



Water and Sewer Service Areas in the DVRPC Region

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Water and Sewer Service Areas

Introduction

Land use patterns and population densities are heavily influenced by the presence of public drinking water supplies and sanitary sewers. Water and sewer infrastructure supports higher-density development and more intensive land uses by providing adequate drinking water and fire protection and safeguarding public health and the environment from inadequately treated wastewater. The presence of water and sewer infrastructure supports intensive land uses that alter landscapes, impact ecosystems, and impose complex changes on water quality and quantity in a watershed. Since dense development cannot occur or be sustained without an adequate water supply or means to adequately treat wastewater flows, this infrastructure can be used as a smart growth management tool that influences land use patterns and can even influence where land development occurs.

DVRPC uses public water service area (WSA) and sewer service area (SSA) data to assist in designating future growth areas in the region. Areas that are currently served by public water and sewer are better able to manage development or redevelopment than areas without this infrastructure and are thus more appropriate for future growth and development. Identifying future growth for areas where water and sewer infrastructure exists or is planned can benefit the region both environmentally and economically. The environmental benefits include adequately treated wastewater, preservation of groundwater resources, and support for higher-density land uses that reduce sprawl and land consumption. Economic benefits include a reliable water supply for residents, industry, and fire protection, reduction of infrastructure maintenance costs, and the ability to share maintenance and operations costs among larger numbers of users. If incorporated into the planning process, water resource management—of both WSAs and SSAs—can play an important role in both the environmental and economic health and sustainability of the region.

Background

In 1992, DVRPC published the *Inventory of Public Water and Sewer Facilities in Southeastern Pennsylvania*. This publication was part of an in-depth inventory of existing and proposed WSAs and SSAs in the region. This effort was updated in 2002 for public sewer service and in 2003 for public water service, and it is maintained in a Geographic Information System (GIS) by DVRPC.

For the New Jersey side of the region, the New Jersey Department of Environmental Protection (NJ DEP) has maintained GIS data on public water and sewer systems since 1998. NJ DEP has periodically updated this data, and these updates represent the best available information on water and sewer infrastructure in New Jersey. The Pennsylvania Department of Environmental Protection (PA DEP) does not maintain a similar GIS data set.

This document summarizes the update of existing GIS data of WSAs and SSAs and attempts to identify and analyze expansion of this infrastructure in the region. DVRPC staff utilized a number of different sources to inventory water and sewer infrastructure, including GIS data from the DVRPC member counties, water and sewer utilities, NJ DEP, municipal comprehensive plans, and Pennsylvania Act 537 Plans and Chapter 94 reports.

Staff used the 2002 and 2003 DVRPC inventories for sewer and water service in Pennsylvania and 2004 water inventory (updated from 1998) in New Jersey as a base to build upon and to guide investigation of potential system expansions. SSA mapping is currently being revised in New Jersey as the state updates its wastewater management plans (WMPs). For this report, DVRPC has used draft WMP data from the DVRPC member counties and will utilize the adopted WMP maps when they are approved by NJ DEP (anticipated in late 2013). Due to changes in the methodology for determining areas approved for sewer service in New Jersey between 2006 and the present, historical comparisons between the updated 2013 SSAs and previous inventories do not provide meaningful results.

Findings

Since this update was largely a GIS exercise, a portion of the indicated increase in WSAs and SSAs can be attributed to differences in data collection methodology. WSA and SSA data is generalized by nature, and direct comparisons with developed land statistics may not be possible due to the nature of the underlying data. A critical review of the data does, however, offer insight to where development has occurred in relation to WSAs and SSAs, as well as where future growth should occur to be served by infrastructure. The data layers should not be used as an exact map identifying areas of localized water or sewer service.

Water and sewer infrastructure are critical to supporting intensive land uses and growing population densities. Geographic information of current infrastructure can be a valuable land use planning tool to help determine the most appropriate locations for planned development. The locations of water and sewer infrastructure not only indicate places where more intensive development can be sustained but can also assist planners to identify areas that may be developed in the future due to proximity to potable water supply and sewage treatment capacity.

There are exceptions to this generalization. Community drinking water wells and package wastewater plants that only serve a small community or residential developments help to facilitate land development on remote greenfields. Typically, a homeowner's association or developer, and not the municipality, municipal authority, or water or wastewater company, will be responsible for the drinking water and sewage treatment facilities for developments using these systems. Identifying the locations of these systems is important, as these types of facilities allow development to "leapfrog" into rural areas until housing and development densities necessitate larger and more sophisticated water and wastewater facilities. Public water supply systems and wastewater discharges are regulated by the state DEPs and are included in this inventory where information is available. A public water supply system is defined by the Clean Water Act as a connection to drinking water that serves 25 people or 15 service connections for 60 days per year. The Clean Water Act also requires that states regulate wastewater discharges into surface or sub-surface waters under the National Pollution Discharge Elimination System (NPDES), and

on-lot systems serving 20 or more persons per day. Septic systems, while regulated and permitted by local governments, are not included in this inventory.

Development in the Region

Between 2000 and 2010, approximately 64,000 acres were converted from wooded, vacant, or agricultural land to developed land in the region. Of this 64,000 acres, almost 50 percent of that development occurred in Burlington and Chester counties (10,000 and 21,000 acres, respectively). Burlington and Chester counties are the largest counties in the region with the most available undeveloped land (even after the growth between 2000 and 2010), so it is to be expected that these counties led the way in acres of growth.

During that same time period, population in the region grew by almost 240,000 people. Gloucester County led the New Jersey portion of the region with a gain in population of 34,000 people, while Chester County added 65,000 people in the DVRPC Pennsylvania counties. The severe economic downturn at the end of the decade resulted in a loss of over 475,000 jobs in the region (*National Establishments Time Series* database, 2012).

Table 1 lists the land area for each county, the amount of development that has occurred between 2000 and 2010 according to the DVRPC 2010 Land Use Files, and the percentage of each county that is developed land.

For the purposes of this report, developed land includes all land uses except wooded land, agriculture, water, and vacant land¹. The land uses are determined at a much finer scale than the generalized WSA and SSAs; therefore, WSA and SSA GIS data may cover undeveloped lands. Water and sewer infrastructure growth should be relative to this growth in development as these services are installed to accommodate land development and growth in population.

¹ The New Jersey Counties use a different definition for "Developed Land" and the data presented in this report will differ from the developed land statistics present in the New Jersey Wastewater Management Plans.

Table 1 Change in Developed Land (2000–2010)

County	County Area (Acres)	Developed Land (2000)	Developed Land (2010)	Change in Developed Land	Percentage of County that is Developed Land (2010)
Pennsylvania					
Bucks	397,492	149,251	161,102	11,851	40.5%
Chester	485,468	145,551	167,692	22,141	34.5%
Delaware	122,221	80,829	81,002	173	66.3%
Montgomery	311,636	174,155	182,740	8,585	58.6%
Philadelphia	90,989	75,531	75,381	-150	82.8%
Total	1,407,806	625,317	667,917	42,600	47.4%
County	County Area (Acres)	Developed Land (2000)	Developed Land (2010)	Change in Developed Land	Percentage of County that is Developed Land (2010)
New Jersey					
Burlington	524,704	95,345	105,474	10,129	20.1%
Camden	145,551	74,155	76,013	1,858	52.2%
Gloucester	215,013	63,240	68,325	5,085	31.8%
Mercer	146,348	61,323	65,573	4,250	44.8%
Total	1,031,616	294,063	315,385	21,322	30.6%
DVRPC Region	2,439,422	919,920	983,302	63,922	40.3%

Source: DVRPC 2013

Water and Sewer Infrastructure

Expansion of WSA and SSAs in the DVRPC region occurred mostly in the counties with the highest growth potential and the highest rate of land development. In Pennsylvania, Chester County experienced the most land development growth between 2000 and 2010 (15.2 percent, according to the DVRPC land use data). This growth was accompanied by the largest growth in both the new acres (21,043 acres of WSA and 26,215 acres of SSA) and percentage (13.6 percent increase in WSA and 31.6 percent increase in SSA) of county land area served by water and sewer infrastructure.

