



WATER SUPPLY LANDS PROJECT

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ACRONYMS and DEFINITIONS

305(b) – National Water Quality Inventory Report to Congress (305(b) report) is the primary means of informing Congress and the public about the general water quality conditions in the U.S. The document characterizes water quality, identifies water quality problems and describes programs to restore and protect our waters (www.epa.gov/305b)

CSO – combined sewer overflows; overflow of untreated sewage directly into waterways.

DWSRF – Drinking Water State Revolving Fund; a fund to assist public water systems to comply with the 1996 amendments of the Safe Drinking Water Act. In addition to improvements to infrastructure to eliminate pollutants, the fund promotes source water protection.

FPCCT – French and Pickering Creeks Conservation Trust

NPDES – National Pollution Discharge Elimination System; a permit program administered by the federal government through the Clean Water Act. The National Pollution Discharge Elimination System regulates point source pollution from industrial, municipal and other facilities into surface waters.

SOC – synthetic organic chemicals such as synthetic detergents, fuel additives, solvents, plastics, resins and synthetic fibers

SWAP – Source Water Assessment Public Summary; result of the Federal Safe Drinking Water Act amendments of 1996; a brief description of a public water source's water quality, contaminant evaluation, water protection activities and water protection needs.

TMDL – Total Maximum Daily Load; a calculation of the maximum amount of pollutant that a water body can receive and still meet minimum water quality standards.

Turbidity – sediment discharges into waterways from storm-water sewers and erosion.

VOC – volatile organic chemicals from urban and agricultural run-off, municipal and industrial discharges and landfill leachates

WWT – wastewater treatment discharges; treated sewage discharges into waterways. Most treated effluent remains high in nutrients and toxins, phosphorus, nitrogen and suspended solids.

I. SUMMARY

Non-point source pollution is a major contributor to the degradation of south-eastern Pennsylvania's drinking water quality. Contributing factors to drinking water pollution vary depending on the type of human development adjacent to streams and rivers. It has been established (Sweeney et al, 2004 & Trust for Public Land, 2005) that a large forested riparian buffer improves the quality of drinking water and filters out non-point source pollution. This report looks at the existing water supply lands in the five counties of the south-eastern Pennsylvania area, Berks, Bucks, Montgomery, Chester and Delaware counties. Eleven areas in these counties are identified with large riparian buffer lands that are minimally protected and/or may be subject to development pressure. The major contributing factors to non-point source pollution in these eleven areas are identified and protection strategies are recommended for these buffer lands.

II. INTRODUCTION

For many public water supply systems in the south-eastern Pennsylvania portion of the Delaware River basin; networks of forests, fields, and wetlands provide living buffers filtering out non-point source pollutants. Non-point source pollution (NPS) is caused as rainfall or snowmelt runoff picks up natural and man-made pollutants, depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. (US EPA website, www.epa.gov) These same forests, fields and wetlands are increasingly subject to development pressure, exposing raw water sources to increased amounts and types of contaminants that must be filtered and treated through expensive water treatment plants. At a time when the issues of human health, water quality and quantity, and land use are becoming increasingly intertwined, the trend of increased contaminants in water sources should be of concern for residents, local governments and businesses throughout the region.

Privatization of municipal water systems is a recent trend in the lower Delaware River Basin. The shift from public to private ownership of water systems (including land and improvements) often results in less community control of lands surrounding reservoirs and intakes. In addition to privatization, an associated trend in the region is the sale of water supply buffer lands for development. Pennsylvania Public Utility Commission regulations do not prohibit the sale of buffer lands within a specified distance of water intakes or reservoirs, whether they are owned by municipal authorities, water supply companies, or private landowners.

As the amount of protected natural land adjacent to and upstream of surface water intakes decreases, the effectiveness of the “living filters” that protect drinking water for over 4.5 million people also decreases. The costs of constructing water treatment plants and upgrading their filtration and treatment technology are generally recognized by water suppliers and borne by their customers and ratepayers in the region. Rarely are the cost savings associated with protection and restoration of water supply buffer lands considered. For example, the City of New York is spending over \$1 billion on

land and easement acquisition and riparian buffer restoration to buffer streams in the Catskills region of New York state (in the upper Delaware River basin), as opposed to spending over \$5 billion on construction of water treatment plants.

