

# Berks County Source Water Protection Program May 2017



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Berks County  
Source Water Protection Program

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# Berks County

## Source Water Protection Program

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# Glossary of Water Terms

**Aquifer** – a natural underground layer of sand, gravel, or rock that contains water.

**Aquifer or Groundwater Recharge** - Recharge is the rate at which precipitation infiltrates in the ground to supply water to groundwater wells or springs.

**Community Water System** – a water system that supplies drinking water to 25+ people year-round in their residences.

**Delineate** – to mark the outline of a groundwater or surface water study area.

**Emergency Response Plan** – a preparedness plan developed by a municipality to form consistent procedures in an emergency situation.

**Geology** – The study of the Earth, and the Earth’s materials and processes.

**Groundwater** – underground water that supplies wells and springs.

**Intake** – a structure installed in a surface water body (lake, creek, or reservoir) that draws raw water for the treatment of drinking water.

**Point Source Pollution** – pollutants that come from a single exit point, like a pipe.

**Management Strategies** – approaches taken by the water supplier and the Steering Committee to protect the sources of drinking water.

**Municipal Separate Storm Sewer System (MS4)** – stormwater management program that is intended to improve waterways by reducing contaminants in runoff.

**Non-Point Source Pollution** – pollutants that are contained in water runoff from construction, roads, agriculture, or residential areas.

**PSOCs – Potential Sources Of Contamination** – areas or activities that may potentially have a negative impact on the drinking water source.

**Public Water System** – a water system that supplies water to 25+ people at least 60 days per year.

**Source Water** – the wells, springs, reservoirs, or lakes in their natural state, prior to treatment for drinking use.

**Study Area** – the land regions that may impact the drinking water source.

**Surface Water** – water sources that are open to the air, such as rivers, lakes, streams, and reservoirs.

**Time-of-Travel (TOT)** - USGS data for the network of streams, drainage area, and mean annual stream velocity is used to compute how long it takes water to move from the upstream end of a stream segment to the downstream end. This is typically used for surface water sources to determine a 5-hour and 25-hour TOT from an intake.

**Topography** – graphic display of the Earth’s surface including the elevation, and position of natural and man-made features.

**Watershed** – the land area from which water eventually drains to a lake, river, or reservoir.

**Watershed Management Area (WMA)** – a portion of an existing delineated protection zone, the goal of which is to select an area that is manageable for the water system and/or steering committee in terms of keeping an inventory of potential sources of contamination and implementing source water protection strategies. Criteria for the size, location, and extent of the WMA includes input from the steering committee, and natural features and man-made structures that have an effect on the flow of water to the sources.

**Wellhead Protection Area** – the land area around a well or wellfield which is proactively managed to prevent contamination.

**Zone I** - Zone I is a circle around the well or spring with a radius between 100 and 400 feet, with the greatest potential for contamination.

**Zone II** - Zone II is the surface representation of the “capture zone” of the well, spring, or wellfield, the amount of water contributing to a well or spring in 10 years or less. The zone is usually measured in acres.

**Zone III** - Zone III, or the zone of contribution, is the portion of the watershed that can contribute water to the capture zone, usually measured in acres or miles.

**Zone A** - It is the area within 0.25 miles on either side of the stream, from a point 0.25 miles below the intake to upstream locations that represent a 5-hour time-of-travel (TOT) to the intake. In other words, water flowing anywhere in Zone A is estimated to reach the intake within 5 hours.

**Zone B** - Zone B encompasses the watershed extending upstream of Zone A to a 25-hour time-of-travel along the tributary streams. Water flowing in Zone B is estimated to reach the intake within 25 hours.

**Zone C** - Zone C is typically the remainder of the watershed. Water flowing in Zone C is estimated to reach the intake in more than 25 hours.