In New Jersey, Burlington and Gloucester counties experienced both the largest growth in developed lands and new WSAs, with developed land in those counties increasing by 10.6 percent (10,129 acres) and 8 percent (5,085 acres), respectively, between 2000 and 2010. Growth in WSAs, in those counties, increased by 10 percent (10,117 acres) in Burlington County and 14.7 percent (10,194 acres) in Gloucester County. Due to the changes in methodology identifying SSAs in New Jersey, statistics on SSA growth are not available.

The large increase (10,703 acres, or 15.8 percent increase) in growth in SSAs in Delaware County was somewhat unexpected because that county is largely developed. The growth in SSAs in Delaware County occurred mostly in the Existing Development land use planning areas and can be partially attributed to development of the western portion of the county. Expansions of SSAs in Delaware County can also be attributed to connections of large areas previously served by septic systems made possible by upgrades to wastewater treatment plants and interconnections between sewage collections systems. The methodology used for determining these statistics is provided in the Appendix of this report.

Water

Roughly 45 percent of the region's land area is served by a public water system (50.8 percent of the land area in the Pennsylvania counties and 36 percent of the land area in the New Jersey counties). These systems use both groundwater and surface water as drinking water supplies. Generally, as an area becomes more densely developed and groundwater sources cannot be replenished as quickly as they are used, surface water sources, such as the Delaware, Schuylkill, Raritan, and Susquehanna Rivers, are tapped to provide reliable sources of drinking water.

In Pennsylvania, Bucks and Chester counties showed the largest increase in public water service in terms of both acres (14,113 and 21,043, acres respectively) and percentage of growth (11.1 percent and 13.6 percent growth, respectively). These are the two largest counties in the Pennsylvania subregion. After the expansion of WSAs, Bucks and Chester County are both approximately 36 percent served by WSAs, indicating potential for future growth of this infrastructure.

As in Pennsylvania, the two largest counties in the New Jersey portion of the DVRPC region (Burlington and Gloucester) showed the largest growth in land area being served by WSAs. Both counties added over 10,000 acres of public water supply area since the data was last updated by the NJ DEP in 2004. Expansion of WSAs in Mercer County was robust at over 8,000 new acres served.

Generally, WSAs in the DVRPC region have grown by approximately 9 percent between 2002–2004 and 2013. This growth can partially be attributed to new development in greenfields (southern Gloucester County and western Chester County) as well as extensions of public water systems to connect existing development that did not previously have access to adequate sources of treated water.

WSA system expansion can accompany infill development and often serves subdivisions that are along a WSA boundary or connect unserved developments when main extensions are introduced into an area. As infrastructure links water systems, communities along those main line extensions

have the opportunity to access public drinking water supplies. A good example of this type of growth can be seen along the U.S. 1 Corridor in western Chester County.

Table 2 details the basic WSA statistics in Pennsylvania and New Jersey and identifies the expansion in WSAs by county between 2003 (in Pennsylvania), 2004 (in New Jersey), and 2013.

Table 2 Land Area Served by Public Drinking Water Sources

County	County Area (Acres)	2003 WSA (Acres)	2013 WSA (Acres)	Change in WSA (Acres)	Percent increase in WSA (2003–2013)	2013 Percent of County Served
Pennsylvania						
Bucks	397,492	127,453	141,566	14,113	11.1%	35.6%
Chester	485,468	154,496	175,539	21,043	13.6%	36.2%
Delaware	122,221	96,816	103,540	6,724	6.9%	84.7%
Montgomery	311,636	197,850	208,418	10,569	5.3%	66.9%
Philadelphia	90,989	85,900	85,904	4	0.0%	94.4%
Total	1,407,806	662,514	714,967	52,453	7.9%	50.8%
County	County Area (Acres)	2004 WSA (Acres)	2013 WSA (Acres)	Change in WSA (Acres)	Percent increase in WSA (2004–2013)	2013 Percent of County Served
New Jersey						
Burlington	524,704	100,825	110,942	10,117	10.0%	21.1%
Camden	145,551	81,115	87,368	6,253	7.7%	60.0%
Gloucester	215,013	69,512	79,707	10,194	14.7%	37.1%
Mercer	146,348	84,423	93,202	8,779	10.4%	63.7%
Total	1,031,616	335,875	371,219	35,344	10.5%	36.0%
DVRPC Region	2,439,422	998,389	1,086,186	87,797	9.0%	44.5%

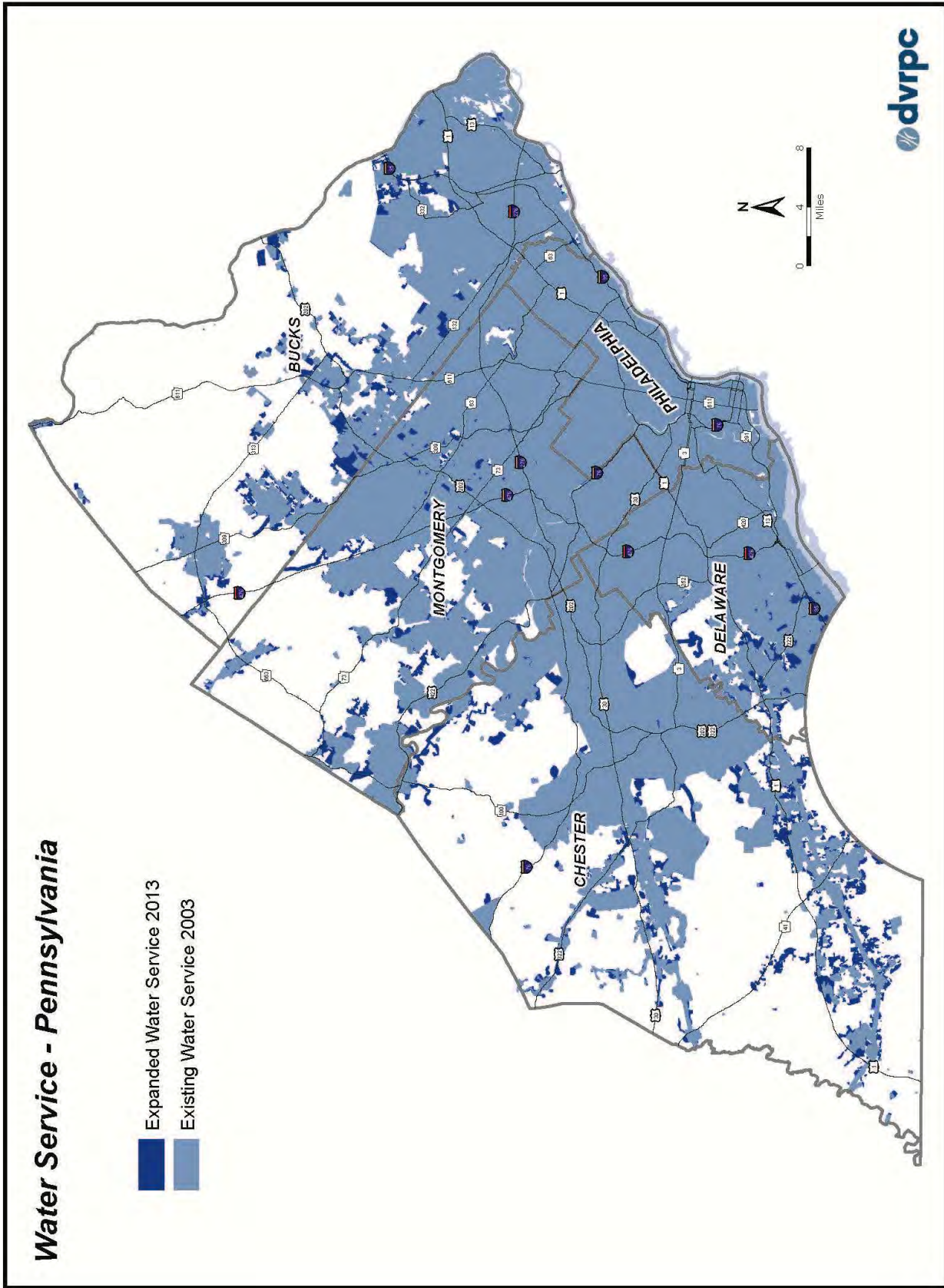
Source: DVRPC 2013

Figures 1 and 2 are maps of the region’s WSAs and represent geographically where the expansions described in Table 2 have occurred. The maps show two data layers; the historical WSAs and the updated WSAs. Since the data layer for the historical WSA sits on top of the updated layer, the areas where you see the 2013 WSAs represent areas where the systems have expanded or changed since the previous data collection.