The width and linear feet of buffers protected can vary for each system, based in part on the realities of land use and ownership patterns in the area. These networks of natural areas are sometimes called “green infrastructure” because of their ecological benefits for local communities. Protecting and restoring these “water supply areas” appropriately reduces the cost of water treatment, and even more importantly, can reduce the risk to human health from unregulated or emerging contaminants such as pharmaceutical and personal care products which are increasingly being detected in raw drinking water sources, and are beyond the capabilities of most wastewater plants to remove.

“The Safe Drinking Water Act amendments of 1996 require states to develop and implement Source Water Assessment Programs to analyze existing and potential threats to the quality of the public drinking water throughout the state.” (US EPA website, www.epa.gov/safewater/protect/swap.html). The Source Water Assessment Program (SWAP) was developed to delineate or map the source water areas for all surface and groundwater supplies, list or inventory the existing or potential sources of contamination, rank or prioritize the risks identified to determine susceptibility of the public water source to contamination. The amendments also required States to notify and involve the public about the risks identified in the Assessment to ensure necessary information to control or prevent contamination is available to protect human health. Thus, SWAP is designed to gather information about the raw water quality of all drinking water sources (both groundwater and surface water), determine the susceptibility of the sources to pollution, and form a framework for the development of local, voluntary source water protection programs as part of a multiple-barrier approach to protect drinking water as it travels from source to tap.

Under the guidance of the PA Department of Environmental Protection, reports known as Source Water Assessments, have been prepared for all public water systems throughout the region. Executive summaries of the reports are being posted to the PADEP website at (www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/SrceProt/SourceAssessment/default.htm) Click on the “SWAP Reports” Tab to locate the desired county. For full SWAP Report information contact the local DEP region Office. Information on SWAPs was obtained from the Pennsylvania Department of Environmental Protection’s e-Library website. SWAPs provide valuable information regarding:

- 1) potential sources of contaminants within the drainage area for a given water intake
- 2) the susceptibility of the water supply system to contamination from those sources
- 3) recommended strategies for addressing and reducing the threat of water supply contamination.

Most importantly for this project, the US EPA Source Water Assessment website discusses the value of land conservation upstream of surface intakes in reducing the threat of pollution-generating land uses to drinking water supplies, and cites the Drinking Water State Revolving Fund (DWSRF) as a source of land conservation funding (www.epa.gov/safewater/dwsrf/source.pdf). While the EPA, through the Drinking Water State Revolving Fund does allow SRF as a source of land conservation funding, Pennsylvania has decided NOT to utilize the SRF for land acquisition purposes. Land preservation has been done primarily using local funding sources such as ballot initiatives (see www.landvote.org), as well as DCNR’s Growing Greener II, along with funding through public/private partnerships and land conservation organizations.

The majority of SWAPs prepared for systems in the Delaware Valley identify runoff from rural and urban land areas as primary sources for pollution and stream impairment. Point-source pollution from industrial and municipal discharges are still a factor in the degrada-

tion of surface water, but non-point source pollution accounts for the majority of impairments in 305(b) list (PA DEP).

The 2002 Federal Clean Water Act requirements (NPDES and TMDL) for communities in the region were adopted to address the serious threats to drinking water and watershed health posed by the non-point source pollutants. However, like the Safe Drinking Water Act Amendments, the Clean Water Act requirements also do not mandate land conservation as a water quality protection strategy. Communities own the responsibility of planning for and protecting their water supplies, and it is important to recognize that the quality of water is directly influenced by the land use surrounding the source. Water protection strategies are best when they include acquisitions of land and easements adjacent to surface water intakes and reservoirs, and riparian and wetland buffers upstream of surface water intakes. Such acquisitions can be accomplished by public-private partnerships of state, county, municipal governments, water companies, and non-profit land trusts and watershed associations.

