



READING AREA
Water Authority

Source Water Protection Program
September 2019

Reading Area Water Authority
Berks County, PA
Source Water Protection Plan Update

Executive Summary

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 Reading Area Water Authority (RAWA, PWSID# 3060069) provides drinking water to approximately 125,000 people in Berks County, southcentral Pennsylvania. The first public supply of water delivered in Reading was introduced in 1821 by the Reading Water Company. The Maidencreek Filter Plant was constructed in 1935, and can treat a capacity of 40 million gallons of water per day from Lake Ontelaunee, the primary water source. The Reading Area Water Authority was established in 1994.

RAWA wishes to preserve and improve the safety of its drinking water supply for its customers today and into the future., and is concerned about the possibility of contamination from agricultural activities around the watershed, which can trigger algae blooms in low-flow conditions. In 2004, RAWA applied for assistance from the Pennsylvania Department of Environmental Protection (DEP) Source Water Protection grant program to develop a thorough and comprehensive source water protection plan. In 2007, DEP approved RAWA's source water protection plan for implementation.

The objective of this project is to update the 2007 source water protection plan, with new delineations for the RAWA water sources, educate the public on the importance of source water protection, plan for potential pollution events, and maintain compliance with DEP's Chapter 109 regulations.

Description of Study Area

Lake Ontelaunee is a 1,082-acre man-made lake with a storage capacity of approximately 3.88 billion gallons of water, and is designated for protection of Warm Water Fishes (WWF). Surface water enters the lake primarily from Maiden Creek, and another tributary, the Saucony Creek. Numerous other streams are present in the watershed, including several small tributaries that flow directly into the lake. Water discharged from Lake Ontelaunee flows over the dam at Route 61, through the lower Maiden Creek, and into the Schuylkill River, which joins the Delaware River to eventually empty into the Atlantic Ocean. Portions of property around the Lake are available to the public for recreational activities including biking, walking, fishing, and hunting.

Overall, the Maiden Creek Watershed covers approximately 216 square miles, and includes sections of 24 municipalities in Berks and Lehigh counties.



The watershed is comprised of three different sections of two physiographic provinces, which produce a variety of landforms and soils within a relatively small area. The southern slope of Blue Mountain is in the Appalachian Mountain section of the Ridge and Valley Province. The southern boundary of the watershed, including the north face of Irish Mountain and Sand Hill, lies within the Reading Prong Section of the New England Province. Elevations range from approximately 1,675 feet above sea level along Blue Mountain to 260 feet at the mouth of Maiden Creek.

Farmland and forest dominate the watershed; however, it also includes rural, low-density, and high-density residential areas. Two major highway corridors, Interstate 78 and Pennsylvania Route 222, traverse the watershed and include some commercial and industrial development.

Previous Studies

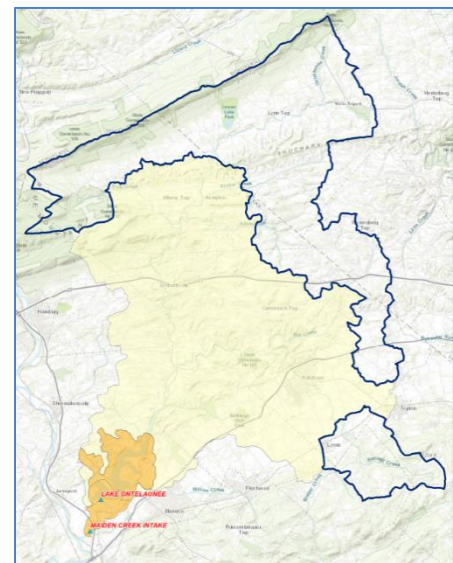
This study builds upon previous work completed for the Reading Area Water Authority. The original watershed assessment was conducted in 1998 for the U.S. Environmental Protection Agency (EPA), which found that potential contaminants to Lake Ontelaunee included bacterial contamination from humans and animals, sediment, and algae growth. Additional concerns were potential pollution from nutrients and pesticides flowing into local waterways from nearby agricultural operations, and point-source discharges from upstream industrial and commercial facilities.

Based on a study completed in 1994, Lake Ontelaunee was placed on the 1996 303(d) list of impaired waterways, describing Lake Ontelaunee as impaired for nutrients (phosphorus and nitrates) and sediment. This placed a priority on the development of a Total Maximum Daily Load (TMDL) document, approved by EPA Region III staff in 2004. The TMDL calls for significant reductions in phosphorus and sediment in cropland and pasture, urbanized areas, and septic systems.