Figure 1 is a map showing the Pennsylvania WSAs in 2003 and the updated data layer in 2013. The maps shows that much of the growth in WSAs in Pennsylvania occurred along the U.S. 1, U.S. 30, U.S. 322, and PA 41 corridors in western Chester County as well as in western and northwestern Montgomery County. The map also shows a concentration of WSA expansion in central Bucks County.

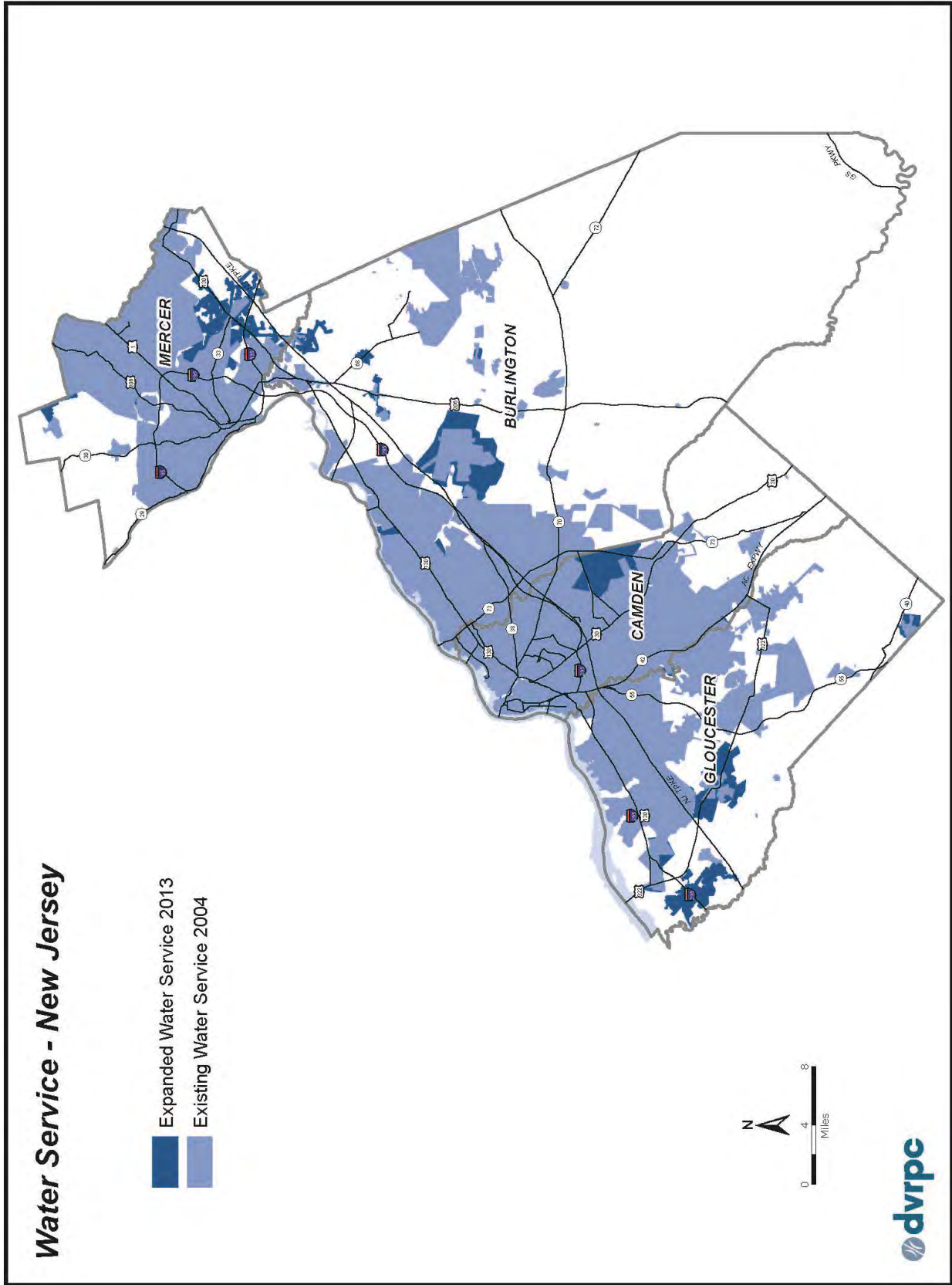
Figure 2 is a map of the New Jersey WSAs in 2004 from the New Jersey DEP and the updated 2013 data layer. The map shows large areas of WSA expansion in southeastern Mercer County, central Burlington and Camden counties, and southern Gloucester County.

These maps provide a simple picture as to where new WSA growth may occur in proximity to existing infrastructure. When viewed in combination with other GIS data layers, such as environmental constraints, the transportation network, and protected lands, this data can be a powerful tool in assessing and directing future land development.



Source: DVRPC 2013

Figure 1 WSAs in Pennsylvania 2002 and 2013



Source: DVRPC 2013

Figure 2 WSAs in New Jersey 2003 and 2013

Sewer

Planning for areas that may be served by public sewers is more regulated than expansion of public drinking water areas. Sewer system expansions are required to meet federal Clean Water Act provisions and are regulated by Pennsylvania Act 537 and the New Jersey Water Quality Management Planning Program (WQMP). Through these programs, the state environmental agencies can facilitate planning to ensure that adequate wastewater treatment facilities are in place to protect surface and groundwater quality.

Overall, approximately 39 percent of the region is served or designated as appropriate for public SSAs, with 41 percent of the Pennsylvania subregion currently served and 35 percent of the New Jersey subregion designated as appropriate for sewer service. Locations of SSAs in the region reflect the most developed counties, with Philadelphia, Camden, Mercer, Montgomery, and Delaware counties leading the region with 50 percent or more of their land area served by SSAs. Public sewer infrastructure is a necessity for densely populated areas, such as Philadelphia, Camden, Trenton, and Chester cities. These centers of infrastructure often serve as receiving areas for wastewater flows when capacity outweighs demand after decades of population decline in urban centers.

Updating the SSA maps in the Pennsylvania portion of the DVRPC region proved to be more problematic than updating the WSAs. More sewer systems in the region are operated on a municipal scale rather than by large regional utilities (portions of Delaware County are an exception to this generalization), making data collection more of a challenge.

The NJ DEP maintains a GIS database of SSAs in the state. This data identifies areas where public sewers are permitted by the state-approved wastewater management plans (WMPs), as opposed to where public infrastructure has been constructed. This is an important distinction and difference between the Pennsylvania and New Jersey SSA maps. DVRPC has decided to utilize this dataset due to its availability, consistency with state planning efforts, and the fact that it is maintained and reviewed by NJ DEP.