# Acronym List

<b>AST</b>	Aboveground Storage Tank
<b>BMP</b>	Best Management Practice
<b>CD</b>	Compact Disc
<b>CERCLIS</b>	Comprehensive Environmental Response, Conservation, & Liability Information System
<b>DCNR</b>	Pennsylvania Department of Conservation & Natural Resources
<b>DEM</b>	Digital Elevation Model
<b>DEP</b>	Pennsylvania Department of Environmental Protection
<b>EPA</b>	Environmental Protection Agency
<b>ERP</b>	Emergency Response Plan
<b>ERRI</b>	Environmental Resources Research Institute
<b>ESRI</b>	Environmental Systems Research Institute
<b>GMS</b>	Groundwater Modeling System
<b>MGD</b>	Million Gallons per Day
<b>MODFLOW</b>	Modular Three-Dimensional Finite-Difference Ground-Water Flow Model
<b>MODPATH</b>	Particle Tracking Post-Processing System
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>NWIS</b>	National Water Information System
<b>PAGWIS</b>	Pennsylvania Ground Water Information System
<b>PENNDOT</b>	Pennsylvania Department of Transportation
<b>PEST</b>	Model-Independent Parameter Estimation

<b>PG</b>	Professional Geologist
<b>PSOC</b>	Potential Source of Contamination
<b>PSU</b>	Pennsylvania State University
<b>PWSID</b>	Public Water System Identification Number
<b>RCRA</b>	Resource Conservation & Recovery Act
<b>SCAS OSU</b>	Spatial Climate Analysis Service, Oregon State University
<b>SDWA</b>	Safe Drinking Water Act
<b>SSM</b>	Spotts, Stevens and McCoy
<b>SWAP</b>	Source Water Assessment and Protection program
<b>SWP</b>	Source Water Protection Plan
<b>SWPTAP</b>	Source Water Protection Technical Assistance Program
<b>TRI</b>	Toxic Release Inventory
<b>USDA</b>	United States Department of Agriculture
<b>USGS</b>	United States Geological Survey
<b>UST</b>	Underground Storage Tank

# **Berks County**

## **Source Water Protection Program**

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### **Executive Summary**

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Clean, safe drinking water is often taken for granted. Many people have no idea where their water comes from, how it is purified, or how it arrives at their sink. Protecting the raw water supply has been increasingly recognized as a critical element in the overall mission of delivering a safe and reliable supply of drinking water to consumers. Comprehensive source water protection not only benefits the water supply, but ultimately the economic, social, and environmental well-being of a community.

### **Project Background**

The County of Berks wishes to preserve and improve the safety of drinking water supplies today and into the future. Historic concerns include the possibility of contamination from various sources with a focus on agricultural activities, stormwater runoff, and transportation corridors. In 2016, the Berks County Water and Sewer Association (BCWSA) with assistance from the Berks County Planning Commission (BCPC) applied for assistance from the Pennsylvania Department of Environmental Protection (DEP) Source Water Protection Technical Assistance Program (SWPTAP) to develop a thorough and comprehensive source water protection program for the entire county.

The objective of this project is to develop a source water protection program that incorporates existing and new delineations for drinking water sources not previously covered by a source water protection plan, as well as identifying management strategies that can be implemented across the region. The benefit of systems working together and pooling resources to protect the county's drinking water sources is one of the main goals of the Berks County Source Water Protection Program.

### **Description of Study Area**

The County of Berks consists of 72 municipalities and covers a total area of 864 square miles in southcentral Pennsylvania. During the publication of this study, over 411,000 people make their home in the county, and community water systems (CWS) provide drinking water to 70% of the population.

The major land use in Berks is agricultural operations, which covers 206,688 acres, or 37% of the county. 35% of the county (195,323 acres) is comprised of undeveloped land, which includes forested areas, open spaces, and water bodies. Residential development occupies 16%, industrial and commercial land encompass 7%, and transportation corridors comprise the remaining 5% of land use.