To locate a Land Trust and find out what conservation activities are happening in your area Please visit the Pennsylvania Land Trust Association website at: <http://conserveland.org>

III. PURPOSE

This report identifies for local governments, watershed associations and land trusts the critical buffer areas for surface intakes and reservoirs associated with public water supply systems. It provides an overview of ownership patterns and conservation opportunities for water supply buffers in the five-county south-eastern Pennsylvania portion of the lower Delaware River basin. The five-counties are Delaware, Bucks, Montgomery, Chester and Berks Counties.

An initial list of twenty-four surface water intakes was evaluated for the region and their SWAPs were reviewed. The study was limited to the systems with SWAPs as of summer 2005, but cannot be considered a comprehensive assessment of all surface water intakes and reservoirs used for drinking water supplies in the region. Thirteen sites were eliminated from this project due to their locations along the Schuylkill River that were already substantially developed with little or no adjacent or upstream land suitable for conservation. The remaining eleven intakes and reservoirs were selected along streams with open land suitable for protection (Fig. 1). Their SWAPs were evaluated and tax parcel data was compiled to determine the owner-

ship patterns upstream from surface water intakes for public drinking water supply systems. The buffers adjacent to and immediately upstream of surface water intakes and/or reservoirs were ranked according to their level of protected status (protected, vulnerable, developed). The water sources were evaluated for existing sources of non-point source pollution and type of existing contaminant in the water source and a value was assigned to the potential buffer areas for their likelihood of reducing these pollutants in the water source (Table 1). Parcels of 10 acres or greater were the focus of this evaluation, as these sizes tend to have the greatest potential for protection as living filters.

The information for each public water supply system covered in the report will be shared as individual data summary sheets with local watershed organizations, land trusts, and municipalities as a catalyst for potential land conservation projects. Data sheets include a map of the surface intake area and associated tax parcels, known protected lands in the area, and summarized information from the SWAPs.

Potential Sources of Contamination	Sediment (soil/gravel) and Turbidity	Nutrients (nitrates-nitrites/phosphorus)	Biocides (insecticides/herbicides)	Heavy metals (lead/zinc)	Volatile Organic Chemicals (VOC's)	Pathogens (fecal coliform bacteria, cryptosporidium)	Road salt (Sodium Chloride)	Value of Buffer Lands in Reducing Impact
Roads/ parking lots	√	√		√	√		√	High
Auto repair shops				√	√			High
Lawns	√	√	√			√		High
Cultivated fields	√	√	√			√		High
Livestock / Pastures	√	√	√			√		High
Construction sites	√	√			√			High
On-lot septic systems					√	√		High

The non-point source pollutants affecting streams in the Delaware Valley originate in a variety of rural and suburban land uses and land management approaches.