In 2010, the New Jersey DEP instituted an administrative order requiring an update to the WMP maps in the state. All 21 New Jersey counties have submitted draft WMP maps in 2012, and these draft maps were referenced for this update. Due to changes in methodology in mapping SSAs in New Jersey between 2006 and these draft WMP maps, growth statistics of SSAs in New Jersey are not measurable.

Due to differences in the availability of relevant historical data of SSAs in each of the states, analysis of the two state SSAs will be treated in different sections.

Pennsylvania SSAs

The expansion of SSAs in the DVRPC Pennsylvania counties exhibited two types of growth. The first type was expansion of SSAs to accommodate land development. This type of expansion is evident in Chester County, where development of 22,000 acres of land between 2000 and 2010 was accompanied by 26,000 acres of new SSAs between 2002 and 2013. This represents a 31.6 percent increase in SSAs in Chester County.

The second type of expansion of SSAs in the Pennsylvania counties occurred in largely developed areas, such as Delaware and Montgomery counties, where public SSAs expanded into existing developed areas to replace failing or underperforming on-lot systems. This second type of expansion is most evident in Delaware County, where SSAs expanded by almost 11,000 acres between 2002 and 2013, representing an expansion of SSAs in the county of 15.8 percent. Montgomery County SSAs grew by almost 17,000 acres, representing a 10 percent increase. The location of these expansions is explored further in the following section of this report, which reviews SSA expansion in Land Use Planning areas.

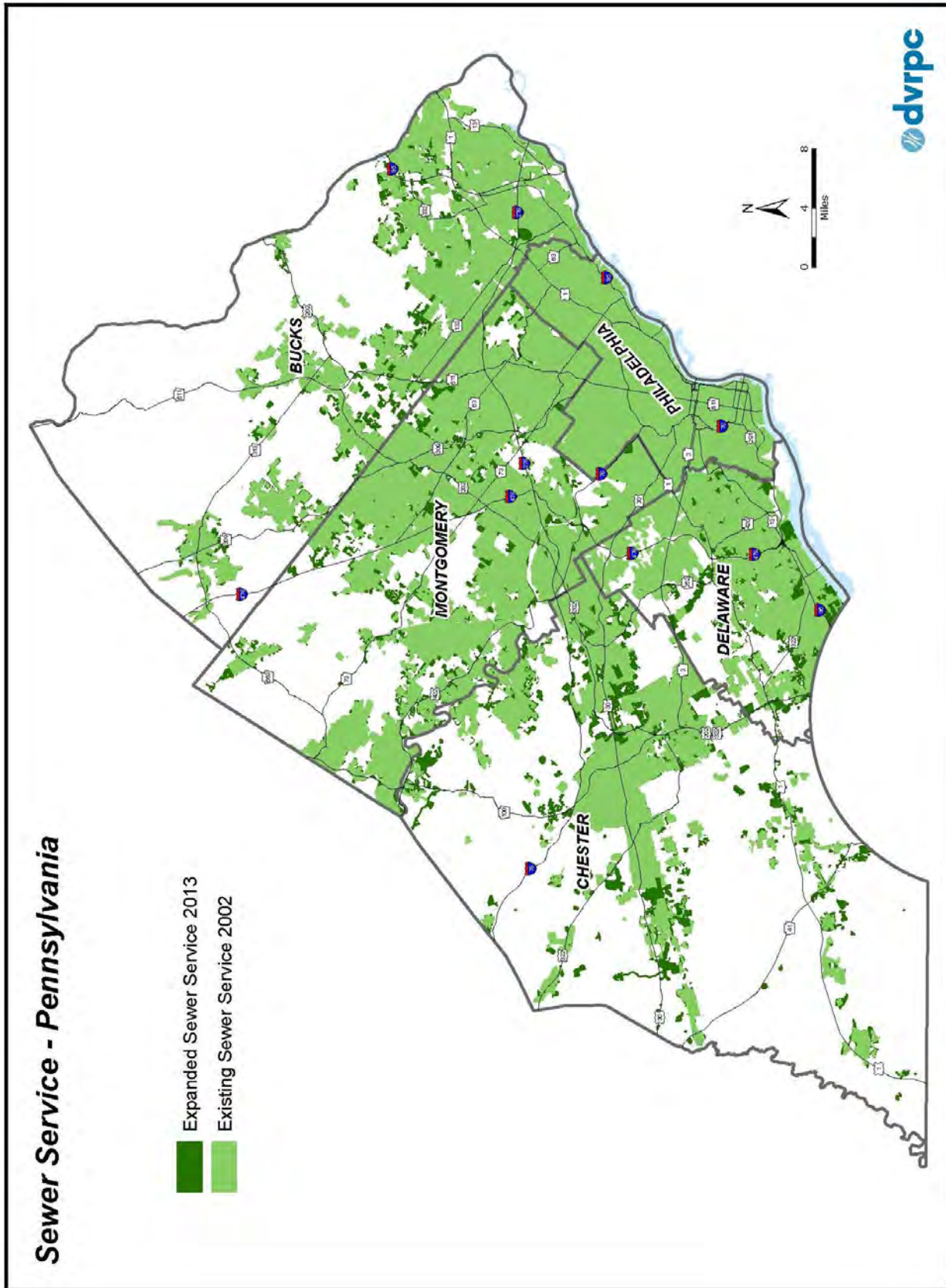
Table 3 details the expansion of SSAs in the Pennsylvania counties between the 2002 and 2013 inventories. The table includes information on percent change and percent of county land area served by SSAs.

Table 3 Growth of SSAs 2002–2013

County	County Area (Acres)	Percent of County Served	2002 SSA (Acres)	2013 SSA (Acres)	Change in SSAs (Acres)	Percent increase in SSA (2002–2013)
Pennsylvania						
Bucks	397,492	29.4%	104,351	116,840	12,489	12.0%
Chester	485,468	22.5%	82,999	109,214	26,215	31.6%
Delaware	122,221	64.2%	67,759	78,461	10,703	15.8%
Montgomery	311,636	59.6%	168,845	185,720	16,875	10.0%
Philadelphia	90,989	95.9%	87,249	87,267	19	0.0%
Total	1,407,806	41.0%	511,203	577,503	66,300	13.0%

Source: DVRPC 2013

Figure 3 shows the Pennsylvania SSAs in 2002 and the updated 2013 data layer. Growth in SSAs is similar to WSA expansion but not as widespread. Another difference in the growth in SSAs compared to WSAs is that SSA growth is more prevalent directly adjacent to existing SSAs. WSAs, because of the ability to provide community wells through isolated groundwater sources can occur in a disjointed fashion. SSAs are more difficult to provide in isolation, and the maps show growth of SSAs where they can tie into existing systems. This map also shows where SSA expansion has occurred within the boundaries or “donut holes” of existing SSAs. Older communities and subdivisions with less dense development patterns will often tie into sewer infrastructure when housing densities or infrastructure expansion brings sewer mains into an area, when density exceeds the ability of local soil conditions to adequately handle wastewater flows through on-lot systems, or when septic systems consistently malfunction for other reasons. This second type of SSA expansion is evident in Figure 3 in central Chester, Delaware, and Montgomery counties.



Source: DVRPC 2013

Figure 3 SSAs in Pennsylvania 2002 and 2013

New Jersey SSAs

For this analysis, DVRPC utilized the draft GIS SSA data submitted to the state for the WMP update in Burlington, Camden, Gloucester, and Mercer counties. This data coverage is generalized and indicates areas that are allowed to be served by public sewer systems.

When NJ DEP approves the SSA maps in the county WMPs, DVRPC will update this analysis to reflect any significant changes to the mapped areas. Until that time, these data sets offer the best sources of data to identify SSAs in the New Jersey subregion of the DVRPC area.

It is important to note that the available SSA maps from the WMPs identify areas where public sewers are permitted and not necessarily where infrastructure currently exists. Subsequently, statistics regarding SSAs of the DVRPC New Jersey Counties may be higher in this report than what is reported in county documents.