Berks County is part of the United State Geologic Survey (USGS) Hydrologic Unit 2 (HUC02) within the Mid-Atlantic Region. The majority of the county (90%) lies within in the Delaware River Basin, with the remaining 10% is located in the western and southern parts of Berks County and drains to the Susquehanna River Basin. Within the Delaware River basin, the Schuylkill River watershed dominates the area. Berks County comprises approximately 40% of the entire Schuylkill River watershed, and major tributaries to the Schuylkill River include the Maiden Creek, the Tulpehocken Creek, and the Manatawny Creek. Several water systems with approved source water protection plans also withdraw from the main stem of the Schuylkill River. Other watersheds that originate outside of the area that contribute to Berks County waterways include the Little Lehigh River, the Perkiomen Creek, and tributaries to the Susquehanna River basin.

Major transportation routes through the study area include Interstates 78 and 176, the Pennsylvania Turnpike (Interstate 76), State Route 222, State Route 61, and State Route 422. Six entities operate railroads within Berks County, which include Norfolk Southern; Reading Blue Mountain and Northern Railroad; Kutztown Transportation Authority; Allentown and Auburn Railroad Company; East Penn Railroad LLC; and Eastern Berks Gateway Railroad Company. The railway systems carry numerous products to and through the region.

Berks County is located within the Blue Mountain and Great Valley Sections of the Ridge and Valley physiographic province, the Reading Prong Section of the New England physiographic province, and the Gettysburg-Newark Lowland and Piedmont Lowland Sections of the Piedmont physiographic province. The county is fortunate to have numerous streams designated by DEP as Exceptional Value (EV) and High Quality (HQ). These streams require special attention to maintain their excellent water quality, and can be found throughout Berks County

Between 2003 and 2012, the Environmental Protection Agency approved several Total Maximum Daily Load (TMDL) regulations for impaired waters in Berks County. Impairments include pH, siltation, nutrients, PCBs, metals, and other pollutants. A TMDL determines a pollution reduction

target necessary for a waterway to meet a “fishable/swimmable” goal of the Clean Water Act. The specific objective of each individual TMDL is to achieve the water quality standards set by the DEP. Many other studies and reports have been conducted within Berks watersheds, and are too numerous to provide a comprehensive inventory.

### **Overview of Participating Water Systems**

Community water systems with an approved Source Water Protection Plan or designated as Substantial Implementation were invited to participate in the development of this program. Other CWS without an approved plan were encouraged to enter the SWPTAP program, as well as provide input during Steering Committee meetings. As of the development of this program, 16 community water systems have an approved plan, and 9 have met the standards required for Substantial Implementation. An additional 4 drinking water suppliers have plans in progress. An update of additional systems participating in the ongoing program will be provided in subsequent Annual Reports to the DEP-Southcentral Region.

### **Drinking Water Resources**

A significant purpose of the source water protection program is to delineate protection zones around each of the system’s water sources. Though private wells are not discussed in this program, these water sources are located within a watershed, and susceptible to any contaminant that might threaten a public water supply. Of the 864 square miles in Berks County, DEP-approved protection zones encompass approximately 410 square miles, over 47% of the county. Methods of how the protection zones were developed for the community water systems are described below.

For the groundwater wells discussed in this report, the protection zones were delineated using a steady-state hydrogeologic computer model and other calculations based on well information, groundwater flow patterns and watershed configuration. Zone I is a 100 to 400 foot radius around the well head, the smallest of the three zones, and is also the most stringent from a protection standpoint. Zone II is the surface representation of the capture zone. This area is delineated by a volume of water, in an aquifer, that is diverted to a well. Zone III, or the zone of contribution, is the upgradient extent of the subbasin that can contribute water to the capture zone.

The determination of the Zone I area of a spring source follows a more stringent approach than the well methodology because of the spring’s more vulnerable nature. For springs with flows of greater than 100,000 gallons per day, Zone I is a 400-foot radius circle that is positioned so the circle extends

750 feet upslope and 50 feet downslope from the spring. For springs with flows of less than 100,000 gallons per day, Zone I is a 200-foot radius circle that is positioned so the circle extends 350 feet upslope and 50 feet downslope from the spring.

