfunction and to decide the extent of the repair needed to correct the problem. Corrective action may be as simple as requiring a septic tank to be cleaned or as complex as installing a new system at a new location.

- Local agency issues a Notice of Violation to the responsible property owner requiring the submission of a sewage permit application for the proper system repair. The local agency can often persuade the responsible property owner to take appropriate corrective action. If the responsible property owner fails to voluntarily take proper corrective action, the local agency and SEO should take appropriate legal actions, generally with the assistance of the municipal solicitor.
- SEO issues the responsible property owner a permit to repair or replace the malfunctioning system after any necessary site testing has been done and an acceptable system design has been submitted.
- Responsible property owner begins the repair/replacement activities as approved by the permit. Heavy rains or frozen soils could delay the repair/replacement activities until conditions improve.

What should the person making a complaint expect from the local agency and SEO?

The local agency or SEO should acknowledge a complaint and investigate serious complaints in a timely fashion. Normally, the SEO should contact the owner of the alleged malfunction within one week of receiving the complaint. An actual site visit, if necessary, should be scheduled promptly.

The person making the complaint should not expect a final resolution of a serious malfunction to occur "overnight." The various steps to resolving a serious malfunction take time; investigating the site, testing soils, processing the sewage permit application, designing the repair system and conducting the repair. Also, the timing of the field activities are dependent on the weather.

If legal action is required by the local agency to get the responsible property owner to resolve the serious malfunction, additional delays can be expected. Complainants need to give their local officials time to do the job.

What happens if the malfunction problem is not resolved?

If the responsible property owner fails to repair the malfunction, the person making the complaint should go back to the local agency and renew the complaint. That person also may wish to seek private legal assistance to help resolve the matter.

What are DEP's roles and responsibilities for resolving malfunction problems?

DEP's role in the onlot sewage disposal program is one of oversight. Under Act 537 and its regulations, the responsibility for investigating and resolving malfunction problems was explicitly given to local agencies, not to DEP. For that reason, DEP does not ordinarily get directly involved in matters that are strictly the responsibility of local agencies. DEP's responsibilities under the onlot sewage program include:

- Training and providing technical assistance to SEOs and local agencies to ensure that they can effectively perform their activities;
- Routinely evaluating the performance of each certified SEO and each local agency. Appropriate action is taken where an evaluation reveals inadequate or inappropriate municipal or SEO response to complaints about system malfunctions or other violations of Act 537 or the rules and regulations; and
- Providing grants and reimbursements to local agencies and SEOs for permitting and enforcement activities which are consistent with Act 537 and DEP's rules and regulations.

While DEP will not ordinarily intervene in individual complaints, it is DEP's responsibility to take action where a pattern of unresponsiveness on the part of an SEO or municipality is observed. DEP action could include:

- The suspension or revocation of an SEO's certification;
- The withholding or reduction of a local agency's reimbursement for the administration of the program; and/or
- The issuance of a formal order to compel a local agency to adequately administer the program.

In addition to providing training and technical guidance to handle individual septic system problems, DEP works cooperatively with municipal governments to correct areas with multiple malfunctions. During the process of updating an official municipal plan, a schedule is developed either to provide comprehensive municipal repair and management of area-wide problems, or to construct community sewage collection and treatment systems to replace the failed septic systems.

Are there indications of a septic system in trouble?

Yes. There are many indicators of a malfunctioning septic system. Some indicators can be very obvious to the property owner while others may require more careful observation. The indicators may include:

- Toilet runs sluggishly;
- Sewer odors in the house and/or drinking water;
- Sponginess around septic tank, distribution box, dosing tank or absorption area;
- Surfacing raw sewage;

- Dosing pump runs constantly or not at all;
- Dosing tank alarm light is on; and/or
- Backup of sewage into laundry tubs or other fixtures.

What can property owners do to prevent septic system malfunctions?

Properly designed and installed sewage disposal systems function better and longer with proper maintenance. Most of the following recommended maintenance activities are simple and inexpensive for the property owner to implement:

- Conserve water and reduce wastewater flow into the septic tank;
- Have the septic tank pumped at least every three-five years, depending on tank size and household size;
- Avoid putting harsh chemicals in the septic system;
- Do not use the toilet to dispose of bulky, slowly decomposing wastes'
- Divert run-off from downspouts, sump pumps, and paved surfaces away from septic tank and sewage disposal area;
- Keep heavy vehicles, equipment and livestock away from the septic system; and
- Do not plant trees and shrubs over or close to the septic system.

Fact Sheet

Commonwealth of Pennsylvania • Department of Environmental Protection ACT 537 #7

APPEALING A LOCAL AGENCY DECISION UNDER ACT 537

What is a local agency?

A **local agency** may be a municipality, a combination of municipalities acting cooperatively or jointly, a county, a county department of health or a joint county department of health that administers the provisions of the Pennsylvania Sewage Facilities Act (Act 537) on the local level. One of the administrative functions of the local agency is to review applications and issue permits for the installation of onlot sewage disposal systems. The local agency official who reviews applications for onlot sewage disposal system permits and issues the permits on behalf of the local agency is known as the **Sewage Enforcement Officer**, or SEO.

What permitting actions of the local agency are appealable?

If the local agency either issues or denies a permit for an onlot sewage disposal system after review of a permit application, either of these actions would be appealable. The revocation of a previously issued permit also is an appealable action. However, a local agency finding that the application for an onlot sewage disposal system permit is incomplete is not an appealable action.

Who may appeal a local agency permitting decision?

Anyone who disagrees with a local agency permitting decision may appeal that action. For example, neighboring property owners may appeal the issuance of a permit on an adjoining lot. If an application for a permit has been denied, the affected property owner may appeal the denial. If the local agency revokes a permit that it has previously issued, the affected property owner may appeal the revocation action.

How much time do I have to appeal a local agency permitting action?

The filing deadlines vary depending upon the action being appealed. A written appeal of the issuance or denial of a permit must be filed within 30 days of the action (issuance of the permit or receipt of the written notice of permit denial) or the right to a local agency hearing expires. In the case of a permit revocation, the appeal must be filed within 10 days of receipt of the written notice of revocation or the revocation action becomes final.

Where do I file an appeal of local agency permitting action?

The appeal must be filed with the local agency serving the area in which the permit was issued.

If I am opposed to the issuance of a permit, how will I know when the permit has been issued?

In order to know when a permit has been issued, you may request to be notified by the local agency. Alternatively, you may check for the posting of the permit on the lot. This is required prior to the start of construction of the onlot sewage disposal system.

If I file an appeal of a permit issuance, must construction on the lot stop?

Appeal of an issued permit does not stop construction on the lot; therefore, the appeal should be filed as soon as possible following permit issuance.

If my permit is revoked and I file an appeal of the revocation, may I continue to construct my home or sewage system?

Appeal of a revocation does NOT allow construction on the lot to continue. No further construction or use of the sewage system or the structure it is to serve may occur until a new permit is issued.

How soon can I expect a hearing of my appeal to be held?

The local agency must hold a hearing within 30 days of receipt of an appeal. The local agency must inform both the appellant and DEP of the date, time and location of the hearing, and must be prepared to defend its actions during the course of this and any subsequent appeal.

How should I prepare for the hearing?

You should gather any evidence that is available to support your contention that the local agency action was unjustified. You should also make arrangements with any experts or witnesses that you may want to have testify at the hearing in support of your position.

What will happen at the hearing?

At the hearing, you will be given the opportunity to formally present the reasons that you think the local agency decision was unjustified. You may have experts

or witnesses testify in support of your position, and submit evidence gathered by you or your expert(s). You also may question the SEO or any experts providing testimony or evidence for the local agency. The local agency, its SEO and experts, if any, also will be given the opportunity to present evidence and testimony in support of the local agency's position. After all evidence and testimony has been presented, the local agency will render its decision on the appeal.

How will I know what the local agency has decided?

The local agency will inform you of its decision in writing within a reasonable time, usually two to four weeks.

What are my options if the local agency does not find in my favor?

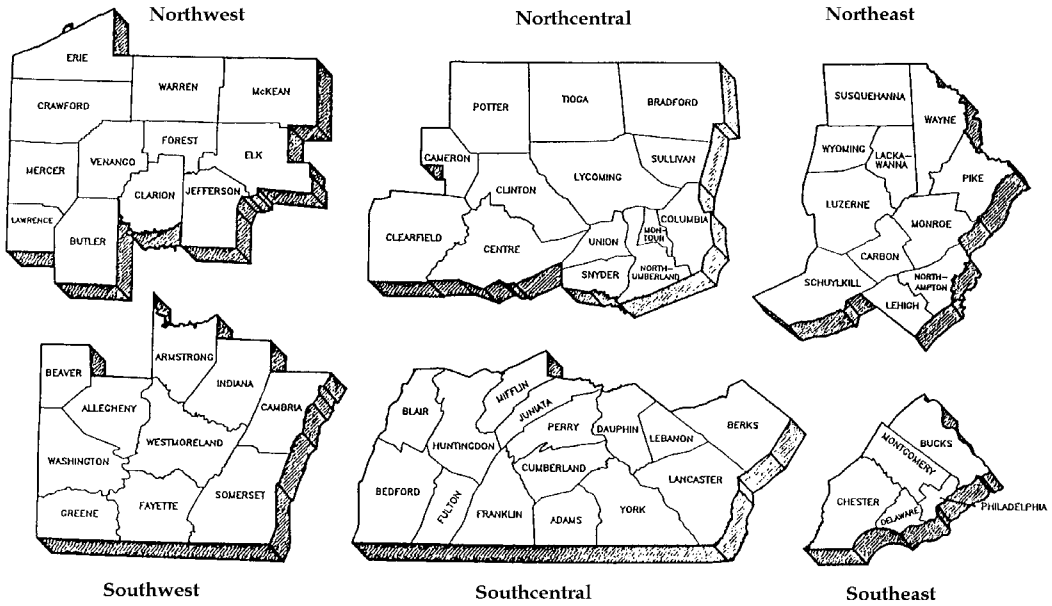
In the event of an unfavorable decision, you may choose to appeal the local agency's decision to the county Court of Common Pleas.

Whom should I contact if I want additional information regarding filing an appeal of a permitting action?

The local agency is solely responsible for appeals of permitting actions. You or your representative should contact the local agency for more information.

For more information,
call the DEP regional office in your area or contact:

Department of Environmental Protection
Bureau of Water Supply and Wastewater Management
P.O. Box 8467
Harrisburg, PA 17105-8467
(717) 783-3795



This fact sheet and related environmental information are available electronically via Internet. For more information, visit us through the PA PowerPort at http://www.state.pa.us or visit DEP directly at http://www.dep.state.pa.us (directLINK "Wastewater").

www.GreenWorks.tv - A web space dedicated to helping you learn how to protect and improve the environment. The site features the largest collection of environmental videos available on the Internet and is produced by the nonprofit Environmental Fund for Pennsylvania, with financial support from the Pennsylvania Department of Environmental Protection, 877-PA-GREEN.

Commonwealth of Pennsylvania
Mark Schweiker, Governor

Department of Environmental Protection
David E. Hess, Secretary
3800-FS-DEP1860 Rev. 11/2001

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Fact Sheet

Commonwealth of Pennsylvania • Department of Environmental Protection **ACT 537 #8**

BONDED DISPOSAL SYSTEMS AND SOIL MOTTLING

This fact sheet addresses some commonly asked questions regarding the bonded sewage disposal system process described in Act 537, and in Title 25, Pennsylvania Code, Chapter 73 §73.77. This regulation, as well as others, may be found at www.pacode.com. If you choose the "bonded disposal system" process, the "Bonded Disposal System Confirmation" form (3800-FM-WSWM0148), while not required to be used, may be helpful. This form is available electronically on DEP's website at www.dep.pa.state.us (directLINK "Wastewater").