Thirty-five percent of the New Jersey subregion is included in the SSAs. Camden and Mercer counties, being the most developed counties in the subregion, have the largest percentage of land area served by public sewer (62.4 percent and 51.1 percent, respectively).²

Burlington County, however, by virtue of the county being more than two times larger than the other New Jersey counties in the region, has more land area designated for SSAs than the other three counties. The Pinelands Comprehensive Management Plan (PCMP) limits public sewer expansion and discharges into the Pinelands watersheds. This management plan limits the expansion of public sewer areas in the Pinelands portions of Burlington, Camden, and Gloucester counties. Burlington hosts a much larger portion of the Pinelands Preserve than the other counties in the DVRPC region, indicating that growth of SSAs in Burlington County will be limited by the PCMP.

Table 4 includes statistics on SSAs in the New Jersey counties in the DVRPC region.

²According to the *Wastewater Management Plan for Mercer County* approximately 35 percent of the county land area and 70 percent of the population is served by centralized sewer systems. The larger value reported in Table 4. is due to the fact that this report includes land areas where sewer systems are allowed to be developed in addition to existing sewer systems.

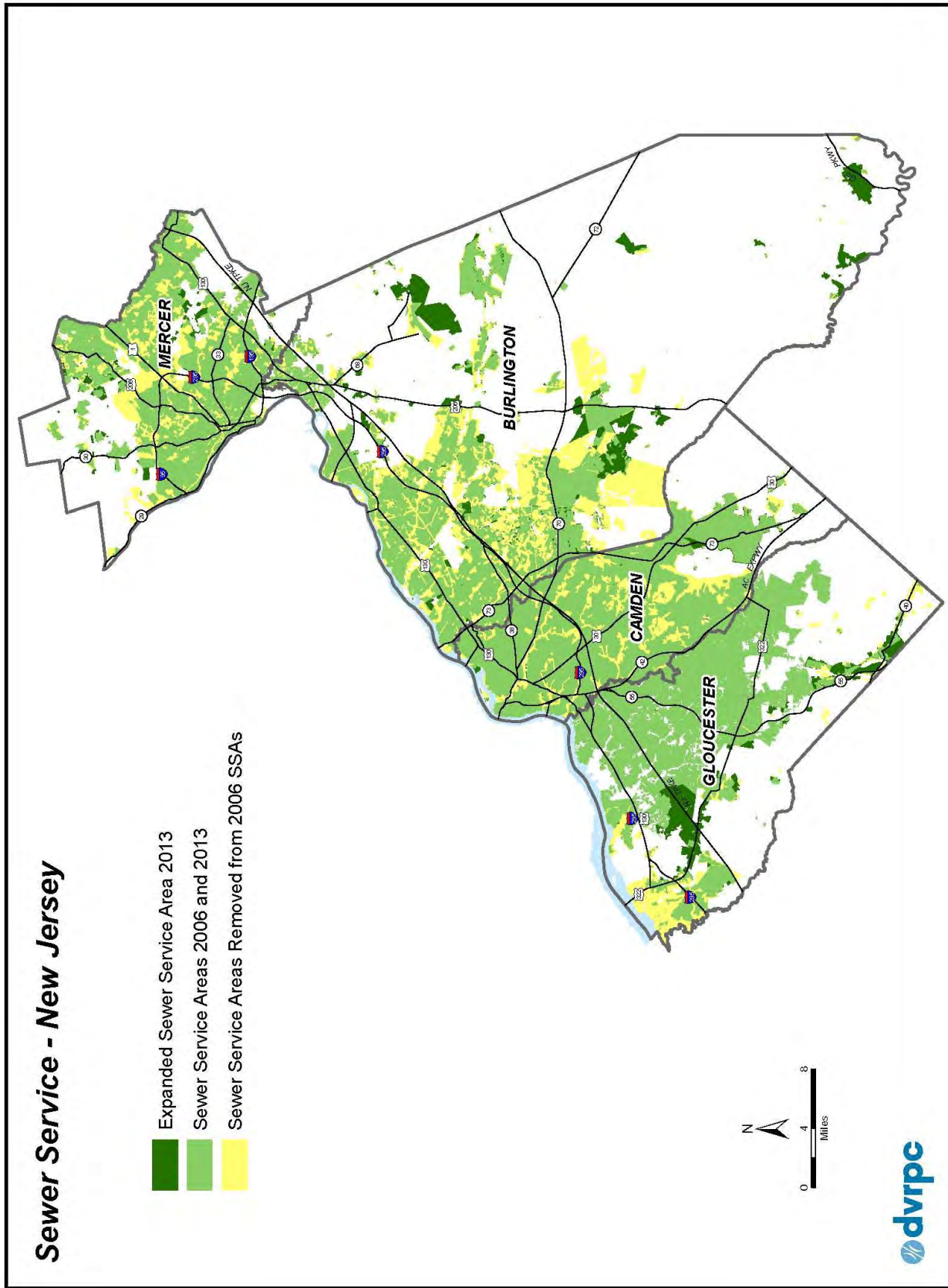
Table 4 Land Area of New Jersey Counties Served by SSAs (2012)

County	County Area (Acres)	2013 SSA (Acres)	Percent of County Approved for Service
New Jersey			
Burlington	524,704	108,928	20.8%
Camden	145,551	90,868	62.4%
Gloucester	215,013	87,664	40.8%
Mercer	146,348	74,781	51.1%
Total	1,031,616	362,241	35.1%

Source: DVRPC 2013

Figure 4 shows changes from the approved 2006 sewer service maps to the current 2013 draft maps. The areas of light green show where the 2006 and 2013 SSAs are consistent with each other. The dark green areas indicate SSAs that are newly designated in the 2013 draft WMPs. The sum of the light green and dark green areas comprise the total 2013 SSAs and is the area used to compute the statistics in Table 4.

The map indicates that some areas (yellow areas on the map) have been removed from the 2006 approved sewer service areas. Much of the area removed was due to environmental constraints such as floodplains and wetlands, but some areas were also removed as otherwise inappropriate for sewer service and the development that would accompany it. The areas that have been expanded as approved for sewer service represent changes on where growth should occur due to updated municipal master plans and ordinances or other similar changes. For example, in Woolwich Township, Gloucester County, the Receiving Area of the TDR program was approved for sewer service in order to accommodate the increases in density needed to implement the TDR program.



Source: DVRPC 2013

Figure 4 SSA Map of New Jersey Counties. Areas where centralized sewers are allowed in the draft WMP in 2006 and 2013.

Land Use Planning Areas

The *Connections—A Regional Plan for a Sustainable Future* Long Range Plan (LRP) includes a Land Use Plan that defines a regional vision for growth management and open space preservation. The Land Use Plan map comprises four layers: Existing Development, Future Growth Areas, Rural Conservation Lands, and the Regional Greenspace Network. The *Connections* Land Use map promotes a vision where key natural resource and agricultural production areas are preserved and new greenfield development is constrained to designated future growth areas, where supporting sewer, water, and transportation infrastructure is in place or planned.

By comparing the locations of WSA and SSA expansions with newly developed areas, it is possible to track the extent to which the *Connections* Land Use Plan is being implemented. Since areas with public WSAs and SSAs can support more dense development than areas without that infrastructure, the *Connections* plan goals favor investment in this infrastructure in Existing Development and Future Growth planning areas. The location of existing and planned infrastructure guides the siting of future development and informs the areas to label as appropriate for Future Growth.