The surface source protection zones were determined using a geographic information system (GIS) and hydrologic data from the United States Geologic Survey (USGS). By adding up the travel times along a series of stream segments, the model determines the 5-hour and 25-hour time-of-travel boundaries. The water quality in a creek, lake, or reservoir is affected by the quality of all the water flowing into it and all the land upstream of it. Zone A of a surface water source is the most protective zone, and is the area within 0.25 miles on either side of the stream, and 0.25 miles downstream of the intake. Zone B of a surface water source encompasses the drainage area extending upstream beyond Zone A to a 25-hour TOT from the intake along the contributing streams. If a contributing watershed is less than 100 square miles, the remainder of the watershed outside of Zone A is included in Zone B. For watersheds greater than 100 square miles, Zone C is typically the remainder of the watershed outside of Zone B.

### **Potential Sources of Contamination (PSOCs)**

Examples of non-point potential sources of contamination, where contamination occurs over a widespread area, include stormwater runoff from agricultural fields, residential, commercial, and industrial properties. Point sources, where contamination originates from a single discharge point, can include industrial or commercial facilities, permitted pipe discharges, and environmental cleanup sites.

Two categories of non-point source concerns were identified for this project. Agriculture comprises approximately 37% of Berks County land use, and has been the highest concern for many partners, as this runoff contains sediment and nutrients harmful to waterways and groundwater that provide drinking water. Residential and commercial stormwater is also a major issue, with Municipal Separate Storm Sewer System (MS4) programs developed under new regulations.

Committee members expressed concerns on point-source PSOCs such as facilities regulated by the Environmental Protection Agency, remediation cleanup sites, mines, and water discharge points.

### **Contingency Planning**

In the event of an accident or spill that has the potential to impact the source water of Berks County community water suppliers, the water systems will initiate their Emergency Response Plans (ERP) to minimize any potential impacts. Each water system maintains a current ERP and updates it regularly. Plans should include emergency contacts and provisions for alternate sources of water. Berks County water systems will work closely with local and county first responders in the event of a spill or accident that may threaten their water supply. Some water suppliers in Berks County are members of PA WARN and the Delaware Valley Early Warning System. Several water suppliers have interconnects with neighboring water systems and also have plans to receive bulk water deliveries in the event of an emergency. The Berks County Department of Emergency Services offers the opportunity for water systems to participate in the Knowledge Center, the database for emergency response events. This service notifies authorized individuals of events within the county that may affect waterways.

### **New Sources**

As part of an approved source water protection program, community water suppliers must review steps that would be taken to replace their sources in the event that an existing source becomes unusable. If a contamination event occurred that results in a water supplier losing a source, they would work with DEP and other partners to identify, develop, and permit additional sources. Water suppliers are continually reviewing opportunities in their service areas for potential ways of being proactive, ensuring they have available supply for their customers into the future, which includes actively pursuing alternative supplies and increased water production to address growth and system flexibility.

### **Management Strategies**

The SWP Committee will use a variety of management options, including public education and outreach, to develop a comprehensive approach to source water protection and protect water supplies from PSOCs. The Committee members will work cooperatively with local municipalities, the Berks County Water & Sewer Association, Berks County Conservation District, Berks Nature, Schuylkill Action Network, the Berks County MS4 Steering Committee, and other partner organizations to implement this source water protection program.

### **Implementing and Sustaining the Berks County Source Water Protection Program**

To assess possible management strategies for the source water protection areas in the County, it is important to understand the goals and objectives of the organizations participating in the Committee. The Committee supports the concept of “One Water” – source water, stormwater, and wastewater are all interconnected, and each can have a profound effect on the water resources available to everyone.

Participating organizations recognize that the sustainability of this source water protection program is the only way to ensure successful improvements to the watersheds over time. During the development of this program, the need for ongoing leadership and financial support after the implementation/management plan has been completed was discussed among the organizations.

For ongoing leadership of this program, a list of suggested responsibilities was shared with the group, with the primary task being the coordination of County-wide implementation goals and reducing duplication of effort. After reviewing the preliminary list of duties, it was determined that it would be appropriate for the Coordinator (or host organization) to receive compensation for a leadership position. Compensation then required a source of financial support. Several options were discussed, including grant applications and donations from member organizations.