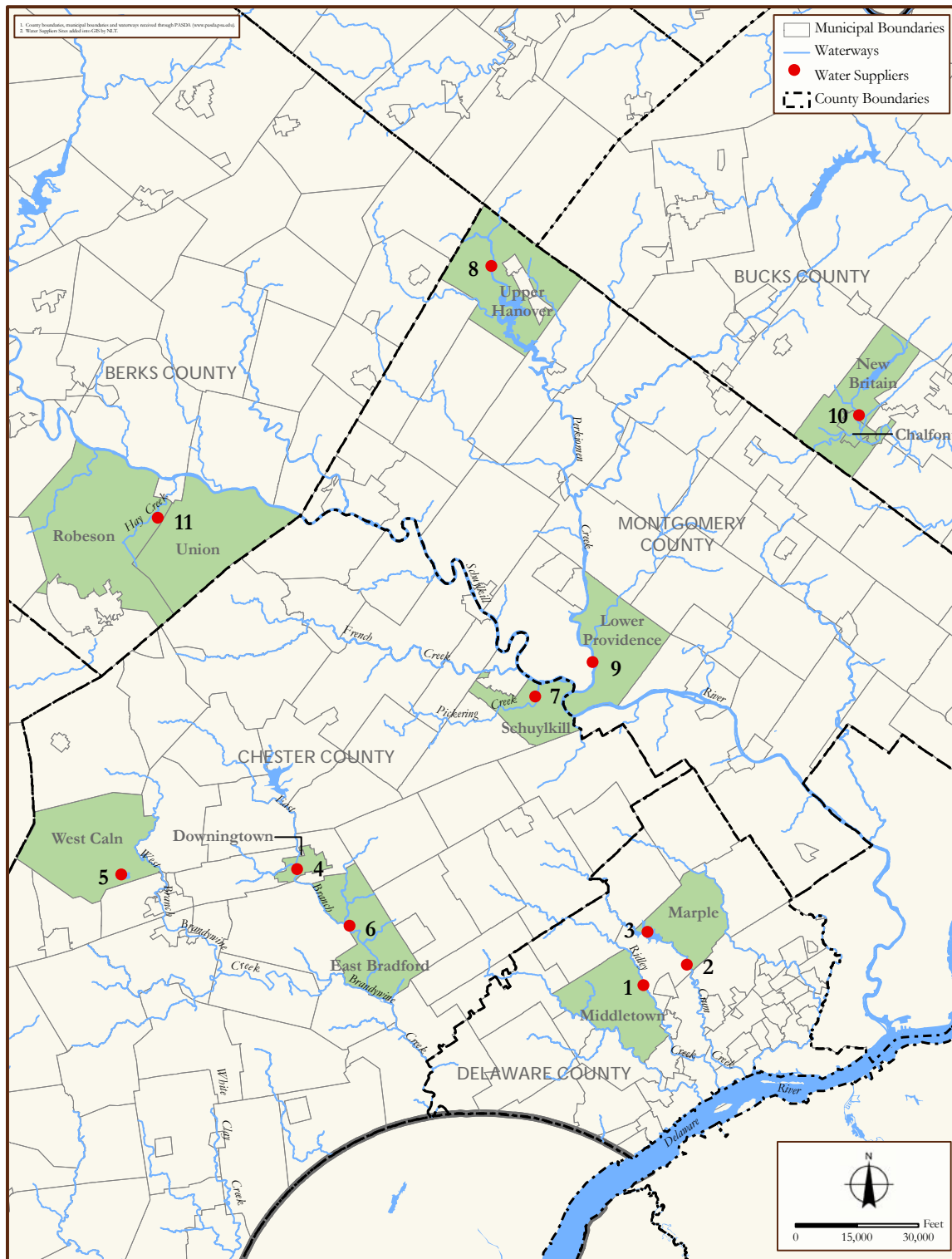


Fig.1: Context Map showing general location of the eleven reviewed water supply buffer areas in the five-county south-eastern PA region. 1) Ridley Creek, Delaware County; 2) Crum Creek, Delaware County; 3)) Springton Reservoir, Delaware County; 4) Downingtown Municipal Authority, Chester County; 5) Rock Run Reservoir/Coatesville Reservoir, Chester County; 6) Ingrams Mill, Chester County; 7) Pickering Creek Reservoir, Chester County; 8) East Greenville Borough Water; Montgomery county; 9) Perkiomen Intake, Montgomery County; 10) North Penn and North Wales Water Authorities, Bucks County; and 11) Birdsboro Municipal Water Authority, Berks County

IV. PROJECT TIMELINE

The Water Supply Buffer Lands project and report were completed as follows:

1) Convene Steering Committee (January 2004)

A Steering Committee for the project was convened in January 2004, and included the following participants:

- Natural Lands Trust – Andrew Pitz and David Harper
- Brandywine Conservancy – Robert Lonsdorf
- Heritage Conservancy – Debra Goldstein (via phone), Sharon Yates
- Pennsylvania Land Trust Association – Andy Loza (via phone)
- Pennsylvania Organization for Watersheds and Rivers – Judith Jordan (via phone)
- Clean Water Action (Eric Wilden)
- League of Women Voters – Julie Kollar

Steering Committee members offered guidance in determining the project need and scope, data sources, and potential implementation strategies for protecting buffer lands. Steering Committee member organizations also agreed to assist with distribution of findings to land trusts, watershed organizations, and municipalities within their respective program areas.