Note: For more information on soils, soil mottling and onlot sewage disposal, please see the DEP Fact Sheet - "Understanding the Importance of Soils in Siting an Onlot System" on the DEP website at www.dep.state.pa.us (directLINK "Wastewater").

What is soil mottling and why is it important?

The Pennsylvania Sewage Facilities Act (Act 537) defines soil mottling as "a soil color pattern consisting of patches of different color or shades of color interspersed with the dominant soil color which results from prolonged saturation of the soil." The presence of soil mottling is a strong indicator of a "seasonal" or "perched" water table (the water table's highest level reached during wet periods of the year). The water table may rise to within 20 inches of the soil's surface inside the absorption area of a septic system. If this occurs, then the soil depth necessary for proper sewage treatment will not be available because the soil will become saturated. In saturated soils, the oxygen needed for sewage treatment has been replaced by water. The bacteria necessary to treat the sewage need oxygen to survive. This condition can result in untreated or insufficiently treated sewage polluting the groundwater (often the only source of potable water), pooling on the surface of the ground and/or backing up into the house. Such conditions can pose a serious health hazard.

If I have soil mottling on my lot, is there anything I can do?

There are rare instances when soil mottling is **NOT** the result of a seasonal or perched high water table. To determine if this is the case on an individual lot, Act 537 provides a procedure by which a property owner can have his lot tested when they detect soil mottling. If the testing procedure is used and demonstrates that the soil mottling is not the result of a seasonal or perched high water table, the property owner may be able to obtain a permit from the municipality or local agency to install a type of onlot system called a **bonded disposal system**. The remainder of this fact sheet discusses the bonded disposal system application process.

Under what conditions may the bonded disposal system process be used?

The bonded disposal system process can be used if the **ONLY** reason a lot does not meet the requirements for the installation of an individual onlot system is evidence of soil mottling that is **NOT** the result of a seasonal or perched high water table.

What is a bonded disposal system?

A bonded disposal system is an individual sewage disposal system serving a single family residence located on an individual lot where soil mottling exists within 20 inches of the mineral soil surface. The installation, operation and replacement of this type of system is guaranteed by the property owner through the posting of a bond. Please note that the individual residential spray irrigation system (IRSIS), a different type of system that can also be installed on soils having soil mottling within 20 inches of the mineral soil surface, is **NOT** included in this definition. A property owner whose lot has soil mottling within 20 inches of the surface may want to investigate the possibility of installing an IRSIS before proceeding with the bonded disposal system process.

How can I find out if the only reason my lot failed was the presence of soil mottling?

While the Sewage Enforcement Officer (SEO) must make several determinations on a given lot to evaluate its suitability for onlot sewage disposal, most of these measurements should have been completed and found acceptable before conducting the soil profile evaluation that revealed the soil mottling.

The remaining test is called a **percolation**, or "perc," test. This test is completed last because the depth of the holes used in the percolation test will depend upon the results of the soil profile evaluation.

The SEO uses the soil profile evaluation to determine the soil's depth to **limiting zone**. DEP regulations define a limiting zone as a soil horizon or condition in the soil profile or underlying strata which includes one of the following:

1. A seasonal high water table, whether perched or regional, determined by direct observation of the water table or indicated by soil mottling;
2. A rock with open joints, fracture or solution channels, or masses of loose rock fragments, including gravel, with insufficient fine soil to fill the voids between the fragments; and
3. A rock formation, other stratum or soil condition that is so slowly permeable that it effectively limits downward passage of effluent.

If the SEO examines the soil profile and finds any of the above three conditions within 20 inches of the mineral soil surface, the lot is deemed unsuitable for installation of an onlot sewage disposal system. Normally, the percolation test is not scheduled and a permit for an onlot sewage disposal system is denied. However, under the bonded disposal system process, if the lot failed due to the presence of soil mottling (case #1), the permit applicant can request that the percolation test be completed despite the results of the soil profile examination. The percolation test is required before a permit can be issued because the results of the test help determine the proper size and design of the onlot system.

How do I go about requesting a percolation test?

A written request must be submitted to the local agency. If this procedure is followed, the local agency is required by law to conduct the percolation test, at the expense of the applicant.

A note of caution: Although the law says that the applicant's first step is to request a percolation test, it is advisable for the applicant to hire a soil consultant to re-evaluate the soil profile first for several reasons. First, it is almost impossible to know the depth at which to run the percolation test without knowing the correct depth to limiting zone. If the percolation test is completed at the wrong depth, it cannot be used in sizing the onlot system and must be reconducted at the correct depth. Since the percolation test is generally the more expensive of the two tests, it is best to run it only once. Second, if the soils expert you hire agrees with the SEO's determination that the mottling is due to a perched or seasonal high water table, the onlot disposal system will not work properly and there is no reason to run the percolation test. For these reasons, DEP suggests that the applicant have his/her soils expert examine the soil profile first.

You must notify the local agency in writing at least seven days before any testing is conducted at your site, so that the local agency representative may observe the evaluations and/or review the results.

Who would be considered a qualified soils expert?

You can hire any qualified soil scientist, qualified registered professional geologist, certified sewage enforcement officer or qualified registered professional engineer to evaluate your soils, provided the person is not employed by the local agency with control over your property.

What do I do after my site has been evaluated by the soils expert?

If your expert determines that the original soil profile evaluation was accurate and that the soil mottling on your site displays evidence of a perched or seasonal high water table, you have the option of appealing the original permit denial to the local agency. You must file for this appeal within 30 days of the date of the permit denial. The DEP Fact Sheet, "Appealing a Local Agency Decision Under Act 537" on the DEP website www.dep.state.pa.us (directLINK "Wastewater") describes the appeal process in detail.

While it is unlikely in this case that the local agency's decision will be overturned, you can also work with your local agency SEO to investigate other possible sewage disposal options.

If, however, your expert finds that the mottling on your site is not an indication of a seasonal or perched high water table, and the expert is willing to put his or her findings in writing, you have two options:

1. You may choose to appeal the original permit denial, as described above. You may use your expert's soil profile appraisal, as well as any other available evidence, to argue for a reversal of the local agency's decision; or
2. You may request a permit to be issued by the local agency under the bonded disposal system procedure. In this option, you would pose a written request for the local agency to perform a percolation test based on the written findings of your soils expert. Your expert may actually conduct the percolation test as long as the local agency's SEO is present to observe the test. If the results of the test are unsuitable per DEP regulations, this demonstrates that the soil

mottling present on the lot is not the only reason for the lot's unsuitability for onlot sewage disposal. The process stops at this point if the local agency cannot issue a permit for an individual residential onlot disposal system that meets DEP regulatory standards (as required by law). If, however, the percolation test results fall within acceptable standards as defined in DEP regulations, Act 537 requires the local agency to issue a permit if all of the following requirements are met:

- The individual residential onlot sewage system must be designed in accordance with DEP regulations. The property owner is required to obtain the design, which the local agency SEO will review to determine if it is in compliance with the Act and regulations.
- The property owner must provide, and the local agency must accept, evidence of financial assurance (bond) in an amount sufficient to cover the reasonably anticipated cost to repair or replace the onlot system, clean up contaminated groundwater and replace any contaminated water supplies in the event of a system malfunction. The minimum amount the local agency may accept under the law is $20,000 or 15 percent of the appraised value of the lot and proposed house, annually, up to three years. At its discretion, the local agency may require an additional two years of financial assurance. The local agency must also establish the procedures to be followed if the financial assurances must be forfeited due to a system malfunction and/or the type of additional financial assurance required if the original system is replaced. By law, the local agency may offer, for a fee, financial assurance for bonded disposal systems. This is a choice of the individual agency; you should check with your local agency to see if they offer this option; and
- The property owner must document that the property deed contains a clause clearly stating the presence of soil mottling on the property and that an individual onlot sewage system meeting the requirements of Section 7.2 of Act 537 was installed on the property.

Who is responsible for the local agency's costs incurred in review of my application?

The permit applicant must pay for any costs incurred by the local agency for review of the application. These costs can include those incurred for technical and legal review of the application, as well as consultant or legal fees for establishing the term or amount of the financial assurances and forfeiture procedures.

How long must I maintain the financial assurances?

The law requires the local agency to waive the financial assurance requirements five years after the date they were established.

Who is liable for the bonded disposal system in the event of a malfunction?

The law excuses the municipality, local agency SEO and DEP from liability for the performance of bonded disposal systems. The local agency that issued the permit for the system could be liable if it chose to offer the financial assurance itself. In this case, the local agency would only be liable for the amount established in the financial assurance agreement.

If the bonded disposal system malfunctions to the ground surface or pollutes the groundwater while the financial assurances are in effect, the financial assurances must be forfeited to the local agency. The funds must be used to correct the malfunction, clean up any contaminated groundwater and replace any contaminated water supplies. If the amount of the financial assurance is insufficient to cover these costs, the property owner is liable for any additional costs. If the system malfunctions after the financial assurances are waived by the local agency (three to five years following permitting of the system), the property owner is liable for the costs.

If I need additional information on this process, whom can I contact?

The local agency is solely responsible for administering the Act 537 permitting program. DEP recommends that you direct any specific questions to your local agency and/or SEO.

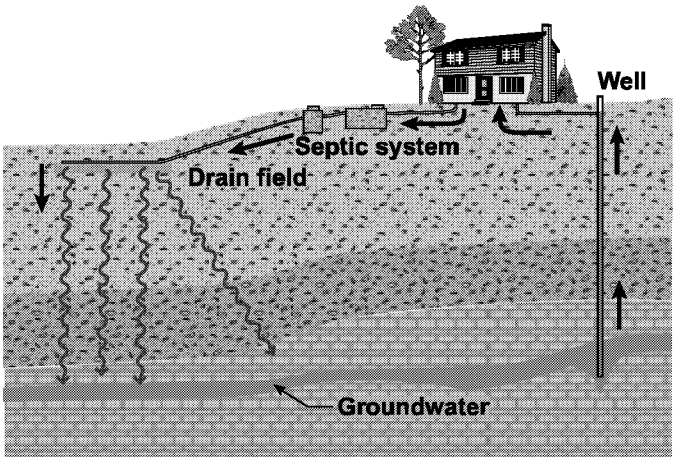
Fact Sheet

Commonwealth of Pennsylvania • Department of Environmental Protection **ACT 537 #9**

UNDERSTANDING THE IMPORTANCE OF SOILS IN SITING AN ONLOT SYSTEM

Why is having a properly functioning onlot system important?

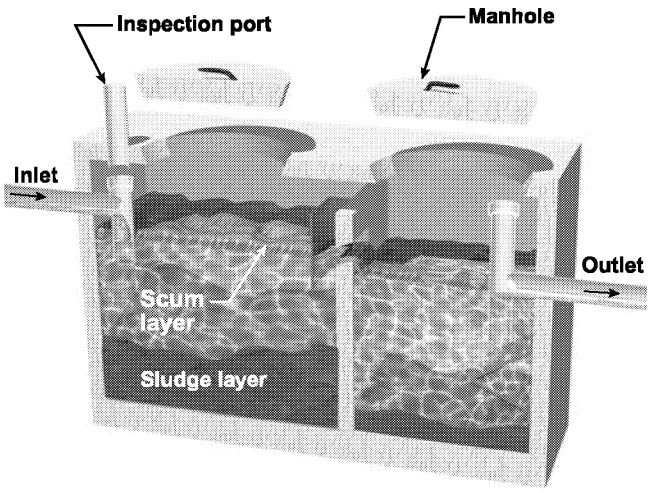
Groundwater is the primary source of drinking water in areas served by individual and community wells; therefore, keeping the groundwater free of contamination is very important. Water that carries sewage from a household or business to an onlot sewage disposal system (sometimes called a septic system) will eventually re-enter this same groundwater. Onlot systems, when properly designed, operated and maintained, will treat this wastewater so that it may safely be used again. Onlot systems that are not functioning properly do not treat sewage to a level that is safe and can discharge improperly treated sewage to the surface of the ground and/or to groundwater. Improperly treated sewage carries bacteria and viruses known to cause may human diseases, such as gastroenteritis, diarrhea and dysentery.