It is important to note that the Greenspace Network runs through Existing Development and Future Growth Areas and that the generalized nature of the WSAs and SSAs may encroach on this data layer, resulting in an overestimation of the extent of the Greenspace Network served by WSAs and SSAs in the following tables. The tables highlight the percent of both existing and expanded SSA and WSA in Rural Conservation Lands by county. Rural Conservation Lands depict large agricultural, natural, and rural areas worthy of heightened preservation efforts, but they also contain villages and scattered suburban development and are not intended as “no growth zones.” Rural Conservation Lands are designated as areas whose natural, agricultural, and rural values should be protected, while allowing for limited growth that is in character with the setting. Concentrated growth, requiring public water and sewer systems, may be part of the plan or strategy to accommodate growth and preserve the character of Rural Conservation Land planning areas. Depending on the context, expansion of sewer and water systems into Rural Conservation Lands may or may not be consistent with smart growth principles. The following tables measure growth of sewer and water infrastructure in Rural Conservation Lands for informational purposes.

The Land Use Planning Areas designated in the *Connections* Long Range Plan are a distinct land-use category used by DVRPC and differ from classifications used by each of the counties in their land-use plans and classifications. These categories should not be confused with similar land use category terms identified in county plans and publications.

Water Service Areas

While over 50 percent of the Pennsylvania subregion is served by public water systems, and only 36 percent of the New Jersey subregion is served by WSAs, a similar number of acres of WSA are located in Rural Conservation Lands in Pennsylvania as in New Jersey (50,000 and 43,000

acres, respectively). This translates into 7 percent of the WSA in Pennsylvania being in Rural Conservation Lands as compared to 11.5 percent of WSAs in New Jersey.

Chester and Montgomery counties lead the Pennsylvania counties with acres of WSAs in Rural Conservation Lands with 16,000 and 13,000 acres of WSAs, respectively. When viewed as a percentage of total WSAs, rural land area WSAs represent 7.2 percent of the total Montgomery County WSAs and 12.4 percent of the total Chester County WSAs. Chester and Montgomery counties also host the largest WSAs in Future Growth Planning Areas, indicating that these counties will likely continue to experience significant land development and expansion of these systems in the future.

New Jersey, Burlington, Mercer, and Gloucester counties have similar acres of Rural Conservation Lands served by public WSAs (16,000, 12,900, and 12,900 acres, respectively). These areas represent between 14 and 16 percent of the total county WSAs. These three counties also have similar land areas in the Future Growth Areas. The location of WSAs in New Jersey in Rural Conservation Lands is consistent with the counties that show the largest growth in developed land and WSAs.

Of the suburban counties, Camden and Delaware counties are largely developed and have relatively smaller land areas in the Rural Conservation and Future Growth planning areas than the other counties in the region.

Table 5 shows Water Service Area by land use planning area and the percentage of total WSAs located within Rural Conservation Areas.

Table 5 Acres of WSAs in Land Use Planning Areas (2013)

County	Water Service Area by Land Use Planning Area (Acres)					Percent WSA in Rural Conservation Lands
	Total WSA	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
Pennsylvania						
Bucks	141,566	96,084	6,775	9,674	29,026	6.8%
Chester	175,539	110,814	16,290	21,787	26,640	12.4%
Delaware	103,540	80,034	2,280	3,110	18,112	3.0%
Montgomery	208,418	156,708	9,276	14,988	27,441	7.2%
Philadelphia	85,904	68,685	383	298	16,537	0.3%
Total	714,967	512,325	35,004	49,857	117,756	7.0%

Table 5 continued.

County	Water Service Area by Planning Area (Acres)					Percent WSA in Rural Conservation Lands
	Total WSA	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
New Jersey						
Burlington	110,942	64,191	15,587	16,215	14,947	14.6%
Camden	87,368	71,168	4,279	779	11,143	0.9%
Gloucester	79,707	42,639	12,066	12,878	12,117	16.2%
Mercer	93,202	53,467	11,481	12,943	15,303	13.9%
Total	371,219	231,465	43,413	42,815	53,510	11.5%
DVRPC Region	1,086,186	743,790	78,417	92,672	171,266	8.5%

Source: DVRPC 2013

System Expansion

Almost 22 percent of the expansion of WSAs in the region occurred in Rural Conservation Lands. In the Pennsylvania subregion, 19 percent of the total growth was in Rural Conservation Lands, while in the New Jersey subregion, growth in this planning area was 26 percent of the total. Sixty-one percent of this infrastructure expansion occurred in Existing Development areas and Future Growth areas. While the majority of system expansion is occurring in the appropriate planning areas, limiting expansion of infrastructure into preservation areas would further the LRP goals of Managing Growth and Protecting Resources.

Chester and Bucks counties led the Pennsylvania counties in WSA expansion in Rural Conservation Lands at 5,400 and 2,300 acres of expansion in this planning area type, respectively. Montgomery County also experienced 2,000 acres of WSA expansion in Rural Conservation Lands. A larger percentage of Montgomery County's water service growth occurred in rural areas than in Bucks County (19.3 percent versus 16.5 percent). One in four new acres served by WSAs in Chester County was in a Rural Conservation Lands Planning Area. This trend is consistent with the larger land development trend occurring in greenfields in western Chester County. Chester and Bucks counties also experienced the most development among the Pennsylvania counties between 2000 and 2010.

Consistent with overall growth statistics in the New Jersey counties, Gloucester County experienced the largest expansion of WSAs into Rural Conservation Lands, with approximately 4,000 acres of expansion in this planning area type. Mercer County was second with 2,800 acres of WSA expansion into Rural Areas. Growth in Rural Conservation Lands accounted for over 30 percent of the WSA expansion in Gloucester and Mercer counties.

Table 6 shows the expansion of WSAs identified by *Connections* Land Use Planning areas and the percentage of that expansion that occurred in Rural Conservation Lands.

Table 6 Expansion of WSA by Land Use Planning Areas (2003 to 2013)

County	Expanded Water Service Area by Land Use Planning Area (Acres)					Percent WSA in Rural Conservation Lands
	Expanded WSA by County	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
Pennsylvania						
Bucks	14,113	7,479	1,493	2,324	2,814	16.5%
Chester	21,043	9,153	3,054	5,442	3,392	25.9%
Delaware	6,724	3,344	363	155	2,860	2.3%
Montgomery	10,569	6,186	683	2,039	1,659	19.3%
Philadelphia	NA	NA	NA	NA	NA	NA
Total	52,453	26,162	5,593	9,959	10,730	19.0%
County	Expanded Water Service Area by Land Use Planning Area (Acres)					Percent WSA in Rural Conservation Lands
	Expanded WSA by County	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
New Jersey						
Burlington	10,117	4,147	2,215	2,220	1,534	21.9%
Camden	6,253	5,312	28	141	774	2.3%
Gloucester	10,194	4,640	1,108	4,027	1,418	39.5%
Mercer	8,779	3,208	2,040	2,802	728	31.9%
Total	35,344	16,307	5,391	9,190	4,454	26.0%
DVRPC Region	87,797	42,469	10,984	19,149	15,184	21.8%

Source: DVRPC 2013

Sewer Service Areas

The presence of sewer service is, in some ways, more critical than water service to facilitating suburban development. Providing sources of drinking water to subdivisions is technically less difficult and less expensive than providing adequate wastewater disposal. The presence of SSAs in Rural Conservation Lands can serve as centers from which suburban development can expand, and the location of this infrastructure can indicate areas that are likely to experience development pressure.

When reviewing the statistics of the areas of SSAs within Rural Conservation Lands, Pennsylvania has considerably less SSA area in this planning area type than New Jersey. In the Pennsylvania counties, 3.7 percent of all SSAs are in Rural Conservation Lands, compared to

10.1 percent in the New Jersey counties. Despite having a smaller share of land area in the region, the New Jersey subregion has 36,000 acres of SSAs in Rural Conservation Lands compared to 22,000 acres of SSAs in Rural Conservation Lands in the Pennsylvania counties.

The nature of the GIS data plays a role in this comparative difference. The Pennsylvania data identifies locations where sewer infrastructure exists, while the New Jersey data indicates where SSA expansion is allowed, so the New Jersey data, by definition, contains more land area than the Pennsylvania data.

