

# SOURCE WATER ASSESSMENT REPORT for Little Hocking Water Association, Inc. PWSID: OH8400212



**November 1996**  
**Revised February 2025**

**INTRODUCTION.** The 1996 Amendments to the Safe Drinking Water Act establish a program for states to assess the drinking water source for all public water systems. Ohio's Source Water Assessment and Protection Program is designed to help public water systems protect their sources of drinking water from becoming contaminated. This assessment:

- identifies the drinking water source protection area, based on the area that supplies water to the well(s),
- inventories the potential contaminant sources in the area,
- evaluates the susceptibility of the drinking water source to contamination, and
- recommends protective strategies.

The purpose of the assessment is to provide information that Little Hocking Water Association, Inc. can use to help protect its source of drinking water from contamination.

**SYSTEM DESCRIPTION & GEOLOGY.** Little Hocking Water Association, Inc. is a community public water system serving 9,892 people in Little Hocking, Ohio. This system operates 4 wells that pump approximately 0.8 million gallons of water per day from a sand and gravel aquifer (water-rich zone) within the Ohio River Valley aquifer system. The aquifer is covered by 25 feet of low-permeability material, which provides minimal protection from contamination. Depth to water in this aquifer is 25 to 45 feet below the ground surface.

Soils in the area are silty loams which are moderately well-drained, meaning that much of the rainfall and snowmelt will infiltrate into the soil, instead of running off or ponding. The topography is generally gently sloping with an average slope of 2-6%. Ground water in this area is replenished by the gradual flow of water underground from higher to lower elevations and by approximately 7 inches per year of precipitation that infiltrates through the soil. At the Little Hocking Water Association, Inc. wellfield, ground water flows generally toward the southwest, based on the flow direction of the Ohio River and local topography.

**PROTECTION AREA.** The drinking water source protection area for Little Hocking Water Association, Inc.'s wells is illustrated in Figure 1. This figure shows two areas, one inside the other. The "inner management zone" is the area that provides ground water to Little Hocking Water Association, Inc.'s wells within one year of pumping. A chemical spill in this zone poses a greater threat to the drinking water, so this area warrants more stringent protection. The "source water protection area" is the additional area that contributes water when the wells are pumped for five years. Together, they comprise the drinking water source protection area.

An analytic element model computer program called GFLOW (Ground water FLOW) was used to determine the areal extent of the protection area. Protection areas based on computer modeling can be significantly more credible than those produced by simpler methods, especially in areas with complex geology. The time and effort required to develop a computer model are warranted when the wellfield is located in a complex hydrogeologic setting, and the

hydrogeologic data needed to run the program are available for the area. Both criteria were met for Little Hocking Water Association, Inc.'s source water assessment.

The GFLOW model for Little Hocking Water Association, Inc.'s wellfield was designed to simulate the characteristics of a sand and gravel buried valley aquifer bounded by interbedded bedrock of limited permeability. Figure 2 shows that the sand and gravel aquifer was modeled as an area of different flow properties (called an "inhomogeneity") within the bedrock aquifer. The Ohio River was modeled as lines along which ground water enters or leaves the aquifer (called "line sink strings").

### **Model Values**

Information needed to run the model includes, at a minimum, **pumping rate** of the wells, **hydraulic conductivity** of the aquifer (that is, the ease with which water moves through it), **aquifer thickness**, and **aquifer porosity** (Tables 1 & 2). For this model, the pumping rate of 1.2 million gallons per day represents the maximum current daily pumping rate as recorded in Ohio EPAs files, and matches the previous modeling done in the original wellhead protection report completed in 1996 by Burgess & Niple. The hydraulic conductivity of 100-900 feet per day for the sand-and-gravel aquifer was based on pump tests conducted at the wellfield in 1996. An aquifer thickness of 60 feet was used, based on well logs. Site specific information on the hydraulic conductivity of the interbedded bedrock was not available, and measured porosity values were unavailable for any of the units. In these cases, the values used in the model were based on values typically found in these kinds of rock and sediments. They were: 22.5% porosity for the sand-and-gravel aquifer, 10% porosity for the interbedded bedrock, and 1-4.5 feet per day hydraulic conductivity for the interbedded bedrock.

The protection area was determined based on the best information available at the time of the assessment. If you would like to have more information about how this protection area was derived, or if you would like to collect additional

information and revise your protection area, please call Ohio EPA staff listed at the end of this report. Also, a more detailed discussion of the technical aspects of modeling drinking water source protection areas, can be found in the *Delineation Guidelines and Process Manual* (Ohio EPA, 2010) on Ohio EPAs Source Water Assessment and Protection Web page ([www.epa.ohio.gov/ddagw/swap.aspx](http://www.epa.ohio.gov/ddagw/swap.aspx)).