Groundwater Flow
Onlot Sewage Disposal System

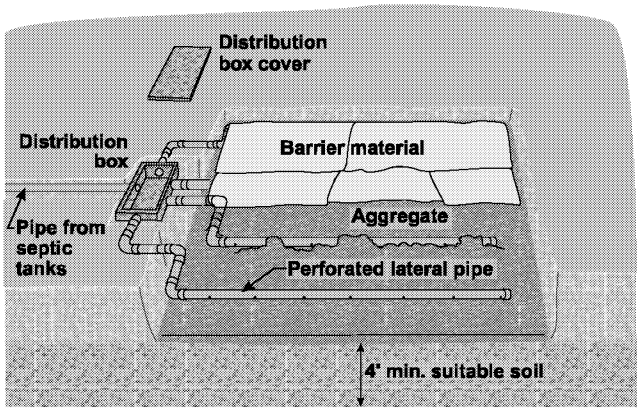
How does an onlot system treat sewage?

The sewage from household plumbing first enters a treatment tank, where primary treatment occurs. The heavier solid matter settles to the bottom of the tank, where microorganisms feed on and break down the waste. Lighter fats, oils and greases float to the top of the tank, forming a scum layer. Wastewater leaving the treatment tank is cleaner, but still contains disease-causing bacteria and viruses, as well as other contaminants, which must be further treated before reaching groundwater or other water supplies.



Treatment Tank

From the treatment tank, the partially-treated sewage passes through a distribution system of piping and into a bed of gravel (aggregate). The sewage flows over the gravel and then into the underlying soil. In a properly sited onlot system, further treatment is provided by this soil. The soils are the most important part of your onlot system because they provide a treatment "barrier" between untreated sewage and water supplies.



Soil Absorption Area

What soil conditions are needed to treat sewage?

About four feet of suitable soil is needed under the gravel layer to treat sewage. Good soil for sewage treatment is relatively free of rock and not saturated with water. The soil structure must allow the liquid waste to

pass through at a suitable rate. The waste must pass slowly enough to allow the microorganisms time to feed on the harmful material, yet fast enough to dispose of the amount of liquid waste entering the absorption area. While soils rich in clay treat sewage most effectively, the fine pores of many of these soils slow the downward movement or percolation of sewage, which may cause backups to the surface of the ground. Soils rich in sand allow rapid percolation to dispose of sewage but do not hold the sewage long enough to treat it adequately before it reaches groundwater. Treatment continues in the soil until rock or soil saturated with liquid is encountered. Rock allows sewage to move quickly into groundwater without proper treatment. Saturated soils do not provide the aerobic (oxygen rich) conditions needed by microorganisms to treat sewage.

Partially treated sewage reaching either rock or saturated soils will enter the water supply. Any contaminants or disease-producing organisms present in the sewage will be in the glass of water you drink from your polluted well. Viruses can survive in groundwater in excess of one year.

How do I know if my soils will properly treat sewage?

As part of the evaluation of a building lot to be served by a septic system, the sewage enforcement officer (SEO) employed by your local or county government evaluates soils by examining a soil profile. This is an excavation (commonly called a soil profile or deep probe) of the soil near the proposed location of the absorption area. The SEO enters the excavation to evaluate the soil's texture, structure and color. The SEO also looks for signs of rock and saturated soils. A percolation test is performed to determine soil permeability (the rate of water movement through the soil). If the results of these soil tests show that the soils can properly treat sewage, a system may be installed. If there are problems with the soils, systems designed to overcome these soils limitations, such as an elevated sand mound, may have to be used. If the soils are unsuitable, no septic system may be installed. This is why it is important to have soils testing done before committing to the purchase of a building lot.

How does water move through the soil?

Rain and other sources of water move through the soil until the water reaches a barrier (called a limiting zone). In some cases, rock or tight layers of clay will slow down water movement and cause saturation of the soil above the barrier. During wet periods in the fall or spring, these water levels rise close to the surface of the soil. The closest the water table comes to the surface of the ground is called the seasonal high water table. In drier periods of the year, the water level drops. If the water table rises close to the surface within a septic system's absorption area, the soils will become saturated and cannot treat sewage. If the depth of this seasonal high water table is too close to the surface, the site may be unsuitable for any soil-dependent onlot system.

If an SEO evaluates a soil profile during the wettest part of the year, water will usually fill the hole to the level of the seasonal high water table. At other times of the year, this water table may be below its highest level, and the SEO must look for other evidence of the highest level the water will reach. The SEO looks for soil structure, signs of restrictive layers of soil, depth of root penetration and soil mottling.

What is soil mottling and why is it important?

Soil mottling is a contrasting or "blotchy" color pattern within the dominant soil color. It is formed when the seasonal high water table rises into aerobic soils changing the conditions in the soils from aerobic (oxygen rich) to anoxic (without oxygen). The types of bacteria that can live under these two conditions are different. Bacteria living under aerobic conditions die when the water table rises because the oxygen in the soil is replaced by water. Anoxic bacteria begin to thrive because they can use certain oxides (oxygen bonded to iron and manganese) in the soil to survive. When the bacteria use the oxygen bonded to the iron and manganese, these minerals change color and dissolve into the water around them. When the water level begins to drop, these dissolved minerals stick to the surface of soil particles as yellow, red, orange, brown, blue or black coatings or a combination of these colors. Areas from which all of these minerals were removed because of long saturation periods become gray in color (called soil gleying).

The SEO can use soil mottling and soil gleying as indicators of a seasonal high water table regardless of what time of year the soils are evaluated. Any sewage reaching this water table, without first passing through a minimum of four feet of suitable soil, will enter the water table improperly treated. In saturated soils caused by seasonal high water table, sewage often backs up onto the surface of the ground because the soil already contains all of the liquid it can absorb. Soil clogging also occurs in the absorption area as slime produced by anoxic bacteria accumulating in the soil, gravel and piping.

Is mottling the reason a site is not suitable for use of a septic system?

No. The reason a site would be found to be unsuitable for an onlot system is that the mottling found at a specific depth documents that the seasonal high water table reaches that level. The seasonal high water table is the reason the site is unsuitable.

Are the colors of mottled soils and the amount of color the same in all soils?

No. Factors such as the length of time the soil is saturated each year, the original soil color, the amount of iron and manganese oxides in the soil, the amount of

oxygen trapped in the soil during saturation periods, the soil temperature, and the types of bacterial populations in the soil all can influence the color and intensity of mottling in the soil.

Does the amount of mottling or the intensity of the color influence the SEO's decision regarding suitability of the lot for septic system use?

No. The tests for other factors that influence mottling are unreliable and complex. The SEO must make a decision regarding seasonal high water table based primarily on the presence or absence of a uniform depth of soil mottling or direct observation of water in the soil profile. This determination may be supported in some cases by additional information, such as the presence of deeper restrictive layers of soil or rock which would cause the seasonal water table to rise in the soil.

Doesn't mottling only occur in clay soils in lowland areas or flat areas near streams where drainage is poor?

All soils containing manganese or iron oxides, even sandy soil or well drained soils, will produce mottling when saturated because of a seasonal high water table. While lowlands, flat areas and areas near streams commonly have mottled soils, many other areas, including uplands, hillsides, farmland and wooded land, may also have mottled soils. This is because the presence of restrictive layers in the soil is very common in this state. These restrictive layers, as discussed before, often cause seasonal high water tables and the accompanying mottled soils.

My property has a seasonal high water table, so I conducted a percolation test during dry weather. The percolation test passed. Does that mean that the system will work even though there is a seasonal high water table at a depth which makes the lot unsuitable for an onlot system?

No. A percolation test conducted during dry weather may result in an average rate that falls within the acceptable range. This may occur when the water table has dropped below the depth of the percolation test holes. However, when the water table is high, saturated soils will be found closer to the surface. Saturated soils cannot treat sewage effluent.

I don't have four feet of suitable soil on my property, but the SEO issued a permit for an elevated sand mound. How does this system work?

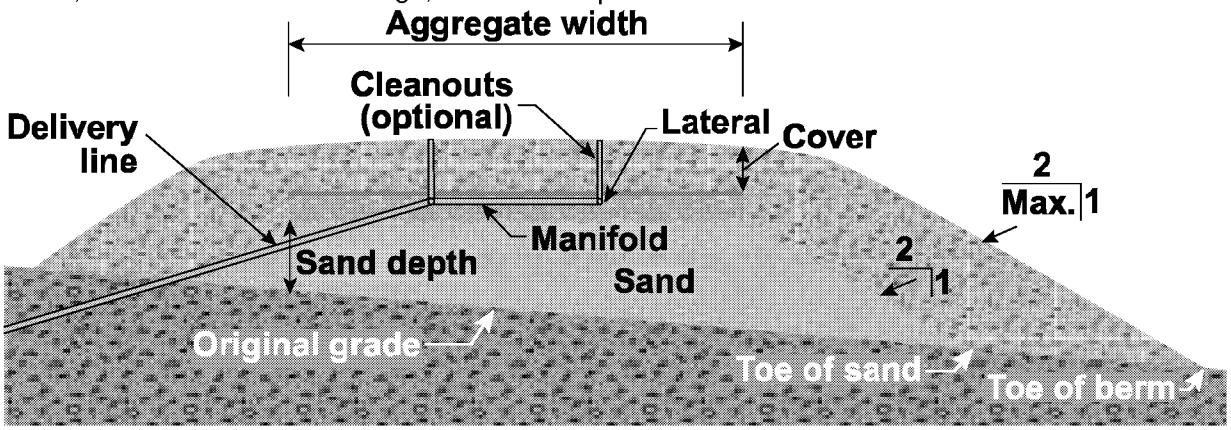
The elevated sand mound system (illustrated below) makes up for the lack of natural suitable soil by using a special blend of sandy fill material. The sandy fill material is placed on top of the natural soil. The piping and gravel are then placed on top of this fill material and a mound is formed above the original ground level. A property with as little as 20 inches of suitable natural soil may use an elevated sand mound, depending on slope. The required four feet of suitable soil in this case is made up of 20 inches of natural soil and 28 inches of sandy fill material.

I understand the need for an elevated sand mound for my lot but don't like the idea of a big mound in the middle of my yard. Can it be blended into the landscape?

Yes, if possible, the system should be located in a position that will make it easy to blend into the landscape. Fill soils may be used to blend the system into the landscape after installation, as long as care is taken not to damage the system or compact the soils around the system. Elevated sand mound systems, however, are never "cut" into a hillside.

What if I disagree with the SEO's evaluation of my soils?

A process has been established for the appeal of decisions made by an SEO and is discussed under DEP fact sheet, "Appealing a Local Agency Decision Under Act 537" at the DEP website www.dep.state.pa.us (directLINK "wastewater"). An additional process specifically for disagreements regarding mottling is discussed under DEP fact sheet, "Bonded Disposal Systems and Soil Mottling" at the DEP website www.dep.state.pa.us (directLINK "wastewater").