These assessments prompted RAWA to develop and implement a comprehensive source water protection plan, through a grant program offered by the Pennsylvania Department of Environmental Protection. In 2004, RAWA began a formalized plan that included a rigorous delineation of the water flowing to their intake, an inventory of Potential Sources of Contamination, specific management strategies to reduce potential contamination of their sources, contingency planning, and new source review. The plan was approved for implementation by the DEP in 2007.

In 2016, RAWA revised their potential contaminants inventory and time-of-travel study through an updated computer model that assessed overland flow from each potential contaminant location to the downstream receiving stream, flow through Lake Ontelaunee to the primary intake at the dam, and in-stream flow from the Maiden Creek headwaters to the Lake Ontelaunee confluence and secondary intake.

The time-of-travel study completed in 2016 provided the basis for the 2019 update. For this project, SSM staff created overland flow pathways between each new PSOC and the existing stream network, using ArcGIS software and topographical contours. High flow velocity was used for the stream network, since in most cases, potential contaminants would not reach the stream except during a rain event. Once velocities were applied to each segment in the network, time-of-travel could be calculated. Adjustments were then made to account for Lake Ontelaunee lag time, as was done in the 2016 study.

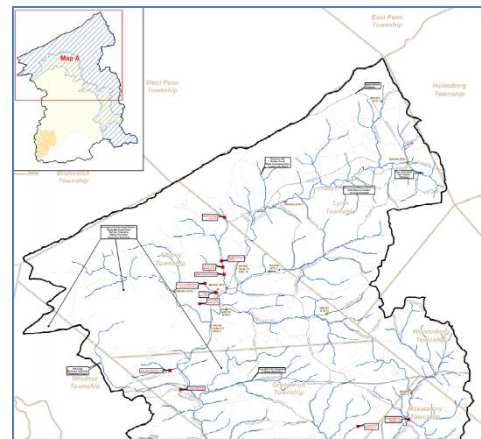


Many other studies have been conducted within the Maiden Creek Watershed by local agencies and organizations. Early reports focused on the current state of the watershed and evaluated options for stormwater and water resources management. In 2005, the Schuylkill Action Network obtained EPA

grant funding to establish Best Management Practices (BMPs) on farms with small waterways in the watershed, and conduct pre- and post-project water quality monitoring. In 2014, the Delaware River Watershed Initiative provided additional funding to concentrate on specific areas of improvement, based on impairments to the Maiden Creek and other tributaries that need assistance to reduce nutrients and sediment flowing to the Schuylkill River.

The Lower Maiden Watershed Implementation Plan was developed in 2017, and submitted for DEP and EPA review. This plan focuses on the Moselem Creek and three tributaries that are impacted by agricultural activities within the watershed.

In 2018, the Berks County Conservation District completed the Maiden Creek Watershed Water Quality Report. This study was conducted with the purpose of providing a snapshot of the long-term water quality trends within the watershed, and help prioritize restorative best management practices in selected focus areas of the Middle Schuylkill. RAWA provided their watershed monitoring results database as part of this initiative. The study recommended that Lake Ontelaunee be closely monitored to determine how it processes potential increases in sediment and nutrient runoff.



The USDA-Natural Resource Conservation Service's *National Water Quality Initiative* (NWQI) invests in targeted assistance to farmers in selected watersheds to improve the water quality in high-priority streams. In 2019, the Maiden Creek Watershed was selected for a pilot study area, with meetings and projects to improve water quality to be prioritized through partnerships with local organizations. A comprehensive Watershed Assessment was developed by NRCS staff and submitted for evaluation for project selection. RAWA provided much of the water quality information for this document.

Description of Water System

The Reading Area Water Authority directly provides drinking water to approximately 87,000 people in Reading, Pennsylvania and several surrounding communities, and can serve up to 125,000 people through interconnections with other water systems. The primary water source is Lake Ontelaunee in

the Maiden Creek Watershed, located northeast of the City of Reading in Berks County. A supplemental intake is located downstream of the Ontelaunee Dam, in the Maiden Creek.

The Maidencreek Filter Plant is permitted to withdraw up to 35 million gallons of water per day from Lake Ontelaunee. The plant utilizes conventional treatment systems, including disinfection, filtration, and other controls. The treated water from the filter plant flows by gravity to two 10-million gallon water storage basins, then to the Maidencreek Pumping Station for distribution to customers. RAWA has several one-way interconnections with neighboring water systems where RAWA can provide water, but not receive it, as well as two-way interconnections, where either system can provide or receive water.

RAWA has also purchased over 2,000 acres within the watershed to help keep it in a natural state, and staff plants approximately 1,000 trees each year on city property around the lake to reduce additional siltation.