**INVENTORY.** On June 6, 2024, an inventory of potential contaminant sources located within the drinking water source protection area was conducted by Ohio EPA (Figure 1). Table 3 provides additional information about these types of potential contaminant sources.

A facility or activity is listed as a potential contaminant source if it has the **potential** to release a contaminant, based on the kinds and amounts of chemicals typically associated with that type of facility or activity. It is beyond the scope of this assessment to determine whether any specific potential source is **actually** releasing (or has released) a contaminant to ground water. Also, the inventory is limited to what Ohio EPA staff were able to observe on the day of the site visit. Therefore, Little Hocking Water Association, Inc staff should be alert to the possible presence of potential sources of contamination that are not on this list.

**GROUND WATER QUALITY.** At this time, there is evidence indicating the quality of water provided by Little Hocking Water Association, Inc. has been impacted. Samples collected on July 17, 2020 contained PFOA above the concentration of concern of 4 nanograms per liter (ng/L) on 1 occasion, with a concentration of 79 ng/L. Samples collected on July 17, 2020 also contained HFPO-DA (Gen X) above the concentration of concern of 10 nanograms per liter (ng/L) on 1 occasion, with a concentration of 2500 ng/L. This indicates a manmade influence. These concentrations are ABOVE the federal and state drinking water standard of 4 ng/L for PFOA, and 10 ng/L for HFPO-DA (Gen X).

Please note that this water quality evaluation has some limitations:

- the data evaluated are mostly for treated water samples only, as Ohio EPA's quality requirements are for the water being provided to the public, not the water before treatment.
- sampling results for coliform bacteria and naturally-occurring inorganics (other than arsenic) were not evaluated for this assessment, because they are not a reliable indicator of aquifer contamination.

Current information on the quality of the treated water supplied by Little Hocking Water Association, Inc.'s Public Water System is available in the Consumer Confidence Report for the system, which is distributed annually. It reports on detected contaminants and any associated health risks from data collected during the past five years. Consumer Confidence Reports are available from Little Hocking Water Association, Inc.

**SUSCEPTIBILITY ANALYSIS.** This assessment indicates that Little Hocking Water Association, Inc.'s source of drinking water has a **high** susceptibility to contamination because of:

This assessment indicates that Little Hocking Water Association, Inc.'s source of drinking water has a HIGH susceptibility to contamination due to the:

- presence of a relatively thin protective layer of clay overlying the aquifer,
- shallow depth (less than 50 feet below ground surface) of the aquifer,
- presence of significant potential contaminant sources in the protection area.
- and the presence of manmade contaminants in the water before treatment, but not in the treated water.

The risk of future contamination can be minimized by implementing appropriate protective measures.

**PROTECTIVE STRATEGIES.** Protective strategies are

activities that help protect a drinking water source from becoming contaminated. Implementing these activities benefits the community by helping to:

- protect the community's investment in its water supply.
- protect the health of the community residents by preventing contamination of its drinking water source.
- support the continued economic growth of a community by meeting its water supply needs.
- preserve the ground water resource for future generations.
- reduce regulatory monitoring costs.

Ohio EPA encourages Little Hocking Water Association, Inc. to develop and implement an effective Drinking Water Source Protection Plan. The plan can be developed from the information provided in this Source Water Assessment Report. The potential contaminant source inventory provides a list of facilities or activities to focus on. Table 4 lists protective strategies that are appropriate for the kinds of facilities/activities listed in the inventory. Finally, a document titled *Developing Local Drinking Water Source Protection Plans in Ohio* is available from Ohio EPA. This document offers comprehensive guidance for developing and implementing a municipal Drinking Water Source Protection Plan. Ongoing implementation of the plan will help protect Little Hocking Water Association, Inc.'s valuable drinking water resources for current and future generations.

For further technical assistance on drinking water source protection, please contact the Ohio EPA Southeast Office at (740) 385-8501, or visit Ohio EPA's [Source Water Assessment and Protection Program](http://epa.ohio.gov/ddagw) website at [epa.ohio.gov/ddagw](http://epa.ohio.gov/ddagw).

This report was written by Ryan Ellis, Ohio EPA, Division of Drinking and Ground Waters, Southeast.

**BIBLIOGRAPHY.**

Ohio EPA public drinking water files.