Typical Elevated Sand Mound System

Fact Sheet

Commonwealth of Pennsylvania • Department of Environmental Protection ACT 537 #10

SALES CONTRACT REQUIREMENTS UNDER ACT 537

Act 537 (the Pennsylvania Sewage Facilities Act) requires every contract for the sale of a lot where there is no currently existing community sewage system available, to contain language notifying the buyer of this fact. Other language indicating what actions are necessary to obtain a sewage disposal permit for the lot or notifying the buyer of unusual circumstances surrounding sewage disposal on the lot may also be required. This fact sheet answers frequently asked questions about required sales contract language.

When does Act 537 require sales contract language?

Act 537 (the Pennsylvania Sewage Facilities Act) requires the inclusion of advisory language in the sales contract for a building lot whenever certain specified situations occur. These include:

- the sale of a lot that does not have access to a community sewage system, and therefore must be served by an individual sewage system;
- the sale of a lot that is served by an individual sewage system installed under the 10-acre permit exemption provisions of Act 537;
- the sale of a lot served by a holding tank, whether permanent or temporary;
- the sale of a lot where the required horizontal isolation distance between the well and sewage system is not met;
- the sale of a lot located within an area where limitations on permit issuance are in effect; or
- the sale of a lot where a required revision for new land development, exception to the requirement to revise or supplement has not been approved by DEP or a delegated local agency.

Why does the act require sales contract language in these situations?

The intent of the sales contract language is to ensure that the buyer of the lot is aware of any unusual circumstances surrounding sewage disposal on the lot. However, it does not substitute for careful investigation on the buyer's part.

If a lot does not have access to a currently existing community sewage system, what language must appear in the sales contract?

Language similar to the following must be included in the sales contract:

"This lot does not have access to a currently existing community sewage system. A permit for an individual sewage system must be obtained from the local agency in accordance with Section 7 of the Pennsylvania Sewage Facilities Act. The buyer should contact the local agency charged with administering the act before signing this contract, to determine the procedure and requirements for obtaining a permit for an individual sewage system if one has not already been obtained."

What language is required if the lot in question was created under the 10-acre exemption provision of Act 537?

Language similar to the following is required:

"Soils and site testing relating to the suitability of this lot for the installation of a sewage disposal system have not been conducted. The owner of the property served by the sewage disposal system installed on this lot at the time of a malfunction may be liable for any contamination, pollution, public health hazard or nuisance which may occur as a result of the malfunction."

What language must be included in sales contracts for lots served by holding tanks?

The sales contract for a lot served by a holding tank must contain language similar to the following:

"With respect to sewage disposal, this property is served by a holding tank instead of a conventional sewage disposal system. The holding tank is designed and constructed for the temporary storage of sewage and to facilitate ultimate disposal of the sewage at another site approved by the Department of Environmental Protection. It has cost $_____ per year to maintain the holding tank since the date of its installation."

If a lot received a waiver of the isolation distance between the well and onlot sewage disposal system components, what advisory language must appear on the sales contract?

Sales contract language similar to the following is required:

"With respect to a well located on this property (or at a designated location on this property), the onlot sewage disposal system components were not installed in conformance with the minimum isolation distances between onlot sewage systems and wells specified in

regulations of the Department of Environmental Protection at Title 25 Pennsylvania Code Chapter 73."

If a lot was created in an area subject to the limitations on permit issuance contained in Act 537, what language must appear in the sales contract?

The contract of sale must include a statement similar to:

"Sewage facilities are not available for Lot #___ in the _____ Subdivision, and sewage facilities will not be available and construction of any structure requiring sewage facilities may not begin until _____ Township has completed and DEP has approved, a major planning requirement in accordance with the provisions of Section 7(b)(4.1)(ii) of the Pennsylvania Sewage Facilities Act (25 P.S. Sec. 750.7(b)(4.1)(ii))."

If sewage facilities planning (a revision, exception or supplement to the municipal Official Sewage Facilities Plan) has not been approved by DEP or a delegated local agency for a lot, what language must appear in the lot's sales contract?

"Sewage facilities are not available to serve this lot. Sewage facilities will not be available, nor may construction begin on this lot, until sewage facilities planning has been approved by DEP or a delegated local agency serving this area, as appropriate."

Must the sales contract language be included only in the sales contracts for new lots, or must it be included for every sale of a lot affected by one of the specified conditions?

The sales contract language must be included in the contract for each sale of the affected lot for as long as the condition remains. If the condition triggering the sales contract language requirement is removed, the language is no longer required.

What happens if the required language is not in the contract?

If the required sales contract language does not appear in the sales contract, the contract is not enforceable by the seller against the buyer. Further, should the contract contain language that attempts to waive the buyer's rights to any of the required disclosures, the contract is void.

For more information,
call the DEP regional office in your area or contact:

Department of Environmental Protection
Bureau of Water Supply and Wastewater Management
P.O. Box 8467
Harrisburg, PA 17105-8467
(717) 783-3795

DEP REGIONAL OFFICES

Southeast Region
Suite 6010, Lee Park
555 North Lane
Conshohocken, PA 19428
Water Supply: 610-832-6060
Wastewater: 610-832-6131

Counties: *Bucks, Chester, Delaware, Montgomery and Philadelphia*

Northwest Region
230 Chestnut St.
Meadville, PA 16335-3481
Water Supply: 814-332-6899
Wastewater: 814-332-6942

Counties: *Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango and Warren*

Southwest Region
400 Waterfront Drive
Pittsburgh, PA 15222-4745
Water Supply: 412-442-4217
Wastewater: 412-442-4035

Counties: *Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington and Westmoreland*

Northeast Region
2 Public Square
Wilkes-Barre, PA 18711-0790
Water Supply: 570-826-2511
Wastewater: 570-826-2553

Counties: *Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne and Wyoming*

Southcentral Region
909 Elmerton Ave.
Harrisburg, PA 17110
Water Supply: 717-705-4708
Wastewater: 717-705-4707

Counties: *Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry and York*

Northcentral Region
208 W. Third St., Suite 101
Williamsport, PA 17701
Water Supply: 570-327-3636
Wastewater: 570-327-3670

Counties: *Bradford, Cameron, Clearfield, Centre, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga and Union*

This fact sheet and related environmental information are available electronically via Internet. For more information, visit us through the PA PowerPort at http://www.state.pa.us or visit DEP directly at http://www.dep.state.pa.us (directLINK "Wastewater").

www.GreenWorks.tv - A web space dedicated to helping you learn how to protect and improve the environment. The site features the largest collection of environmental videos available on the Internet and is produced by the nonprofit Environmental Fund for Pennsylvania, with financial support from the Pennsylvania Department of Environmental Protection, 877-PA-GREEN.

Commonwealth of Pennsylvania
Mark Schweiker, Governor

Department of Environmental Protection
David E. Hess, Secretary
3800-FS-DEP2028 Rev. 11/2001

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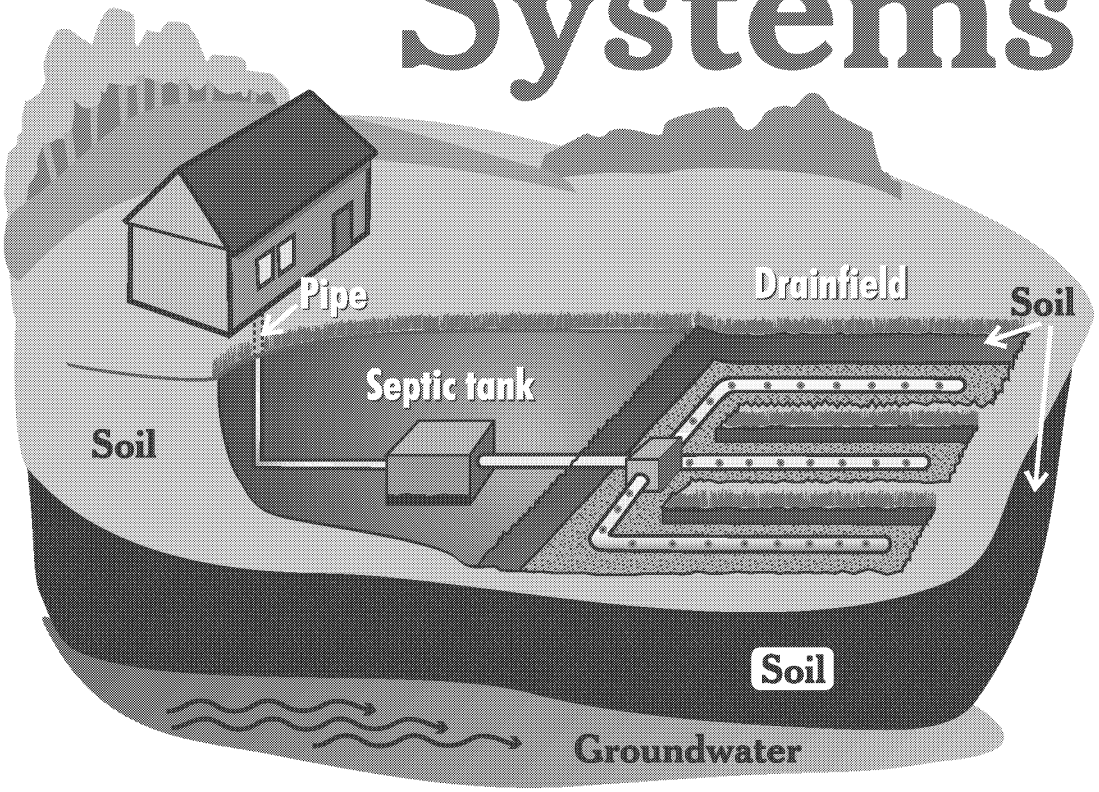
A Homeowner's Guide to Septic Systems



What's Inside

Your Septic System is your responsibility!

Did you know that as a homeowner you're responsible for maintaining your septic system? Did you know that maintaining your septic system protects your investment in your home? Did you know that you should periodically inspect your system and pump out your septic tank?

If properly designed, constructed and maintained, your septic system can provide long-term, effective treatment of household wastewater. If your septic system isn't maintained, you might need to replace it, costing you thousands of dollars. A malfunctioning system can contaminate groundwater that might be a source of drinking water. And if you sell your home, your septic system must be in good working order.

Top Four Things You Can Do to Protect Your Septic System

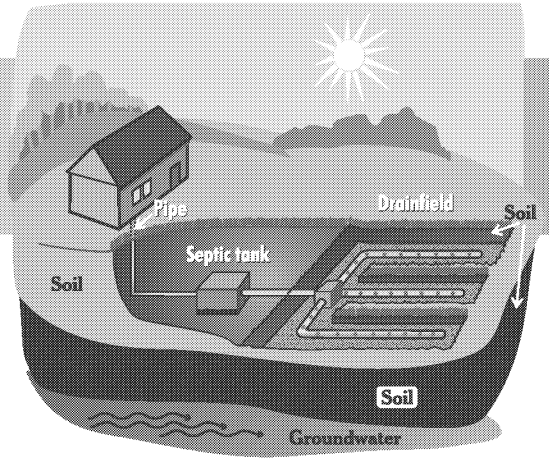
1. Inspect your system (every 3 years) and pump your tank as necessary (generally every 3 to 5 years).
2. Use water efficiently.
3. Don't dispose of household hazardous wastes in sinks or toilets.
4. Care for your drainfield.

This guide will help you care for your septic system. It will help you understand how your system works and what steps you can take as a homeowner to ensure your system will work properly. To help you learn more, consult the resources listed at the back of this booklet. A helpful checklist is also included at the end of the booklet to help you keep track of your septic system maintenance.

How does it work?