When looking at the data on a county basis, SSA expansion (in the Pennsylvania subregion) is occurring in relative fashion with the rate and location of land development.

The 2013 SSA GIS data show that Chester and Montgomery counties have the largest SSAs in the Rural Conservation Lands planning area in the Pennsylvania subregion (8,000 and 7,300 acres, respectively). This is consistent with the growth of land development that occurred in Chester County between 2000 and 2010 and the fact that Montgomery County has the largest SSA system of all of the counties in the Pennsylvania subregion. Montgomery County has a large share of acres of SSAs in Rural Areas, but this still accounts for less than 4 percent of total SSAs in the county.

In the New Jersey subregion, Gloucester County has the largest area and percentage of total SSAs in Rural Conservation Areas (14,000 acres and 16 percent of total SSA). This statistic reflects the growth pressure that Gloucester County experienced between 2000 and 2010 and the expected future growth in the county, and it may also reflect the physical limitation of the soil in the county for on-lot wastewater systems

Table 7 includes the statistics on locations of SSAs in the DVRPC Region segregated by Land Use Planning Area and the percentage of SSAs in Rural Conservation Lands.

Table 7 Acres of SSAs in Land Use Planning Areas (2013)

County	Sewer Service Area by Land Use Planning Area (Acres)					Percent SSA in Rural Conservation Lands
	Total Acres of SSA	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
Pennsylvania						
Bucks	116,830	88,038	4,120	5,293	19,379	4.5%
Chester	109,205	76,375	8,937	7,964	15,929	7.3%
Delaware	78,459	65,366	1,537	643	10,913	0.8%
Montgomery	185,720	149,511	9,070	7,305	19,830	3.9%
Philadelphia	87,267	68,284	383	305	18,295	0.3%
Total	577,503	447,574	24,047	21,510	84,346	3.7%
County	Sewer Service Area by Land Use Planning Area (Acres)					Percent SSA in Rural Conservation Lands
	Total Acres of SSA	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
New Jersey						
Burlington	108,927	68,706	18,210	11,941	10,070	11.0%
Camden	90,868	71,032	8,010	3,104	8,722	3.4%
Gloucester	87,656	47,125	18,584	14,080	7,285	16.1%
Mercer	74,770	49,675	11,531	7,285	6,279	9.7%
Total	362,222	236,538	56,335	36,410	32,938	10.1%
DVRPC Region	939,725	684,112	80,382	57,920	117,284	6.2%

Source: DVRPC 2013

System Expansions

As previously noted, system expansion statistics are not available for the New Jersey SSAs because of an evolving method of identifying SSAs in the state over time. In some cases, direct comparisons between SSAs in the state database between 2006 and 2013 result in smaller SSAs in 2013 because certain environmentally constrained lands were removed from previously approved areas. Because of these discrepancies, this section will address SSA expansions only in the Pennsylvania land use planning areas.

SSAs in the Pennsylvania subregion grew by approximately 66,000 acres between 2002 and 2013. Over 7,700 acres of this growth occurred in Rural Conservation Lands and over 4,000

acres of SSA growth in Rural Conservation Lands occurred in Chester County. This accounts for almost 16 percent of the SSA growth in Chester County.

In the Pennsylvania portion of the region, over 46,000 of the 66,000 acres of expansion occurred in Existing Development and Future Growth Areas, almost six times the land area of SSA expansion that occurred in Rural Conservation Lands in the same time period. This statistic supports the premise that SSA expansion, in the Pennsylvania subregion, is supporting the LRP goals of reducing sprawl and directing land development to places where growth was planned.

Table 8 includes statistics on the growth of SSAs in the Pennsylvania subregion identified by land use planning area and the percentage of growth that has occurred in Rural Conservation Lands between 2002 and 2013.

Table 8 SSAs by Land Use Planning Area in the Pennsylvania Subregion (2013)

County	Expanded Sewer Service Area Growth by Land Use Planning Area (Acres)					Percent SSA Growth in Rural Conservation Lands
	Total Growth of SSAs	Existing Development	Future Growth Area	Rural Conservation Lands	Greenspace Network	
Pennsylvania						
Bucks	12,489	7,833	840	1,532	2,285	12.3%
Chester	26,215	13,782	3,813	4,079	4,535	15.6%
Delaware	10,703	7,373	196	161	2,973	1.5%
Montgomery	16,875	10,859	1,365	2,021	2,630	12.0%
Philadelphia	NA	NA	NA	NA	NA	NA
Total	66,300	39,851	6,214	7,793	12,438	11.8%

Source: DVRPC 2013

Conclusion

The 2013 update of water and sewer service areas in the Delaware Valley Region is intended as a planning tool to help determine areas that are appropriate for future development or redevelopment due to the presence of this critical infrastructure. As such, this data is an important input to DVRPC's LRP. Areas where this infrastructure exists, with the sufficient capacity, can support more intensive land uses and denser development types than areas without this service.

In Pennsylvania, there is no central repository of GIS data for land served by public water or sewer utilities. DVRPC has collected this data from a number of sources with varying degrees of precision and accuracy. Regardless of these difficulties collecting accurate data, the GIS maps of these services provide a reasonably good regional picture of where the infrastructure exists.

In New Jersey, the NJ DEP has maintained GIS data of water and sewer service areas. These data files are readily accessible and provide a valuable tool for planning in New Jersey. DVRPC has accessed additional sources of information to update the public water supply areas in southern New Jersey.

Water and sewer system GIS data can be used as a powerful tool for land use planning. When viewed in conjunction with other GIS data sets such as Land Use, Natural Resource Areas, High Quality Soils, and transportation projects, this data set can provide insight into areas where future development may be likely or appropriate.

Maintaining and updating consistent data on WSA and SSA infrastructure can pose a challenge due to sensitivities for public safety and the fact that the infrastructure is managed by such a large number of disparate entities. DVRPC will continue to work with county planning partners to maintain up-to-date and accurate GIS data set on this important infrastructure.

The GIS data that has been collected for this report is regional in nature and should not be used as the final word on whether a parcel or area is served by public utilities. This data is meant to be used for planning purposes only and not site-specific determination. Furthermore, if users of this data discover discrepancies in the data, they are encouraged to contact DVRPC so that the data can be updated.

Appendix



Methodology

Caveats

This GIS update of water and sewer infrastructure provides a generalized map of areas that are served by public water and sewer utilities and relies on data from a number of different sources. Some areas were created by placing a buffer around existing pipelines, other areas were created by digitizing paper maps and importing the service areas into the GIS, and some areas were created based on a narrative description of a geographic area served, provided by the utilities themselves.

Due to the differing methodologies used to map this infrastructure, the generalized nature of the source data and the public safety concern for mapping critical infrastructure, this GIS data cannot be used to identify specific parcels or locations that are served by public water and/or sewer.

Furthermore, analysis comparing the expansion of WSA and SSA infrastructure over time reflects the generalized nature of the source data. Errors in the calculation of acres served by the utilities are inherent in the process of comparing data sets that were created using different methodologies and relying on inputs from a number of different sources—some of which are more precise than others.

Like the GIS mapping itself, this analysis provides a general idea of where expansions to public water and sewer systems have occurred over the last decade. This analysis, when combined with other GIS data sets such as land use and protected open space, provides a valuable tool to help predict where future expansions of the systems and thus future land development are likely to occur.

Methodology

Due to differences in availability of data of water and sewer infrastructure between New Jersey and Pennsylvania, the methodology to update this geographic information was different in the two states.

Pennsylvania

In Pennsylvania, the DVRPC 2003 data on WSAs and 2002 data on SSAs served as the base data upon which this update was built. Pennsylvania is a little different from New Jersey in that Pennsylvania has a larger number of regional water utilities that serve a large area of the DVRPC region in southeastern Pennsylvania, and the state does not maintain GIS data on the areas served by this infrastructure.