Ohio Department of Natural Resources, 2025, Ohio Geology Interactive Map (digital).

Ohio EPA, 2010, *Drinking Water Source Protection Area Delineation Guidelines & Process Manual*.

**Table 1. Data for Public Water System Wells**

<b>Well #</b>	<b>Total Depth (feet)</b>	<b>Well Drawdown (feet)</b>	<b>Static Level (feet)</b>	<b>Pump Capacity (gallons per min.)</b>	<b>Well Status</b>
1	50	25	10	200	In Use
2	60	20	16	350	In Use
3	57	8	15	350	In Use
5	56	16	16	300	In Use

**Table 2. Data Used in Construction of Ground Water Flow Model**

<b>Type of Information</b>	<b>Value Used</b>	<b>Source of Information</b>
Pumping rate	1.2 million gallons per day	Max daily pumping rate, Ohio EPA public drinking water files
Aquifer porosity (sand-and gravel)	22.5%	Estimated, based on typical porosity of sand and gravel aquifer
Aquifer thickness	60 feet	Well logs for area, filed at Ohio Department of Natural Resources, Division of Water
Hydraulic conductivity of aquifer (sand and gravel)	100-900 feet per day	Estimated, based on typical hydraulic conductivity of sand and gravel aquifer and pump tests in well field
Hydraulic conductivity of bedrock (shale)	1-4.5 feet per day	Estimated, based on typical porosity of shale
Precipitation recharge	10 inches per year	From Ohio Department of Natural Resources, Ohio Geology Interactive Map

**Table 3. Potential Sources of Contamination Around the Little Hocking Water Association, Inc.’s Drinking Water Source Protection Area**

Potential Contaminant Source	Environmental Concerns	# within the IMZ (Inner Management Zone)	# within the OMZ (Outer Management Zone)
<b>COMMERCIAL SOURCES</b>			
Marina/Boat Dock	May be a source for leaks and spills of oil, gasoline, and other petroleum products. If a shipping harbor, potential for leaks and spills of cargo.	0	1
Fleet/Truck/Bus Terminals & Railroad Yard/Maintenance Facilities	May be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Potential for spilled cargo.	1	1
Food/Beverage Processing Facility	May be a source for organic waste and food processing chemicals.	0	1
<b>MUNICIPAL SOURCES</b>			
Municipal Garages	May be a source for automotive chemicals and fuel.	0	1
<b>WASTE DISPOSAL SOURCES</b>			
Wastewater Discharge	If poorly maintained/operated, municipal wastewater discharge sites can be sources for nutrients, ammonia, and pathogens. Poorly maintained/operated industrial wastewater discharge sites could contribute various chemicals depending on operation.	1	2
<b>INFRASTRUCTURE RELATED SOURCES</b>			
Highway / Transportation Route	Accidents on transportation routes pose the threat of leaks and spills of fuels and chemicals. Weed killers used to control vegetation can elevate levels of pesticides in drinking water sources. Runoff may contain oil, metals, and deicers.	1 crossing	
<b>GENERAL POINT SOURCES</b>			
Underground Storage Tanks	If poorly maintained, may be a potential source of leaks and spills for gasoline and other chemicals.	0	2

**Table 4. Examples of Protective Strategies that Little Hocking Water Association, Inc. may choose to protect their source of drinking water.**