Components

A typical septic system has four main components: a pipe from the home, a septic tank, a drainfield, and the soil. Microbes in the soil digest or remove most contaminants from wastewater before it eventually reaches groundwater.



Typical onsite wastewater treatment system

Septic system aliases:

- On-lot system
- Onsite system
- Individual sewage disposal system
- Onsite sewage disposal system
- Onsite wastewater treatment system

Pipe from the home

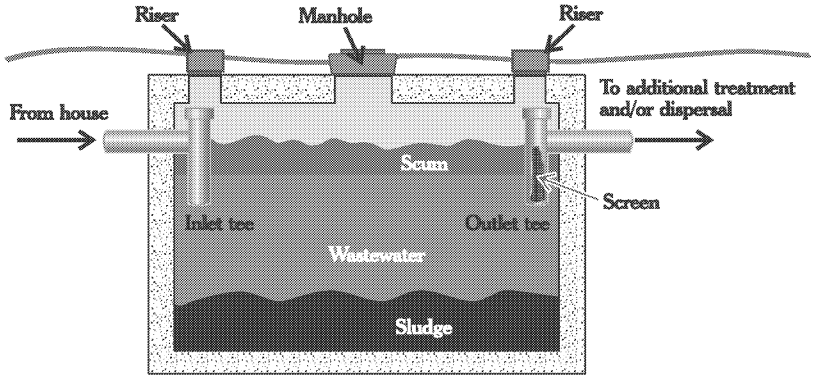
All of your household wastewater exits your home through a pipe to the septic tank.

Septic tank

The septic tank is a buried, watertight container typically made of concrete, fiberglass, or polyethylene. It holds the wastewater long enough to allow solids to settle out (forming sludge) and oil and grease to float to the surface (as scum). It also allows partial decomposition of the solid materials. Compartments and a T-shaped outlet in the septic tank prevent the sludge and scum from leaving the tank and traveling into the drainfield area. Screens are also recommended to keep solids from entering the drainfield.

Newer tanks generally have risers with lids at the ground surface to allow easy location, inspection, and pumping of the tank.

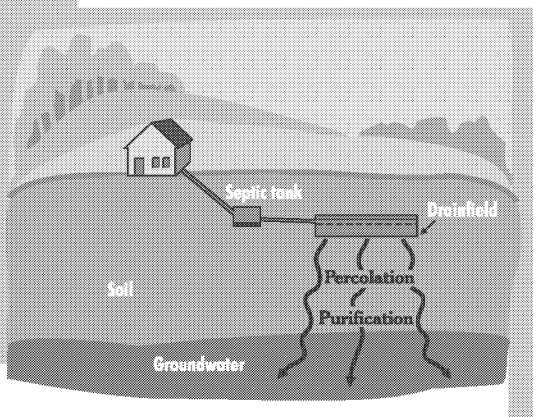
Typical single-compartment septic tank with ground-level inspection risers and screen



Tip To prevent buildup, sludge and floating scum need to be removed through periodic pumping of the septic tank. Regular inspections and pumping as necessary (generally every 3 to 5 years) are the best and cheapest way to keep your septic system in good working order.

Finding Your System

Your septic tank, drainfield, and reserve drainfield should be clearly designated on the "as-built" drawing for your home. (An "as-built" drawing is a line drawing that accurately portrays the buildings on your property and is usually filed in your local land records.) You might also see lids or manhole covers for your septic tank. Older tanks are often hard to find because there are no visible parts. An inspector/pumper can help you locate your septic system if your septic tank has no risers.



Drainfield

The wastewater exits the septic tank and is discharged into the drainfield for further treatment by the soil. The partially treated wastewater is pushed along into the drainfield for further treatment every time new wastewater enters the tank.

If the drainfield is overloaded with too much liquid, it will flood, causing sewage to flow to the ground surface or create backups in plumbing fixtures and prevent treatment of all wastewater.

A reserve drainfield, required by many states, is an area on your property suitable for a new drainfield system if your current drainfield fails. Treat this area with the same care as your septic system.

Soil

Septic tank wastewater flows to the drainfield, where it percolates into the soil, which provides final treatment by removing harmful bacteria, viruses, and nutrients. Suitable soil is necessary for successful wastewater treatment.

Alternative systems

Because many areas don't have soils suitable for typical septic systems, you might have or need an alternative system. You might also have or need an alternative system if there are too many typical septic systems in one area or the systems are too close to groundwater or surface waters. Alternative septic

systems use new technology to improve treatment processes and might need special care and maintenance. Some alternative systems use sand, peat, or plastic media instead of soil to promote wastewater treatment. Other systems might use wetlands, lagoons, aerators, or disinfection devices. Float switches, pumps, and other electrical or mechanical components are often used in alternative systems. Alternative systems should be inspected annually. Check with your local health department or installer for more information on operation and maintenance needs if you have or need an alternative system.

Why should I maintain my septic system?

When septic systems are properly designed, constructed, and maintained, they effectively reduce or eliminate most human health or environmental threats posed by pollutants in household wastewater. However, they require regular maintenance or they can fail. Septic systems need to be monitored to ensure that they work properly throughout their service lives.

Saving money

A key reason to maintain your septic system is to save money! Failing septic systems are expensive to repair or replace, and poor maintenance is often the culprit. Having your septic system inspected regularly (at least every 3 years) is a bargain when you consider the cost of replacing the entire system. Your system will need pumping (generally every 3 to 5 years), depending on how many people live in the house and the size of the system. An unusable septic system or one in disrepair will lower your property value and could pose a legal liability.

Protecting health and the environment

Other good reasons for safe treatment of sewage include preventing the spread of infection and disease and protecting water resources. Typical pollutants in household wastewater are nitrogen, phosphorus, and disease-

causing bacteria and viruses. If a septic system is working properly, it will effectively remove most of these pollutants.

With one-fourth of U.S. homes using septic systems, more than 4 billion gallons of wastewater per day is dispersed below the ground's surface. Inadequately treated sewage from septic systems can be a cause of groundwater contamination. It poses a significant threat to drinking water and human health because it can contaminate drinking water wells and cause diseases and infections in people and animals. Improperly treated sewage that contaminates nearby surface waters also increases the chance of swimmers contracting a variety of infectious diseases. These range from eye and ear infections to acute gastrointestinal illness and diseases like hepatitis.

How do I maintain my septic system?

Inspect and pump frequently

You should have your septic system inspected at least every 3 years by a professional and your tank pumped as recommended by the inspector (generally every 3 to 5 years). Systems with electrical float switches, pumps, or mechanical components need to be inspected more often. Your service provider should inspect for leaks and look at the scum and sludge layers in your septic tank. If the bottom of the scum layer is within 6 inches of the bottom of the outlet tee or the top of the sludge layer is within 12 inches of the outlet tee, your tank needs to be pumped. Remember to note the sludge and scum levels determined by your service provider in your operation and maintenance records. This information will help you decide how often pumping is necessary. (See the checklist included at the end of the booklet.)

What Does an Inspection Include?

- Locating the system.
- Uncovering access holes.
- Flushing the toilets.
- Checking for signs of backup.
- Measuring scum and sludge layers.
- Identifying any leaks.
- Inspecting mechanical components.
- Pumping the tank if necessary.

Four major factors influence the frequency of pumping: the number of people in your household, the amount of wastewater generated (based on the number of people in the household and the amount of water used), the volume of solids in the wastewater (for example, using a garbage disposal increases the amount of solids), and septic tank size.

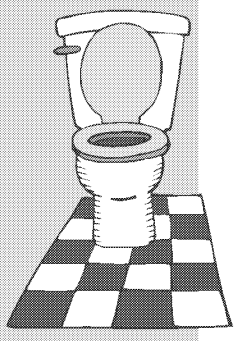
Some makers of septic tank additives claim that their products break down the sludge in septic tanks so the tanks never need to be pumped. Not everyone agrees on the effectiveness of additives. In fact, septic tanks already contain the microbes they need for effective treatment. Periodic pumping is a much better way to ensure that septic systems work properly and provide many years of service. Regardless, every septic tank requires periodic pumping.

In the service report, the pumper should note any repairs completed and whether the tank is in good condition. If the pumper recommends additional repairs he or she can't perform, hire someone to make the repairs as soon as possible.

Use water efficiently

Average indoor water use in the typical single-family home is almost 70 gallons per person per day. Leaky toilets can waste as much as 200 gallons each day. The more water a household conserves, the less water enters the septic system. Efficient water use can improve the operation of the septic system and reduce the risk of failure.

High-efficiency toilets



Toilet use accounts for 25 to 30 percent of household water use. Do you know how many gallons of water your toilet uses to empty the bowl? Most older homes have toilets with 3.5- to 5-gallon reservoirs, while newer high-efficiency toilets use 1.6 gallons of water or less per flush. If you have problems with your septic system being flooded with household water, consider reducing the volume of water in the toilet tank if you don't have a high-efficiency model. Plastic containers (such as ½-gallon plastic milk jugs) can be filled with small rocks and placed in a toilet tank to reduce the

amount of water used per flush. (Be sure that the plastic containers do not interfere with the flushing mechanisms or the flow of water.) You'll save about ½ gallon of water per flush! You might also consider replacing your existing toilet with a high-efficiency model to achieve even more water savings.

Faucet aerators and high-efficiency showerheads

Faucet aerators help reduce water use and the volume of water entering your septic system. High-efficiency showerheads or shower flow restrictors also reduce water use.

Water fixtures

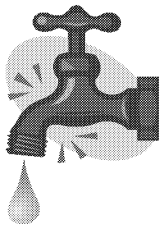
Check to make sure your toilet's reservoir isn't leaking into the bowl. Add five drops of liquid food coloring to the reservoir before bed. If the dye is in the bowl the next morning, the reservoir is leaking and repairs are needed.

A small drip from a faucet adds many gallons of unnecessary water to your system every day. To see how much a leak adds to your water usage, place a cup under the drip for 10 minutes. Multiply the amount of water in the cup by 144 (the number of minutes in 24 hours, divided by 10). This is the total amount of clean water traveling to your septic system each day from that little leak.

Use Water Efficiently!

- **Install high-efficiency showerheads**
- **Fill the bathtub with only as much water as you need**
- **Turn off faucets while shaving or brushing your teeth**
- **Run the dishwasher and clothes washer only when they're full**
- **Use toilets to flush sanitary waste only (not kitty litter, diapers, or other trash)**
- **Make sure all faucets are completely turned off when not in use**
- **Maintain your plumbing to eliminate leaks**
- **Install aerators in the faucets in your kitchen and bathroom**
- **Replace old dishwashers, toilets, and clothes washers with new, high-efficiency models.**

For more information on water conservation, please visit www.epa.gov/owm/water-efficiency/index.htm



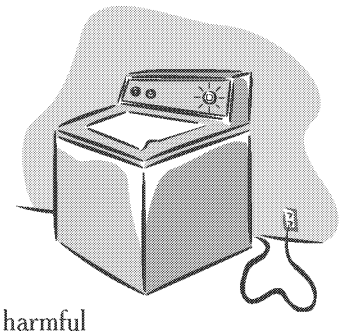
Watch your drains

What goes down the drain can have a major impact on how well your septic system works.

Waste disposal

What shouldn't you flush down your toilet? Dental floss, feminine hygiene products, condoms, diapers, cotton swabs, cigarette butts, coffee grounds, cat litter, paper towels, and other kitchen and bathroom items that can clog and potentially damage septic system components if they become trapped. Flushing household chemicals, gasoline, oil, pesticides, antifreeze, and paint can stress or destroy the biological treatment taking place in the system or might contaminate surface waters and groundwater. If your septic tank pumper is concerned about quickly accumulating scum layers, reduce the flow of floatable materials like fats, oils, and grease into your tank or be prepared to pay for more frequent inspections and pumping.