2) Review SWAPs (July 2004)

A total of twenty-four Source Water Assessment Public Summaries were identified and reviewed by NLT staff. These Summaries pertained to surface water intakes in the lower Delaware River basin and were available on the PA DEP website.

3) Compile GIS Data (August – October 2004)

NLT staff prepared a GIS database consisting of a regional map of potential surface water intake locations, and detailed maps for 24 sites including streams, surface water bodies, tax parcels, and ownership data (where available).

4) Review Tax Parcel Data (January – February 2005)

NLT staff evaluated available tax parcel data for lands adjacent to and upstream from surface water intakes and reservoirs.

5) GIS Analysis (April - May 2005)

NLT staff conducted a GIS analysis to determine the protected status of buffer lands adjacent to or upstream of surface water intakes.

Buffer lands were grouped into three categories of Protected Status:

- Protected ~ substantial buffer areas are adequately protected as park lands or open space not subject to development.
- Vulnerable ~ buffer lands are threatened by development.
- Developed ~ buffer lands are developed.

At this stage, decisions were made to eliminate 13 intake sites located within largely developed areas, and those drawing water directly from either the Schuylkill River or the Delaware River. The latter decision was made based on the likelihood that protection of buffers on the Schuylkill and Delaware Rivers would have little or no beneficial influence on surface water quality in vast upstream watersheds.

6) Generate Summary Sheets for Each Site (June - December 2005)

Summary sheets were generated for eleven surface water intakes and reservoirs. These sheets include data on watershed location, municipality and county, number of customers, average daily water consumption, top contaminants and sources, buffer land status; and a map of the site showing the water resources and parcels 10 acres or greater (both protected and unprotected).

7) Distribute Summary Reports (2006)

NLT is distributing the summary sheets for each intake to Steering Committee members and Local Watershed Groups, Land Trusts, and Municipalities.

V. FINDINGS

The following table provides an overview of water supply systems included in this assessment, and focuses on a summary of the buffer lands, including protected areas, developed areas, and areas recommended for protection. It summarizes the more detailed data included in each individual site assessment.

TABLE 2 – SUMMARY OF WATER SUPPLY INTAKES AND BUFFER LANDS						
Intake	Watershed Location	Municipality/ County	Number of Customers/ Individuals	Average Daily Water Consumption (mil- lions of gallons per day or MGD)	Top Contaminants and Sources	Buffer Land Status
Ridley Creek ~ Aqua PA, Ridley Division	Ridley Creek	Middletown Twp. (just west of Media) Delaware County	13,333 customers/ 40,000 individuals	4.74 MGD	Metals, turbidity, SOCs, sodium chlo- ride from road de-ic- ing, chemical spill potential along roads, railroads, bridges. Nitrate/Nitrite, pesticides/herbicides, VOC's, SOC's in runoff from ag. fields, golf courses, lawns. Septic.	41.3 acres protected on both sides of stream at intake. Elwyn Institute lands upstream in need of protection. Ridley Creek State Park (2,600 acres) and Tyler Arboretum (600 acres) provide a large wooded buffer 1 mile upstream.
Crum Creek ~ Aqua PA, Main Division	Crum Reservoir	Marple Township, Nether Providence Township, Delaware County	200,000 customers		Same as above	Network of 82.3 acres of buffer owned by Aqua PA, including Crum Reservoir and narrow buffer, and upstream land. Large lots upstream in need of buffer protection/restoration.
Springton Reservoir ~ Aqua PA, Main Division	Crum Creek (provides storage for Crum Creek intake)	Newtown Township Upper Providence Township, Delaware County	200,000 customers	n/a	Same as above. Elevated phosphates noted as a problem.	Narrow (50 – 100 foot) buffer owned by Aqua PA (576.8 acres), includes reservoir and buffer lands upstream near Rt. 3. Most adjacent land developed. Unprotected parcels upstream.