With a few exceptions, SSAs are often managed at the municipal level, and updating this coverage presented a greater challenge.

In both cases (water and sewer) a variety of data sources were used to inform this update.

Water

The first step in updating the regional inventory of public water service in Pennsylvania was to request county GIS data for this infrastructure from the planning commissions or departments in Bucks, Chester, Delaware, and Montgomery counties. Each of the counties provided an infrastructure inventory that was conducted in different years based on the year when the last county comprehensive plan was updated; the Montgomery County inventory was published in 2005, Chester County data was published in 2008 and Bucks County's inventory was completed in 2010. Delaware County's inventory data was overly generalized for the purpose of this inventory and was not included in the final GIS database.

In order to supplement county inventory data with the most recent data available, DVRPC staff contacted large water utilities in the region and utilities that held franchise areas adjacent to land that was identified as not being served by public water in the county and DVRPC inventories. Staff first focused on contacting utilities that served Montgomery and Delaware counties because the data provided by those counties was less recent than the Bucks and Chester County data.

A relatively small number of water utilities serve a large portion of southeastern Pennsylvania. By focusing efforts on larger utilities and on utilities that have infrastructure adjacent to potential growth areas, much of the region's public WSAs will be accounted for while minimizing duplicating inventory work conducted by the counties. This approach allowed staff to capture areas where changes to previous inventories were most likely to occur. DVRPC supplemented this data with data from municipal comprehensive plans and water utility websites.

The 2003 DVRPC Water Service Area data also included information on PWSID numbers in the GIS data attribute table. DVRPC compared the PWSID numbers from the inventory attribute table with the PA DEP PWSID database³ of active public water suppliers to identify new community public water suppliers, or sources of public water supply that may have been created since the 2003 inventory. This exercise also helped identify public water supplies that were no longer in use.

By reviewing information from the counties, water utilities, and data in the PA DEP database, staff was able to review likely areas in the region where water service expanded since the 2003 inventory. DVRPC then reviewed a number of online municipal comprehensive plans and water service area maps in an attempt to further capture areas where water service may have expanded.

Data from the counties, utilities, and municipalities were then added to the 2003 DVRPC base maps to determine growth in the region's WSAs.

³<http://www.drinkingwater.state.pa.us/dwrs/htm/welcome.html>

Sewer

Once again, the 2002 DVRPC inventory of SSAs served as the base data for the inventory update. The base data on sewer infrastructure was supplemented by the SSA data provided by the four counties, but since sewer service is more likely to be provided by smaller municipal utilities than larger regional utilities like drinking water, identifying changes to the SSA inventories was more challenging.

Initial efforts were focused on counties with older inventory data (Montgomery and Delaware) and were also targeted toward municipalities identified as having large unserved areas in previous inventories and in municipalities known to have had active development since 2002.

DVRPC staff reviewed online data from PA Act 537 Sewage Facility Plans, Chapter 94 Reports, municipal and regional comprehensive plans, and municipal websites that identified served sewer areas. Staff reviewed the PA DEP list of updated Act 537 Plans⁴ and reviewed SSAs in municipalities that had updated Act 537 Plans since the time the county inventory was conducted. For example, since the Montgomery County data was published in 2005, DVRPC reviewed SSAs in Montgomery County municipalities that had updated Act 537 plans since 2005. This step allowed DVRPC to focus on areas that most likely had changes to served sewer areas since the county inventories were conducted. Staff also contacted county planners and sewer service providers to help identify recent expansions to SSAs that may not have been accounted for in county inventories.

As with the water service area data, data from the counties, state reports, and municipalities were then added to the 2002 DVRPC base maps to determine growth in the region's SSAs.

New Jersey

In New Jersey, NJ DEP distributes and maintains GIS data for water and sewer infrastructure for the entire state. NJ DEP has periodically updated the GIS of sewer infrastructure, while the WSA data has not been updated since 2003.

The mapping of New Jersey SSAs is currently undergoing revision as part of the state WQMP update, and DVRPC has attempted to utilize the most recent draft data available for this inventory. Once the county WMPs are adopted, if the GIS data on SSAs changes significantly, the analysis for New Jersey may need to be revised.

An important distinction between the Pennsylvania and New Jersey SSA mapping is that New Jersey SSA mapping identifies where sewer service is permitted to occur as opposed to where infrastructure currently exists.

⁴http://www.dep.state.pa.us/dep/deputate/watermgmt/wqp/wqp_wm/537Map/537Plan-SE.htm

Water

DVRPC used the water service area data provided by NJ DEP as the base data for this exercise and investigated potential areas that may have new WSAs to add to the base mapping. DVRPC accessed two major sources of information to identify potential expansions of the WSAs in Burlington, Camden, Gloucester, and Mercer counties. Those sources were active Public Water Supply Identification (PWSID) numbers and private utility GIS data.

The first step in investigating changes to the New Jersey public water systems was to determine if there were any new public water systems created since the last NJ DEP inventory or if the private water suppliers had expanded their service territories. The NJ DEP GIS database of WSAs included PWSID numbers in the attribute table. DVRPC compared the list of PWSID numbers in the attribute table to the active list of public water suppliers listed in the *New Jersey Water Watch*⁵ database. New utilities were identified by comparing the list of PWSID numbers currently active in the four DVRPC counties with the PWSID numbers in the NJ DEP GIS data attribute tables. By comparing these two sources of PWSID numbers, staff was able to identify water utilities that had changed ownership or if new sources had come into existence.

The next step was to acquire existing GIS data on WSAs from the large private utilities that have been expanding service and consolidating smaller water utilities in southern New Jersey. Both the New Jersey American Water Company and Aqua America Water Company – New Jersey Division have been expanding their service in this region, and both utilities provided updated GIS data of their service areas to DVRPC in 2011.

Updated GIS data layers, from the private utilities and information on new utilities identified through the NJ DEP Water Watch database, were added to 2003 NJ DEP base data layer to update the inventory by identifying areas where water utilities have expanded or new territories are being served.

Sewer

The NJ DEP maintains a GIS database of SSAs in the state. In 2010, the New Jersey DEP issued an administrative order requiring an update to the WMP Maps in the state. The updated SSA maps essentially identify the areas in the state where public sewers are permitted by the state WMP as opposed to where sewer infrastructure currently exists. All 21 New Jersey counties have submitted draft WMP maps in 2012 and these draft maps were referenced for this update.

For this exercise, DVRPC solicited the draft SSA maps from the counties in an effort to obtain the most up-to-date information. DVRPC received and included data from Burlington, Gloucester, and Mercer counties in this data review. Digital data on the draft SSAs was not available from Camden County, so these areas were imported into GIS from available paper maps. DVRPC recognizes that NJ DEP SSA data will undergo minor updates as the maps are finalized and adopted by NJ DEP. DVRPC will incorporate those changes as they are adopted by the state.

⁵https://www11.state.nj.us/DEP_WaterWatch_public/index.jsp

NJ DEP originally created the SSA GIS maps by digitizing paper maps of the SSAs. Over time, the department has added—and, in some cases, deleted—SSAs, based on new information about where infrastructure actually exists and the presence of sensitive environmental areas. The result is that older GIS data of SSAs shows a larger SSA land area than the most recent state-approved GIS SSA maps.

Due to changes in the mapping methodology between the current SSA and 2006 maps, comparison between historical SSA data and the most recent update would be inappropriate and would not produce meaningful results. Base statistics regarding where public sewers are allowed in the DVRPC region in New Jersey are included in this report.

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Abstract: The Delaware Valley Regional Planning Commission develops a land-use plan component of the region's Long-Range Plan. In 2012, DVRPC updated the GIS coverages of public water supply systems and sewer service areas in order to help identify appropriate areas for future land development and growth. Information for this report was collected from a number of sources, including the DVRPC member counties, water service providers, sewer service providers, and the states of Pennsylvania and New Jersey.

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