Washing machines



By selecting the proper load size, you'll reduce water waste. Washing small loads of laundry on the large-load cycle wastes precious water and energy. If you can't select load size, run only full loads of laundry.

Doing all the household laundry in one day might seem like a time-saver, but it could be harmful to your septic system. Doing load after load does not allow your septic tank time to adequately treat wastes. You could be flooding your drainfield without allowing sufficient recovery time. Try to spread water usage throughout the week. A new Energy Star clothes washer uses 35 percent less energy and 50 percent less water than a standard model.

Care for your drainfield

Your drainfield is an important part of your septic system. Here are a few things you should do to maintain it:

- Plant only grass over and near your septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.
- Don't drive or park vehicles on any part of your septic system. Doing so can compact the soil in your drainfield or damage the pipes, tank, or other septic system components.
- Keep roof drains, basement sump pump drains, and other rainwater or surface water drainage systems away from the drainfield. Flooding the drainfield with excessive water slows down or stops treatment processes and can cause plumbing fixtures to back up.

What can make my system fail?

If the amount of wastewater entering the system is more than the system can handle, the wastewater backs up into the house or yard and creates a health hazard.

You can suspect a system failure not only when a foul odor is emitted but also when partially treated wastewater flows up to the ground surface. By the time you can smell or see a problem, however, the damage might already be done.

By limiting your water use, you can reduce the amount of wastewater your system must treat. When you have your system inspected and pumped as needed, you reduce the chance of system failure.

A system installed in unsuitable soils can also fail. Other failure risks include tanks that are inaccessible for maintenance, drainfields that are paved or parked on, and tree roots or defective components that interfere with the treatment process.

Failure symptoms

The most obvious septic system failures are easy to spot. Check for pooling water or muddy soil around your septic system or in your basement. Notice whether your toilet or sink backs up when you flush or do laundry. You might also notice strips of bright green grass over the drainfield. Septic systems also fail when partially treated wastewater comes into contact with groundwater. This type of failure is not easy to detect, but it can result in the pollution of wells, nearby streams, or other bodies of water. Check with a septic system professional and the local health department if you suspect such a failure, and remember to have your septic system inspected by a professional at least every 3 years.

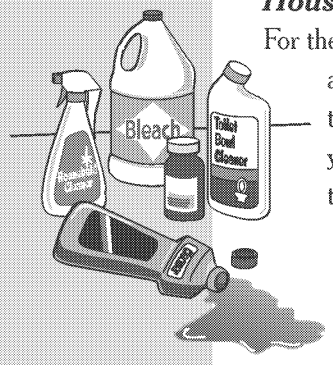
Stop, look, and smell!

Failure causes

Household toxics

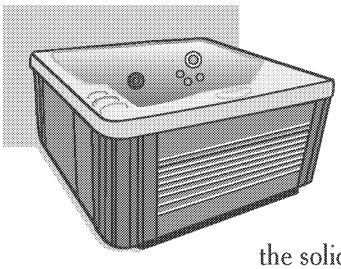
Does someone in your house use the utility sink to clean out paint rollers or flush toxic cleaners? Oil-based paints, solvents, and large volumes of toxic cleaners should not enter your septic system. Even latex paint cleanup waste should be minimized. Squeeze all excess paint and stain from brushes and rollers on several layers of newspaper before rinsing. Leftover paints and wood stains should be taken to your local household hazardous waste collection center. Remember that your septic system contains a living collection of organisms that digest and treat waste.

Household cleaners



For the most part, your septic system's bacteria should recover quickly after small amounts of household cleaning products have entered the system. Of course, some cleaning products are less toxic to your system than others. Labels can help key you into the potential toxicity of various products. The word "Danger" or "Poison" on a label indicates that the product is highly hazardous. "Warning" tells you the product is moderately hazardous. "Caution" means the product is slightly hazardous. ("Nontoxic" and "Septic Safe"

are terms created by advertisers to sell products.) Regardless of the type of product, use it only in the amounts shown on the label instructions and minimize the amount discharged into your septic system.



Hot tubs

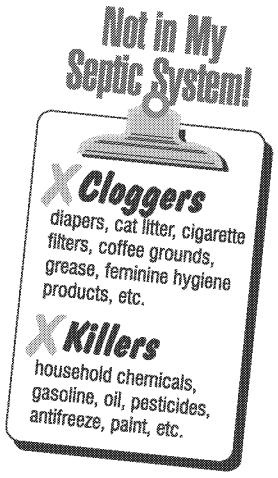
Hot tubs are a great way to relax. Unfortunately, your septic system was not designed to handle large quantities of water from your hot tub. Emptying hot tub water into your septic system stirs the solids in the tank and pushes them out into the drainfield, causing it to clog and fail. Draining your hot tub into a septic system or over the drainfield can overload the system. Instead, drain cooled hot tub water onto turf or landscaped areas well away from the septic tank and drainfield, and in accordance with local regulations. Use the same caution when draining your swimming pool.

Water Purification Systems

Some freshwater purification systems, including water softeners, unnecessarily pump water into the septic system. This can contribute hundreds of gallons of water to the septic tank, causing agitation of solids and excess flow to the drainfield. Check with your licensed plumbing professional about alternative routing for such freshwater treatment systems.

Garbage disposals

Eliminating the use of a garbage disposal can reduce the amount of grease and solids entering the septic tank and possibly clogging the drainfield. A garbage disposal grinds up kitchen scraps, suspends them in water, and sends the mixture to the septic tank. Once in the septic tank, some of the materials are broken down by bacterial action, but most of the grindings have to be pumped out of the tank. Using a garbage disposal frequently can significantly increase the accumulation of sludge and scum in your septic tank, resulting in the need for more frequent pumping.



Improper design or installation

Some soils provide excellent wastewater treatment; others don't. For this reason, the design of the drainfield of a septic system is based on the results of soil analysis. Homeowners and system designers sometimes underestimate the significance of good soils or believe soils can handle any volume of wastewater applied to them. Many failures can be attributed to having an undersized drainfield or high seasonal groundwater table. Undersized septic tanks—another design failure—allow solids to clog the drainfield and result in system failure.

If a septic tank isn't watertight, water can leak into and out of the system. Usually, water from the environment leaking into the system causes hydraulic overloading, taxing the system beyond its capabilities and causing inadequate treatment and sometimes sewage to flow up to the ground surface. Water leaking out of the septic tank is a significant health hazard because the leaking wastewater has not yet been treated.

Even when systems are properly designed, failures due to poor installation practices can occur. If the drainfield is not properly leveled, wastewater can overload the system. Heavy equipment can damage the drainfield during installation which can lead to soil compaction and reduce the wastewater infiltration rate. And if surface drainage isn't diverted away from the field, it can flow into and saturate the drainfield.

For more information

Local Health Department

Name

Agency

Address

Address1

Phone and e-mail

EPA Onsite/Decentralized Management Homepage

www.epa.gov/owm/onsite

EPA developed this Web site to provide tools for communities investigating and implementing onsite/decentralized management programs. The Web site contains fact sheets, program summaries, case studies, links to design and other manuals, and a list of state health department contacts that can put you in touch with your local health department.

National Small Flows Clearinghouse

www.nesc.wvu.edu

Funded by grants from EPA, the NSFC helps America's small communities and individuals solve their wastewater problems. Its activities include a Web site, online discussion groups, a toll-free assistance line (800-624-8301), informative publications, and a free quarterly newsletter and magazine.

Rural Community Assistance Program

www.rcap.org

RCAP is a resource for community leaders and others looking for technical assistance services and training related to rural drinking water supply and wastewater treatment needs, rural solid waste programs, housing, economic development, comprehensive community assessment and planning, and environmental regulations.

National Onsite Wastewater Recycling Association, Inc.

www.nowra.org

NOWRA is a national professional organization to advance and promote the onsite wastewater industry. The association promotes the need for regular service and educates the public on the need for properly designed and maintained septic systems.

Septic Yellow Pages

www.septicyellowpages.com

The Septic Yellow Pages provides listings by state for professional septic pumpers, installers, inspectors, and tank manufacturers throughout the United States. This Web site is designed to answer simple septic system questions and put homeowners in contact with local septic system professionals.

National Association of Wastewater Transporters

www.nawt.org

NAWT offers a forum for the wastewater industry to exchange ideas and concerns. The NAWT Web site lists state associations and local inspectors and pumpers.

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United States
Environmental Protection
Agency

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December 2002

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Septic System Dos and Don'ts

(adapted from National Small Flows Clearinghouse)

Dos

- Check with the local regulatory agency or inspector/pumper if you have a garbage disposal unit to make sure that your septic system can handle this additional waste.
- Check with your local health department before using additives. Commercial septic tank additives do not eliminate the need for periodic pumping and can be harmful to the system.
- Use water efficiently to avoid overloading the septic system. Be sure to repair leaky faucets or toilets. Use high-efficiency fixtures.
- Use commercial bathroom cleaners and laundry detergents in moderation. Many people prefer to clean their toilets, sinks, showers, and tubs with a mild detergent or baking soda.
- Check with your local regulatory agency or inspector/pumper before allowing water softener backwash to enter your septic tank.
- Keep records of repairs, pumpings, inspections, permits issued, and other system maintenance activities.
- Learn the location of your septic system. Keep a sketch of it with your maintenance record for service visits.
- Have your septic system inspected at least every 3 years and pumped periodically (generally every 3 to 5 years) by a licensed inspector/contractor.
- Plant only grass over and near your septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.

Don'ts

- Your septic system is not a trash can. Don't put dental floss, feminine hygiene products, condoms, diapers, cotton swabs, cigarette butts, coffee grounds, cat litter, paper towels, latex paint, pesticides, or other hazardous chemicals into your system.
- Don't use caustic drain openers for a clogged drain. Instead, use boiling water or a drain snake to open clogs.
- Don't drive or park vehicles on any part of your septic system. Doing so can compact the soil in your drainfield or damage the pipes, tank, or other septic system components.

Homeowner Septic System Checklist

Septic System Description

Contact your local authority if you don't have this information.

Date system installed _____

Installer _____

Phone _____

Tank size _____ **gallons**

Capacity _____ **bedrooms**

Type ☐ **conventional**

☐ **alternative (type)** _____

For more information about septic systems, contact:

Clean Water starts at Home

Name

Agency

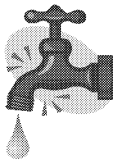
Phone and e-mail

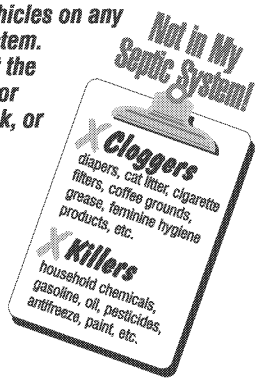
U.S. Environmental Protection Agency

www.epa.gov/owm/onsite/

Things to keep in mind:

- ✓ ***Inspect your system (every 1 to 3 years) and pump your tank (as necessary, generally every 3 to 5 years).***
- ✓ ***Use water efficiently.***
- ✓ ***Don't dispose of household hazardous wastes in sinks and toilets.***
- ✓ ***Plant only grass over and near your septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.***
- ✓ ***Don't drive or park vehicles on any part of your septic system. Doing so can compact the soil in your drainfield or damage the pipes, tank, or other septic system components.***





Septic System Maintenance Record

Next Service	Scheduled Activity	Pumping Co./ Phone	Activities Completed	Comments
Jan. 2003	inspection	Joe Pumper 555-1234	inspection	sludge layer okay-may need pumping next year

Place on electrical box (fuse box) or other convenient location.