TABLE 2 – SUMMARY OF WATER SUPPLY INTAKES AND BUFFER LANDS, *cont'd*

Intake	Watershed Location	Municipality/ County	Number of Customers/ Individuals	Average Daily Water Consumption (mil- lions of gallons per day or MGD)	Top Contaminants and Sources	Buffer Land Status
Downingtown ~ Downingtown Municipal Water Authority	East Branch Brandywine Creek (above Downingtown) Marsh Creek Lake is main allocation.	Downingtown Borough, Chester County	3,000 customers/ 10,000 individuals	1.2 MGD (permitted to 3.8 MGD)	Metals, turbidity, SOC's, sodium chloride from road de-icing, chemical spill potential along roads, railroads, bridges. Nitrate/Nitrite, pesticides/herbicides, VOC's, SOC's in runoff from ag. fields, lawns.	Kerr Park (45 ac.), The Ponds (12 ac.) adjacent to intake. Upstream, Struble Trail, Brandywine Conservancy easements buffer the stream, and Marsh Creek Lake is buffered by a 1,700 acre State Park.
Rock Run Reser- voir ~ PA American Water Company, Coatesville System	Coatesville Reservoir (Rock Run), West Branch Brandywine Creek (below Chambers Lake)	West Caln Township, Chester County	8,800 customers 30,000 individuals (system includes other source on W. Branch Octoraro).	3.2 MGD	Metals, turbidity, SOC's, sodium chloride from road de-icing and chemical spill potential along roads, railroads, bridges. Nitrate/Nitrite, pesticides/herbicides, VOC's, SOC's in stormwater run-off from agricultural fields, golf courses, lawns.	Coatesville Reservoir has narrow buffer. Hibernia County Park (1,000 ac.) protects W. Branch Brandywine intake.
Ingrams Mill Filtra- tion Plant ~ Aqua PA, West Chester Division, Brandy- wine Creek	East Branch Brandywine Creek below Route 322	East Bradford Town- ship, Chester County	9,666 customers/ 29,000 individuals	3.7 MGD (Ingrams Mill) .8 MGD (Fern Hill)	Metals, turbidity, SOC's, sodium chloride from road de-icing and chemical spill potential along roads, railroads, bridges. Nitrate/Nitrite, pesticides/herbicides, VOC's, SOC's in stormwater Runoff from agricultural fields, golf courses, lawns.	Natural Lands Trust easements directly adjacent to and upstream from intake. Brandywine Conservancy conservation easements on some lands adjacent to and upstream of intake. Fern Hill Reservoir has narrow buffer.

TABLE 2 – SUMMARY OF WATER SUPPLY INTAKES AND BUFFER LANDS, cont'd

Intake	Watershed Location	Municipality/ County	Number of Customers/ Individuals	Average Daily Water Consumption (mil- lions of gallons per day or MGD)	Top Contaminants and Sources	Buffer Land Status
Pickering Creek Intake ~ Aqua PA, Pickering Water Treatment Plant	Pickering Creek (Reservoir) – one of 3 intakes	Schuylkill Township, Chester County	570,000 customers	10 MGD	Untreated sewage (CSO's, septic), treated sewage (WWT discharges) urban and agricultural runoff	Narrow buffer around reservoir owned by Aqua PA, ___ acres NLT easement, ___ acres FPCCT easements. Two large parcels adjacent to reservoir currently under development. Numerous upstream parcels unprotected.
East Greenville Borough Water Department ~ East Greenville Water Treatment Plant – PWS ID #1460023	Perkiomen Creek, just above Green Lane Reservoir (near East Greenville)	East Greenville, Montgomery County		250,000 gallons per day	Untreated sewage (septic tanks), agricultural runoff, spills and accidents	
Perkiomen Intake ~ Aqua PA, Pickering Water Treatment Plant – PWS ID #1460073	Perkiomen Creek (near Audubon) – one of 3 intakes for Pickering system	Lower Providence Township, Montgomery County	570,000 customers	20 MGD	Treated sewage (WWT discharges), untreated sewage (CSO's), Urban/ Residential runoff, Agricultural runoff,	