Potential Contaminant Source	Protective Strategies to Consider
General	<ul style="list-style-type: none"> <li>• Purchase additional property.</li> <li>• Provide educational material to members of the community on topics regarding the drinking water source protection area.</li> <li>• Include drinking water source protection into the local school curriculum.</li> <li>• Provide education (material/meetings) local businesses and industries on topics relating to drinking water source protection.</li> <li>• Encourage ‘ground water friendly’ development.</li> <li>• Form partnerships with neighboring jurisdictions and potential contaminant source owners</li> <li>• Develop/enact/enforce a local ordinance which may include any of the following: changing zoning; illegal waste disposal; requiring registration of existing facilities; banning certain new types of activities; dictating chemical handling procedures; maintaining/filing a chemical inventory; facility spill/contingency planning; engineering controls for existing/new facilities; paralleling existing federal or state requirements.</li> </ul>
Agricultural Sources	<ul style="list-style-type: none"> <li>• Assess the use of best management practices and recommend additional practices.</li> <li>• Encourage road safety with agricultural chemicals.</li> <li>• Provide education (material/meetings) to local farmers and agribusinesses on appropriate topics.</li> <li>• Plan/design/implement methods to control impacts to surface water.</li> </ul>
Residential Sources	<ul style="list-style-type: none"> <li>• Inventory/remove underground home heating oil tanks in the protection area.</li> <li>• Identify areas used for illegal dumping.</li> <li>• Provide education (material/meetings) to homeowners on: drinking water protection; use/maintenance of septic systems; illegal dumping; proper well abandonment (both the reason and the process).</li> <li>• Develop a centralized wastewater collection/treatment system.</li> <li>• Encourage/require (and provide incentives) for sealing unused wells.</li> <li>• Ensure enforcement of existing requirements for closing unused wells.</li> <li>• Ensure the proper construction of new wells.</li> </ul>
Municipal Sources	<ul style="list-style-type: none"> <li>• Monitor compliance with existing regulations through inspections and/or contact with regulatory agencies (such as the local fire department, State Fire Marshal, or the Ohio EPA).</li> <li>• Encourage/arrange hazardous materials training or waste and disposal assessments for employees.</li> <li>• Develop an early release notification system for spills and emergency planning; educate emergency responders to be aware of drinking water protection areas; or coordinate facility spill/contingency planning.</li> <li>• Encourage compliance with materials handling procedures/requirements.</li> <li>• Install engineering controls at municipal facilities</li> <li>• Implement pollution prevention strategies.</li> <li>• Work with the street department and Ohio DOT to minimize use of road salt.</li> </ul>

<b>Potential Contaminant Source</b>	<b>Protective Strategies to Consider</b>
	<ul style="list-style-type: none"> <li>• Evaluate and close fire cisterns or other city owned wells.</li> <li>• Conduct routine sewer inspections, maintenance &amp; upgrades.</li> </ul>
Commercial Sources	<ul style="list-style-type: none"> <li>• Monitor compliance with existing regulations through inspections and/or contact with regulatory agencies.</li> <li>• Use routine inspections as an educational opportunity.</li> <li>• Encourage compliance with materials handling procedures/requirements.</li> <li>• Encourage/arrange hazardous materials training or waste and disposal assessments for local businesses (and their employees).</li> <li>• Request installation of engineering controls for existing facilities.</li> <li>• Encourage facility spill/contingency planning in conjunction with the fire department.</li> <li>• Encourage local businesses to implement pollution prevention strategies.</li> </ul>
Industrial Sources	<ul style="list-style-type: none"> <li>• Monitor compliance with existing regulations through inspections and/or contact with regulatory agencies.</li> <li>• Use routine inspections as an educational opportunity.</li> <li>• Encourage compliance with materials handling procedures/requirements.</li> <li>• Encourage/arrange hazardous materials training or waste and disposal assessments for local industries (and their employees).</li> <li>• Encourage facility spill/contingency planning in conjunction with the fire department.</li> <li>• Request installation of engineering controls for existing facilities.</li> <li>• Encourage local industries to implement pollution prevention strategies.</li> <li>• Encourage compliance with materials handling procedures/requirements.</li> <li>• Encourage/arrange waste and disposal assessments for local businesses.</li> </ul>
Oil & gas wells	<ul style="list-style-type: none"> <li>• Provide education (material/meetings) to owners on maintenance.</li> <li>• Ensure/monitor proper operation and maintenance.</li> <li>• Develop an early release notification system for spills.</li> </ul>
Spills	<ul style="list-style-type: none"> <li>• Develop an early release notification system for spills and an emergency response plan.</li> <li>• Include drinking water protection in response planning and training.</li> <li>• Post signs indicating the extent of the protection area.</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Create hazardous materials routes around the protection area and require/encourage transporters to use them.</li> <li>• Work with local transporters on protection area awareness.</li> <li>• Encourage road safety with chemicals.</li> <li>• Post signs indicating the extent of the protection area.</li> </ul>

**Public Water System Name, PWSID#: OH8400212**  
**Belpre Township, Washington County**



**Legend**

- Active Wells for Public Water Systems
- Fleet/Truck/Bus Terminal
- Underground Storage Tank: Leaking
- Source Water Protection Area
- Food/Beverage Processing Facility
- Underground Storage Tank: Non-Leaking
- Inner Management Zone
- Garage: Municipal
- Wastewater Treatment Facility
- Marina/Boat Dock



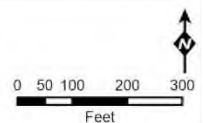
**Protection Area Data**

Number of Wells = 4  
 Pumping Rate = 1.2 million gallons per day  
 Porosity = 22.5%  
 Aquifer Thickness = 60 feet  
 Hydrogeologic Setting = Buried Valley  
 Land Use = Agricultural/Industrial/Residential  
 ODNR Well Log # = 389539; 389538; 450860; 593228