APPENDIX D

CAPACITY, MANAGEMENT, OPERATION, AND MAINTENANCE PROGRAMS (CMOM)

United States Environmental Protection Agency | Office of Water (4201) Washington, DC 20460 http://www.epa.gov/water | EPA 833-01-F-001 January 2001

Proposed Rule To Protect Communities From Overflowing Sewers

The Environmental Protection Agency (EPA) is proposing to clarify and expand permit requirements under the Clean Water Act for 19,000 municipal sanitary sewer collection systems in order to reduce sanitary sewer overflows. The proposed requirements will help communities improve some of our Nation's most valuable infrastructure –our wastewater collection systems–by requiring facilities to develop and implement new capacity, management, operation, and maintenance programs and public notification programs. The 19,000 systems covered by this rule include 4,800 municipal satellite collection systems which will be directly regulated under the Clean Water Act for the first time. The proposed requirements will result in fewer sewer overflows, leading to healthier communities, fewer beach closures, and fish and shellfish that are safer to eat.

Background

Sanitary sewer collection systems perform the critical task of collecting sewage and other wastewater from places where people live, work, and recreate, and transport it to the treatment facility for proper treatment and disposal. These systems are essential for protecting public health and the environment.

A combination of factors has resulted in releases of untreated sewage from some parts of the collection systems before it reaches treatment facilities, known as sanitary sewer overflows. Most cities and towns started building sewer collection systems over 100 years ago and many of these systems have not received adequate upgrades, maintenance and repair over time. Cities have used a wide variety of materials, designs, and installation practices. Even well-operated systems may be subject to occasional blockages or structural, mechanical, or electrical failures. Problems with sewer overflows can be particularly severe where portions of a system have fallen into disrepair or where an older system is inferior to more modern systems.

EPA estimates that there are at least 40,000 overflows of sanitary sewers each year. The untreated sewage from these overflows can contaminate our waters, causing serious water quality problems and threatening drinking water supplies and fish and shellfish. It can also back up into basements, causing property damage and creating threats to public health for those who come in contact with the untreated sewage.

Sanitary sewer overflows that discharge to surface waters have been prohibited under the Clean Water Act since 1972. Municipal wastewater treatment plants that discharge are currently required to comply with National Pollutant Discharge Elimination System (NPDES) permits, which require record-keeping and reporting of overflows and maintenance of their collection system. Most satellite sewage collection systems do not current have NPDES permits.

Proposed Rule to Reduce Sewer Overflows

EPA is proposing revisions to the NPDES permit regulations to improve the operation of municipal sanitary sewer collection systems, reduce the frequency and occurrence of sewer overflows, and provide more effective public notification when overflows do occur. This proposal will provide communities with a framework for reducing health and environmental risks associated with overflowing sewers. The result will be fewer overflows, better information for local communities, and extended lifetime for the Nation's infrastructure. This rule primarily addresses sanitary sewer overflows, not combined sewer overflows.

Capacity Assurance, Management, Operation, and Maintenance Programs. These programs will help communities ensure they have adequate wastewater collection and treatment capacity and incorporate many standard operation and maintenance activities for good system performance. When implemented, these programs will provide for efficient operation of sanitary sewer collection systems.

Notifying the Public and Health Authorities. Municipalities and other local interests will establish a locally-tailored program that notifies the public of overflows according to the risk associated with specific overflow events. EPA is also proposing that annual summaries of sewer overflows be made available to the public. The proposal also clarifies existing record-keeping requirements and requirements to report to the state.

Prohibition of Overflows. The existing Clean Water Act prohibition of sanitary sewer overflows that discharge to surface waters is clarified to provide communities with limited protection from enforcement in cases where overflows are caused by factors beyond their reasonable control or severe natural conditions, provided there are no feasible alternatives.

Expanding Permit Coverage to Satellite Systems. Satellite municipal collection systems are those collection systems where the owner or operator is different than the owner or operator of the treatment facility. Some 4,800 satellite collection systems will be required to obtain NPDES permit coverage to include the requirements under this proposal.

Cost

EPA estimates that this rule would impose an additional total cost for municipalities of $93.5 million to $126.5 million each year, including costs associated with both planning and permitting. A collection system serving 7,500 may need to spend an average of $6,000 each year to comply with this rule.

Additional Information

For additional information about EPA's proposed sanitary sewer overflow regulation, contact Kevin Weiss at weiss.kevin@epa.gov or visit http://www.epa.gov/owm/sso.htm on the Internet.

122.42(f) Capacity, Management, Operation and Maintenance Programs for Municipal Sanitary Sewer Systems

(1) **General Standards** - You, the permittee, must:

(i) properly manage, operate and maintain, at all times, all parts of collection system that you own or over which you have operational control;

(ii) provide adequately capacity to convey base flows and peak flows for all parts of the collection system you own or have operational control;

(iii) take all feasible steps to stop, and mitigate the impact of, sanitary sewer overflows in portions of the collection system you own or have operational control; and

(iv) provide notification to parties with a reasonable potential for exposure to pollutants associated with the overflow event.

(v) develop a written summary of your CMOM program and make it, and the audit under section (5), available to any member of the public upon request.

(2) **Management Program** - You must develop a capacity, management, operation and maintenance (CMOM) program to comply with paragraph (1). If you believe that any element of this section is not appropriate or applicable for your CMOM program, your program does not need to address it, but your written summary must explain why that element is not applicable. The Director will consider the quality of the CMOM program, its implementation and effectiveness in any relevant enforcement action, including but not limited to any enforcement action for violation of the prohibition of any municipal sanitary sewer system discharges described at 40 CFR 122.42(g). The program must:

(i) **Goals**: Identify with specificity the major goals of your CMOM program, consistent with the general standards identified above.

(ii) **Organization**: Identify:

(A) administrative and maintenance positions responsible from implementing measures in your CMOM program, including lines of authority by organization chart or similar document; and

(B) the chain of communication for reporting SSOs under 122.42(e) from

receipt of a complaint or other information to the person responsible for reporting to the NPDES authority

(iii) **Legal Authority:** Include legal authority, through sewer use ordinances, service agreements or other legally binding documents, to:

(A) Control infiltration and connections from inflow sources;

(B) Require that sewers and connections be properly designed and constructed;

(C) Ensure proper installation, testing, and inspection of new and rehabilitated sewers (such as new or rehabilitated collector sewers and new or rehabilitated service laterals);

(D) Address flows from satellite municipal collection systems; and

(E) Implement the general and specific prohibitions of the national pretreatment program that you are subject to under 40 CFR 403.5.

(iv) **Measures and Activities**. Your CMOM program must address the elements listed below that are appropriate and applicable to your system and identify the person or position in your organization responsible for each element.

(A) Maintenance of facilities

(B) Maintenance of a map of the collection system

(C) Management of information and use of timely , relevant information to establish and prioritize appropriate CMOM activities (such as the immediate elimination of dry weather overflows or overflows into sensitive waters such as public drinking water supplies and their source waters, swimming beaches and waters where swimming occurs, shellfish beds, designated Outstanding National Resource Waters, National Marine Sanctuaries, waters withing federal, state, or local parks, and water containing threatened or endangered species or their habitat), and identify and illustrate trends in overflows.

(D) Routine preventive operation and maintenance activities

(E) Assessment of the current capacity of the collection system and treatment facilities which you own or over which you have operational control

(F) Identification and prioritization of structural deficiencies and identifying and implementing short-term and long term rehabilitation actions to address each deficiency

(G) Appropriate training on a regular basis

(H) Equipment and replacement parts inventories including identification of critical replacement parts.

(v) **Design and Performance Provisions**: You must establish:

(A) requirements and standards for the installation of new sewers, pumps and other appurtenances; and rehabilitation and repair projects.

(B) procedures and specifications for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

(vi) **Monitoring, Measurement and Program Modifications**. You must monitor the implementation and, where appropriate measure the effectiveness of each element of your CMOM program. You must update program elements as appropriate based on monitoring or performance evaluations. You must modify the summary of your CMOM program as appropriate to keep it updated and accurate.

(3) **Overflow Response Plan**: You must develop and implement an overflow response plan that identifies measures to protect public health and the environment by, including but not limited to, mechanisms to:

(i) ensure that you are made aware of all overflows (to the greatest extent possible);

(ii) ensure that overflows are appropriately responded to, including ensuring that reports of overflows are immediately dispatched to appropriate personnel for investigation and appropriate response;

(iii) ensure appropriate reporting pursuant to 40 CFR 122.42(e).

(iv) ensure appropriate notification to the public, health agencies, and other impacted entities (e.g. water suppliers) pursuant to 40 CFR 122.42(h). The CMOM should identify the public health and other officials who will receive immediate notification

(v) ensure that appropriate personnel are aware of and follow the plan and appropriately trained; and

(vi) provide emergency operations.

(4) **System Evaluation and Capacity assurance plan**: You must prepare and implement a plan for system evaluation and capacity assurance if peak flow conditions are contributing to an SSO discharge unless you have either (1) already taken steps to correct the hydraulic deficiency or(2) the discharge meets the criteria of 122.42(g)(2). At a minimum the plan must include:

(i) **Evaluation**: Steps to evaluate those portions of the collection system which you own or over which you have operational control which are experiencing or contributing to an SSO discharge caused by hydraulic deficiency or to noncompliance at a treatment plant. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, provide estimates of the capacity of key system components, identify hydraulic deficiencies, including components of the system with limiting capacity and identify the major sources that contribute to the peak flows associated with overflow events.

(ii) **Capacity Enhancement Measures**: Establish short and long term actions to address each hydraulic deficiency including prioritization, alternative analysis, and a schedule.

(iii) **Plan updates**: The plan must be updated to describe any significant change in proposed actions and/or implementation schedule. The plan must also be updated to reflect available information on the performance of measures that have been implemented.

(5) **CMOM Program Audits** - As part of the NPDES permit application, you must conduct an audit, appropriate to the size of the system and the number of overflows, and submit a report of such audit, evaluating your CMOM and its compliance with this subsection, including its deficiencies and steps to respond to them.

(6) **Communications**: The permittee should communicate on a regular basis with various interested parties on the implementation and performance of its CMOM program. The communication system should allow interested parties to provide input to the permittee as the CMOM program is developed and implemented.

Summary of Major Industry Technical References for Sanitary Sewers - April 2001

Measure	Technical References
Identify and track discharges	Sewer System Infrastructure Analysis and Rehabilitation Handbook, EPA, 1991
Overflow emergency response plans	Preparing Sewer Overflow Response Plans: A Guidebook for Local Governments; American Public Works Assoc, Tele: 816-472-6100
Public notification	Combined Sewer Overflows - Guidance for Nine Minimum Controls, EPA, May 1995, EPA 832-B-95-003
General management, operation and maintenance	Wastewater Collection Systems Management, Manual of Practice No 7, Water Environment Federation, 5th edition, 1999. Operation and Maintenance of Wastewater Collection Systems, a field study training program, 4th edition, California State University, Sacramento, 1993. Control of Infiltration and Inflow in Private Building Sewer Connections - Monograph, Water Environment Federation, 1999. Manual of Practices- Wastewater Collection Systems, NASSCO, 1995 Detection, Control and Correction of Hydrogen Sulfide Corrosion in Existing Wastewater Systems, EPA-832-R-92-001, Sept, 1992
Capacity evaluations, actions to ensure adequate capacity and rehabilitation	Sewer System Infrastructure Analysis and Rehabilitation Handbook, EPA, 1991 Existing Sewer Evaluation & Rehabilitation, WEF manual of practice FD-6, ASCE Manual and report on engineering practice no. 62, 1994 Sewerage Rehabilitation Manual, 3rd ed., Water Research Centre, 1994. Inspector Handbook for Sewer Collection System Maintenance and Rehabilitation, NASSCO, 1993 Manhole Inspection and Rehabilitation, ASCE Manuals and Report on Engineering Practice No. 92, 1997 Specification Guidelines for Wastewater Collection Systems Maintenance and Rehabilitation, 9th ed., NASSCO, 1996 Monograph: Control of Infiltration/Inflow (I/I) In Private Sewer Service Connections, WEF, 1999 Demonstration of Service Lateral Testing and Rehabilitation Techniques, EPA, 1985 Handbook for Sewer System Evaluation and Rehabilitation, EPA, 1975, EPA/430/9-75/021
Sewer use ordinance - Testing of new sewers	Demonstration of Service Lateral Testing and Rehabilitation Techniques., EPA, 1985 Gravity Sanitary Sewer Design and Construction, ASCE manual and report on engineering practice no. 60 and WPCF Manual of Practice No. FD-5, 1982.