Public Education and Partnerships

The Reading Area Water Authority's vision includes a team approach to Source Water Protection through partnerships with watershed stakeholders. RAWA staff serves on the Berks County Source Water Protection Committee, and offers collaboration on projects within the Maiden Creek Watershed. This committee will also serve as a partner in RAWA's continued participation in endeavors for improving Lake Ontelaunee and the entire watershed.



RAWA also provides notification to people driving within the protection areas that they are traveling in a water supply area. In 2009, RAWA staff and other partners installed water supply signs both on state highways and local roadways. These signs are an education tool to alert drivers to notify emergency responders if they witness an accident or spill that may impact a nearby waterway.

In addition to these coordinated efforts, RAWA conducts much of its own public education in the community. RAWA operates a dedicated website, with a Source Water Protection webpage. Information on the 1998 watershed assessment, the RAWA program, and brochures on various topics are available for review and downloading at <http://www.readingareawater.com/source-water/>.

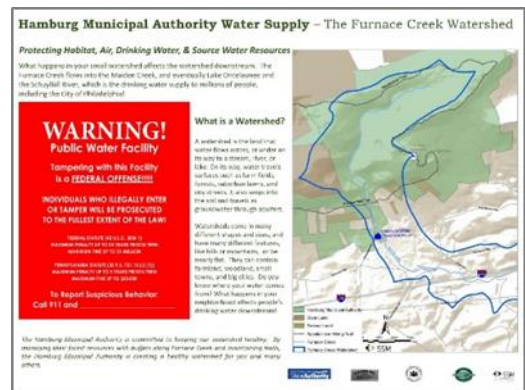
Partnering with the Berks County Conservation District (BCCD), RAWA stenciled several hundred stormdrains within the City of Reading, its primary area of service. These stencils alert residents that the stormdrains lead directly to a river.



In 2015, RAWA partnered with the Borough of Hamburg and the Hamburg Municipal Authority to install signage in the Furnace Creek Watershed, a tributary to the Maiden Creek. The Furnace Creek Watershed contains portions of the Appalachian Trail, which receives hundreds of hikers and other recreational visitors to the area. The signs provide information on the watershed, and warnings on tampering with a water supply.

Source Water Protection Areas

The water quality in a lake, creek, reservoir, or other surface body is affected by the quality of all the water flowing into it and all the land upstream of it. Therefore, the entire drainage area upstream of a surface water source is considered part of a source water protection area. The areas described below were calculated using the average-flow results from the 2016 time-of-travel (TOT) study.



Zone A is the most protective area, and is the area within 0.25 miles on either side of a stream. Along the contributing streams, Zone A extends between an upstream point that represents, on average, a 5-hour TOT to the intake and a downstream point that is 0.25 miles below the intake. Zone A for Lake Ontelaunee covers 6.29 square miles in Ontelaunee, Maiden creek, and Perry Townships.

Zone B of a surface water source encompasses the drainage area extending upstream from Zone A to a 25-hour TOT along the contributing streams. Zone B for the Lake extends an additional 104.2 square miles, and covers portions of 14 municipalities in Berks County and one township in Lehigh County.

Zone C is typically the remainder of the watershed, or the drainage area contributing to streams greater than a 25-hour TOT. Zone C for the Lake intake encompasses another 81.85 square miles in 14 municipalities in Berks and Lehigh Counties.

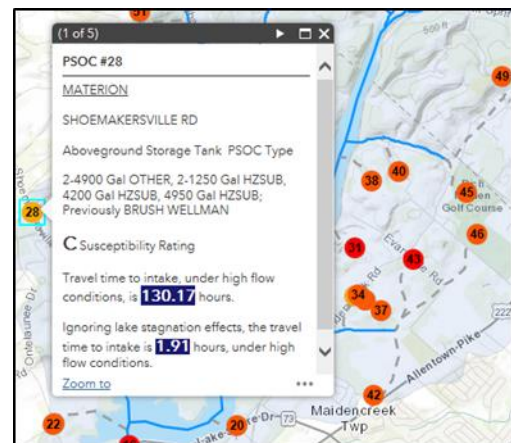
Potential Sources of Contamination (PSOCs)

After the protection areas were delineated, publicly-available data was used to identify potential sources of contamination (PSOCs) within the areas. Both point sources and non-point sources were identified. Example of non-point sources, where contamination occurs over a widespread area, include stormwater runoff from agricultural fields, residential development, and commercial and industrial properties. Point sources, where contamination originates from a single discharge point, can include industrial or commercial facilities, permitted pipe discharges, and cleanup sites.

One of the primary non-point concerns for RAWA is nutrients (phosphorus and nitrates) from upstream farming operations flowing within the watershed, especially from properties along the Moselem Creek. Legacy sediments flowing down the creek as well as spills and releases from accidents on Interstate-78 can also cause contamination problems. Other non-point concerns include the goose population on the lake, and potential contamination from failing on-lot septic systems may also potentially impact water quality.