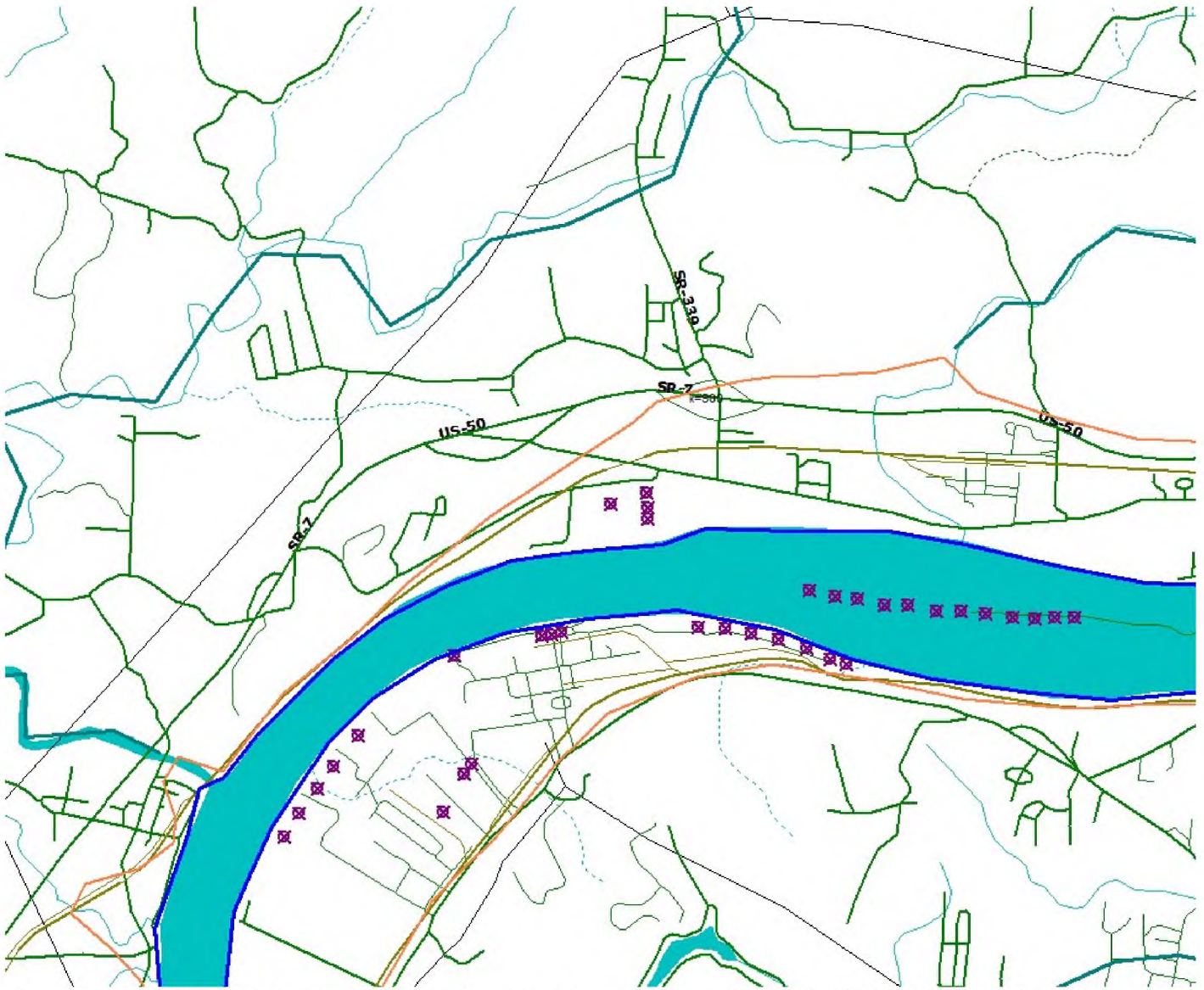


**Drinking Water Source Protection Area**

February 19, 2025



**Figure 1: Little Hocking Water Association, Inc. Drinking Water Source Protection Area with Potential Contaminant Source Inventory**



**Figure 2: GFLOW model setup. Little Hocking Water Association wells north of Ohio River, with Chemours pumping wells south of the river and along Blennerhassett Island. Buried valley aquifer modeled as inhomogeneity (orange), and Ohio River modeled as a pair of line sinks (blue).**