Performance indicators	Collection Systems: Methods for Evaluating and Improving Performance, California State University, Sacramento, 1998. Optimization of Collection System Maintenance Frequencies and System Performance, ASCE, 1999. Benchmarking Wastewater Operations-Collection, Treatment, and Biosolids Management, WERF, Project 96-CTS-5, 1997 Benchmark '95: Wastewater Collection Agencies: An Analysis of Survey Data Charlotte-Mecklenberg Utility Department, 1995 Stalnaker, R. and M. Rigsy, "Evaluating the Effectiveness of Wastewater Collection System Maintenance." Water Engineering Management, January 1997
General design issues	Construction Grants 1985, EPA, 1984, EPA/430/9-84/004 Recommended Standards for Wastewater Facilities, 1990, A report of the wastewater committee of the Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers. Technical Report 16 - Guides for the Design of Wastewater Treatment Works, 1998, New England Interstate Water Pollution Control Commission. Pumping Station Design, 2nd ed, Sanks, 1998 Design of Wastewater and Stormwater Pumping Stations - MOP FD-4. WEF, 1993. Wastewater Engineering: Collection and Pumping of Wastewater. Metcalf & Eddy, Inc., McGraw-Hill, 1981. Design and Construction of Sanitary & Storm Sewers - MOP 9. Water Pollution Control Federation , 1969. Design Manual for Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants, EPA/625/1-85/018, October 1985

To locate these documents, please contact the following:

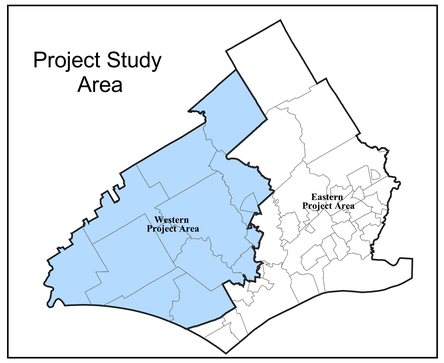
Office of Water Resource Center (202) 260-7786

National Small Flows Clearinghouse (800) 624-8301

Water Environment Federation www.wef.org
(Formerly: Water Pollution Control Federation)

CA State University, Sacremento (916) 278-6142

American Society of Civil Engineers http://www.asce.org/



NEWTOWN TWP
EDGMONT TWP
THORNBURY TWP
CHESTER HEIGHTS BORO
CONCORD TWP
CHADDS FORD TWP
BETHEL TWP
UPPER PROVIDENCE TWP
MIDDLETOWN TWP
ASTON TWP
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WHITE HORSE VILLAGE TP
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2232 E.DEERFIELD DRIVE L.& I.ALLEN
TOFT WOODS TP
60 CHAPEL HILL ROAD WHINFREY, DAVID
131 APPLE TREE ROAD ROACH WHEELER
2390 N.FEATHERING ROAD J.& S.MCGEEVER
APPLETREE,STEEPLECHASE&FOXCHASE 131 APPLETREE DRIVE
321 N.FEATHERING ROAD T.SCHEUERMAN
241,261 WOODHILL LANE SAFT LOWINSKI
1981 KIMBERWICK ROAD N.MCHUGH
1971 KIMBERWICK ROAD N. & D. KEMP
PARK PLACE PS PRIVATE
2201 N.RIDLEY CREEK ROAD D.BYRNE & M.MANNO
VILLAGE OF ROSE TREE PS PRIVATE
1921 RIDLEY CREEK ROAD D.MEINHART & P.RIECHEL
ROSE TREE CROSSING PS PRIVATE
VALLEY VIEW PS UPTSA
CEDAR HILL PS UPTSA
1941 RIDLEY CREEK ROAD R.& L.PROTESTO
CEDAR MEADOW PS UPTSA
46 TANGUY RD JONATHAN KIMMEL
30 SLITTING MILL RD FRED READ
SPRINGWATER HUNT PS PRIVATE
253 OLD GRADYVILLE RD SHIRLEY FULTON
PAINTER ROAD PS MTSA
CHEYNEY UNIVERSITY TP
GLEN MILLS SCHOOL TP
GODDARD SCHOOL TP
SLEIGHTON FARM SCHOOL STP
NORTH HEILBRON DRIVE PS MTSA
520 HILLENDALE ROAD J. & J. KUHN
ORANGE STREET PS AQUA PENNSYLVANIA
WINTER STREET PS UPTSA
PENN STATE PS PRIVATE
COUNTRY VILLAGE PS MTSA
LEMON STREET PS AQUA PENNSYLVANIA
BRAVES TRAIL PS UPTSA
THORNBURY TOWNSHIP TP
COBBLESTONE PS #1 THORNBURY TOWNSHIP
GLEN MILLS SCHOOL PS GLEN MILLS SCHOOL 12 PRIVATE PUMPS
MIRMONT PS PRIVATE
PAUL LANE PS MTSA
YEARSLEY MILL PS MTSA
BLACK HORSE LANE BACKUP PS MTSA
THORNBURY HUNT PS #2 THORNBURY TOWNSHIP
COBBLESTONE PS #2 THORNBURY TOWNSHIP
SO. HEILBRON DR PS MTSA
771 RIDLEY CREEK ROAD R.& K.KOTTYON
WEST FORGE PS MTSA
PENNEL PL (FAIR ACRE) - BACKUP P MTSA
FAIR ACRES PS MTSA
THORNBURY HUNT PS #1 THORNBURY TOWNSHIP
MEDIA STP
LINCOLN STREET PS AQUA PENNSYLVANIA
YMCA PS PRIVATE
HUNTER ST PS MTSA
MEDIA STATION UPTSA
LETITIA PS UPTSA
GRANITE FARMS ESTATES PS PRIVATE
PARK AVENUE PS UPTSA
DARLINGTON PS MTSA
WAWA INC Pre-TP & PS PRIVATE
COUNTRY HOUSE INN PS PRIVATE
ELWYN PS MTSA
BORTONDALE ROAD PS UPTSA
31 TIMBER LA JAY POWELL
UNKNOWN
CHASE PS #2 CTSA
DARLINGTON WOODS STP
FRANKLIN MINT PS PRIVATE
ERIC LANE PS MTSA
FOX ROAD MTSA
CHASE PS #1 CTSA
STONERIDGE PS MTSA
51 CARTER RD EUGENE MOCHAN
47 CARTER RD JOHN SAVON
HONOLD PS CTSA
TUNBRIDGE APARTMENTS PS PRIVATE
LONG POINT LANE PS ROSE VALLEY BOROUGH
OLD MILL PS ROSE VALLEY BOROUGH
43 CARTER RD BILL & LISA SCHATZ
WINDMILL CREEK II PS CTSA
COVENTRY CROSSING TP
LENNI ROAD PS MTSA
CONCORD INDUSTRIAL PARK SP
CHEYNEY ROAD PS CTSA
PARKMOUNT ROAD PS MTSA
KNOWLTON PS MTSA
ROSE VALLEY STP
41 LOCUST FARM DR. GEORGE NORTON
BRINTON MANOR SP
TEAM ROAD PS SWDCMA
CONCORD COUNTRY CLUB SP
FOX VALLEY SP
RIDLEY CREEK DRIVE PS MTSA
SOUTHCO STP
CONCORD WOODS PS CTSA
BROOKHAVEN RD. PS ROSE VALLEY BOROUGH
CONCORDVILLE INN SP
167 CONCORD MEETING RD. JOHN SEDIVY
EAGLE PARK PS SWDCMA
KNOWLTON CHARTER PS MTSA
MEADOWHURST PS MTSA
KNIGHTS BRIDGE WWTP
STATE FARM STP
BRINTON LAKE PS CTSA
148 CONCORD MEETING RD. JOHN LYNAM
22 JEREMIAH COLLETT RD. JOHN SKINNER
VALLEYBROOK TP
MEADOWBROOK PS MTSA
RAMADA INN SP
CENTRAL STP
SISTERS OF SAINT FRANCIS PRIVATE
VILLAGE GREEN PS SWDCMA
PANTOS WWTP
INTERMEDIATE (ECKMAN) PS CFTSA
BRANDYWINE RIVER HOTEL WWTP
65 WILLITS WAY MICHAEL DELORIFICE
30 PONDS VIEW KEITH COX
CONCORD HILLS PS SWDCMA
URBAN PS CFTSA
BRANDYWINE SUMMIT WWTP
CONCORD BEVERAGE SP
CARRIAGE LANE PS SWDCMA
GARNET VALLEY SCHOOL DISTRICT SP
SPRINGHILL FARMS WWTP
RIDINGS WWTP
CONCORD HUNT PS CTSA
BROOKHAVEN WWTP
SCOTS GLEN PS BTSA
RAVENS CREST WWTP
PLANT INFLUENT PS CFTSA
138 KIRK ROAD WALTER HOLMES
JAMES & MARJORIE HILL
GARNET OAKS PS BTSA
LOWER (SMITHBRIDGE) PS CFTSA
876 SHAVERTOWN ROAD GEORGE SHARP
DR. EDWIN GRANITE
BALDWIN RUN POLLUTION CONTROL PLANT
TOBY FARMS PS SWDCMA
866 SHAVERTOWN ROAD JOHN FELDMAYER
8TH STREET PS DELCORA
WOODBROOK PS SWDCMA
BEAVER VALLEY ROAD PS CTSA
FELTONVILLE PS FELTONVILLE
CHESTER PS DELCORA
HEATHERFIELD CLOSE PS BTSA
TROTTERS LEA PS BTSA
PYLE ROAD PS BTSA
ZEBLEY ROAD PS BTSA
BROOMALL PS DELCORA
LUHMAN CIRCLE PS BTSA
BEECH STREET PS SDCA
YATES AVENUE PS LOWER CHICHESTER TOWNSHIP
PRICE STREET PS TRAINER BOROUGH
DELCORA WRTP
SMITH STREET PS TRAINER BOROUGH
WALNUT STREET PS MARCUS HOOK BOROUGH
NAAMAN'S CREEK PS SDCA
MARCUS HOOK PS DELCORA
SUN OIL PS PRIVATE
MARKET STREET LS MARCUS HOOK BOROUGH
Delaware River

WESTON SOLUTIONS 2004

DELCORA

- Public Pump Station Location
- Private Pump Station Location
- Public Treatment Plant
- Private Treatment Plant
- Small Flow Treatment Plant
- Force Mains
- Sewer Lines
- Authority Boundary
- Streams
- Municipal Boundary

N W E S

2500 0 2500 5000 7500 Feet

0.5 0 0.5 1 Miles

Disclaimer: This map is for analytical purposes only. The reliability of this map depends on the accuracy of the underlying data sources which have not been verified.

Sewage Facilities Western Plan of Study