In the 2016 time-of-travel study, a table of current PSOCs was prepared by searching publicly-available environmental databases for regulated locations, as identified by a permit or an enforcement action. The PSOCs found through these database searches are point sources; non-point sources typically are not regulated. 157 sites were listed, and included examples of water pollution control and water resource discharges, storage tank sites, environmental cleanup areas, and biosolids application sites.

The 2019 TOT study also updated the evaluation of the PSOCs within the RAWA delineated protection areas. Twenty-four publically-available databases were assessed and compared with results from the 2007 and 2016 inventories. After consolidation of multiple results for a single facility, 274 point-source PSOCs were identified.



Contingency Planning

In the event of an emergency that could impact the water supply, immediate action is often critical in preventing or minimizing contamination. RAWA maintains a comprehensive emergency plan as required by Section § 109.707(a) Department's Safe Drinking Water Regulations. The Emergency Response Plan (ERP) will help provide safe and adequate drinking water under emergency conditions. Possible emergency situations include a distribution system line break, power outages, drought

conditions, disinfection system failure, contamination of supply, source pump failure, and prolonged water outage. RAWA also maintains a notification system with the Berks County Department of Emergency Services. Staff is notified via a message system when there is a spill or accident that may impact waterways within the county.

Protection of Water Supply Sources

While the Maiden Creek intake is permitted as a supplemental source, it may not completely replace demand from Lake Ontelaunee. The second intake is also downstream of the Lake intake, and therefore draws from the same water source. Any contamination event that would close the Lake intake may also impact the Maiden Creek intake. RAWA maintains interconnections with other nearby water systems that can help offset demand in case of emergency. In the event of a source failure, the water system will work with the DEP for a feasibility study and permitting of new sources of water supply.

Current Source Water Protection and Selected Management Strategies

In addition to the public education and outreach described earlier, RAWA has been an outstanding model for voluntary watershed protection efforts in the community. Many activities are a direct result of the implementation strategies described in the 2007 Source Water Protection Plan, a selected few are described below:

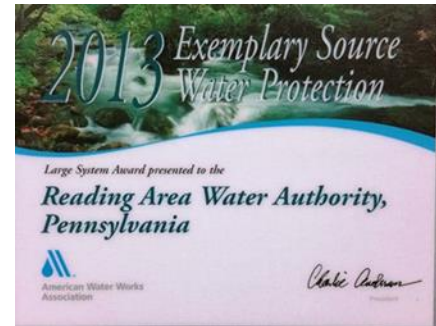
RAWA is a Charter Member of Berks County Water & Sewer Association (BCWSA), which was formed in 2013; staff participates on the Source Water Protection and Education Committees.



RAWA has committed to extensive voluntary water quality sampling across the watershed, including financially supporting the USGS stream gauge at the confluence of the Saucony Creek and Maiden Creek, chemical and macroinvertebrate monitoring at numerous sampling sites across the watershed, and ongoing monitoring collaboration with the Schuylkill Action Network, the Delaware River Watershed Initiative, the Philadelphia Water Department, and the Natural Resources Conservation Service.

In order to reduce wildlife and fowl concentrations at the Lake, RAWA has contracted the U.S. Department of Agriculture to implement a goose management program to minimize pathogens effects in Lake Ontelaunee.

In 2013, RAWA received the 2013 Exemplary Source Water Protection Award for Large Systems from the American Water Works Association, recognizing the development and implementation of a strong and active source water protection program.



RAWA has also provided cost-share assistance for other organizations in both Berks and Lehigh counties to pursue watershed improvements through on-the-ground agricultural best management practices (BMPs), including conservation planning, tree plantings with Olivet clubs and school students, and participation in the US Department of Agriculture’s Conservation Reserve Enhancement Program.

Implementing and Sustaining the Source Water Protection Program

The Reading Area Water Authority management and staff recognize that the sustainability of this source water protection program is the only way to ensure successful improvements to the watersheds over time. RAWA realizes that communication with an intricate network of employees and partners will be required for the ongoing success of the program. A 5-year implementation plan for protecting its water supply has been developed, with each management strategy assigned a person/organization responsible for completing the activity, a timeframe or deadline to be accomplished, and possible financial and human resources needed to achieve the objective.

These activities and timeframes are voluntary, and any instances of missing intended goals do not have any consequence to RAWA or its staff. The management strategies outlined in this program will be reviewed, evaluated, and prioritized according to RAWA’s need to optimize its water system. New strategies may be added to the implementation list, and other options may be discontinued or suspended as human and financial resources are allocated.