TABLE 2 – SUMMARY OF WATER SUPPLY INTAKES AND BUFFER LANDS, *cont'd*

Intake	Watershed Location	Municipality/ County	Number of Customers/ Individuals	Average Daily Water Consumption (mil- lions of gallons per day or MGD)	Top Contaminants and Sources	Buffer Land Status
North Penn and North Wales Water Authorities ~ Forest Park Water Filtration Plant – PWS ID #1090132	N. Branch Neshaminy, Pine Run. Point Pleasant Pump (Delaware River)	Chalfont Borough, Bucks County	27,000 customers (N. Penn) and 25,000 customers (N. Wales) with 125,000 residents.	13.5 MGD	Transportation corridors (road de-icing, spill potential along roads, bridges, railroads), auto repair shops (product disposal), agriculture lawn care, golf courses.	
Birdsboro Municipal Water Authority PWS ID #3060010	Indian Run Reservoir, Dyer-Trap Rock Quarry, Stinson Run Reservoir, and Hay Creek	Union Township, Robeson Township, Berks County		.5 MGD	Petroleum, hydrocarbons from accidents or spills along Route 82 or Geigertown Road, pipeline leaks, metals and organic chemicals from mining activities at Birdsboro Materials Quarry, bacteria, viruses, pathogens, cryptosporidium associated with swimming and agricultural runoff	Approximately 1,800 acres owned by Authority, not protected. Candidate for state and federal funding. Near French Creek State Park.

VI. SUMMARY SHEETS

Summary sheets for the eleven watershed areas follow.

VII. CONCLUSIONS AND NEXT STEPS

The following minimum standards for riparian and wetland buffers are recommended for land areas adjacent to or upstream of surface water intakes and reservoirs in the Delaware Valley. These include criteria developed by the Stroud Water Research Center, the Chester County Water Resources Authority, and the US Forest Service.

- 100 feet of forested cover on either side of a stream or reservoir (provide for reforestation or afforestation, if necessary). Extend buffer 10 feet for each 4-degree increase in slope.
- 25 (100) feet of natural vegetation (meadow, successional old field, or forest) adjacent to each delineated wetland.
- Extend buffer areas at least 1,000 feet upstream of surface water intakes and reservoirs.
- Provide an additional buffer zone of 1,000 feet in width where land use is limited to low density uses where impervious surface coverage is less than 5% and no facilities are permitted where hazardous materials are stored or handled. (SEE SWAP designations)

These standards may be achieved through a combination of strategies, including riparian buffer ordinances, purchase or donation of conservation easements, and purchase or donation of land in fee by municipalities, land trusts, or watershed organizations.

The Safe Drinking Water Act amendments of 1996 included a provision for federal funds to be used for land and easement acquisition to protect drinking water supplies. Federal funds are distributed to states such as Pennsylvania, which administer a Drinking Water State Revolving Fund (DWSRF) program. Loans are granted to community public water systems for building or upgrading water treatment plants and other water supply construction projects. A state also has the option of designating up to 10% of its federal grant specifically for the acquisition of land and conservation easements, as well as for other source water protection activities. The conditions for this land acquisition set-aside as stated in the DWSRF Program Guidelines are:

“A State may provide assistance, only in the form of a loan, to a public water system to acquire land or a conservation easement from a willing party for the purpose of protecting the system’s source water(s) and ensuring compliance with national drinking water regulations.

If a State elects to use this set-aside, the State shall use a priority setting process to decide what land or easements can be purchased. The process must include a requirement that public water systems demonstrate how the land or easements to be purchased will directly promote public health protection and/or compliance with national drinking water regulations. The State must seek public review and comment on this process.” (www.epa.gov/safewater/dwsrf/)

EPA loans for land acquisition and conservation easements can only be given to public water systems. Therefore, local land trusts, community groups, or others that are interested in easements and land acquisition opportunities for protecting drinking water quality should work cooperatively with PA DEP and local water suppliers to request funds from the DWSRF. Land trusts, county and municipal governments with expertise in identifying properties that qualify for the funding or that have experience in negotiating acquisitions from willing sellers can offer their assistance to water suppliers. Such partnerships may complement the ongoing work of organizations to preserve parts of a watershed or ground water area for other purposes.

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