

# Drinking Water Source Assessment for the City of Delphos

## Source Water Assessment and Protection.

The following report for the City of Delphos was compiled as part of the Source Water Assessment and Protection Program for Ohio. This program is intended to identify drinking water protection areas and provide information on how to reduce the risk of contamination of the waters within those areas. The goal of the program is to ensure the long term availability of abundant and safe drinking water for the present and future citizens of Ohio.

The Safe Drinking Water Act Amendments of 1996 established the national Source Water Assessment and Protection Program, targeting drinking water sources for all public water systems in the United States. A public water system is a facility that provides drinking water to 15 or more service connections or that regularly serves at least 25 people a day for at least 60 days a year, whether from an underground well or spring, or from an above ground stream, lake, or reservoir. The requirement does not address residential wells or cisterns. In Ohio there are approximately 5,800 public water systems.

**Background.** The City of Delphos operates a community public water system that serves a population of approximately 7,000. The system operates 8 wells that pump approximately 997,000 gallons of water per day from a carbonate bedrock aquifer. Additionally, an above ground reservoir was constructed in 2006 and was brought online in October of 2007. The source is surface water taken from the Little Auglaize River. The system's overall treatment capacity is approximately 3.75 million gallons per day, but current average production is about 0.98 million gallons per day.

## SUMMARY



**Protection Areas.** The drinking water source protection areas for the City of Delphos' surface and ground water sources are shown in the following figure. Possible impacts to the surface water source include agricultural runoff from row crop agriculture and animal feedlot operations, oil and gas wells, road/rail stream crossings, failing home and commercial septic systems, and new housing and commercial development that could increase runoff from roads and parking lots.

**Protective Strategies.** The ultimate goal of source water assessment is implementation of protective strategies that will better protect the drinking water source. Strategies for protecting the City of Delphos drinking water source include the establishment (with routine updating) of an effective and efficient emergency response plan as well as a plan to educate the responsible parties of potential contaminant sources, controlling livestock access to the streams and drainage systems, controlling septic discharges and runoff from agricultural areas, and coordinating with local emergency response agencies. The City of Delphos Water System contingency plan should be updated as necessary.

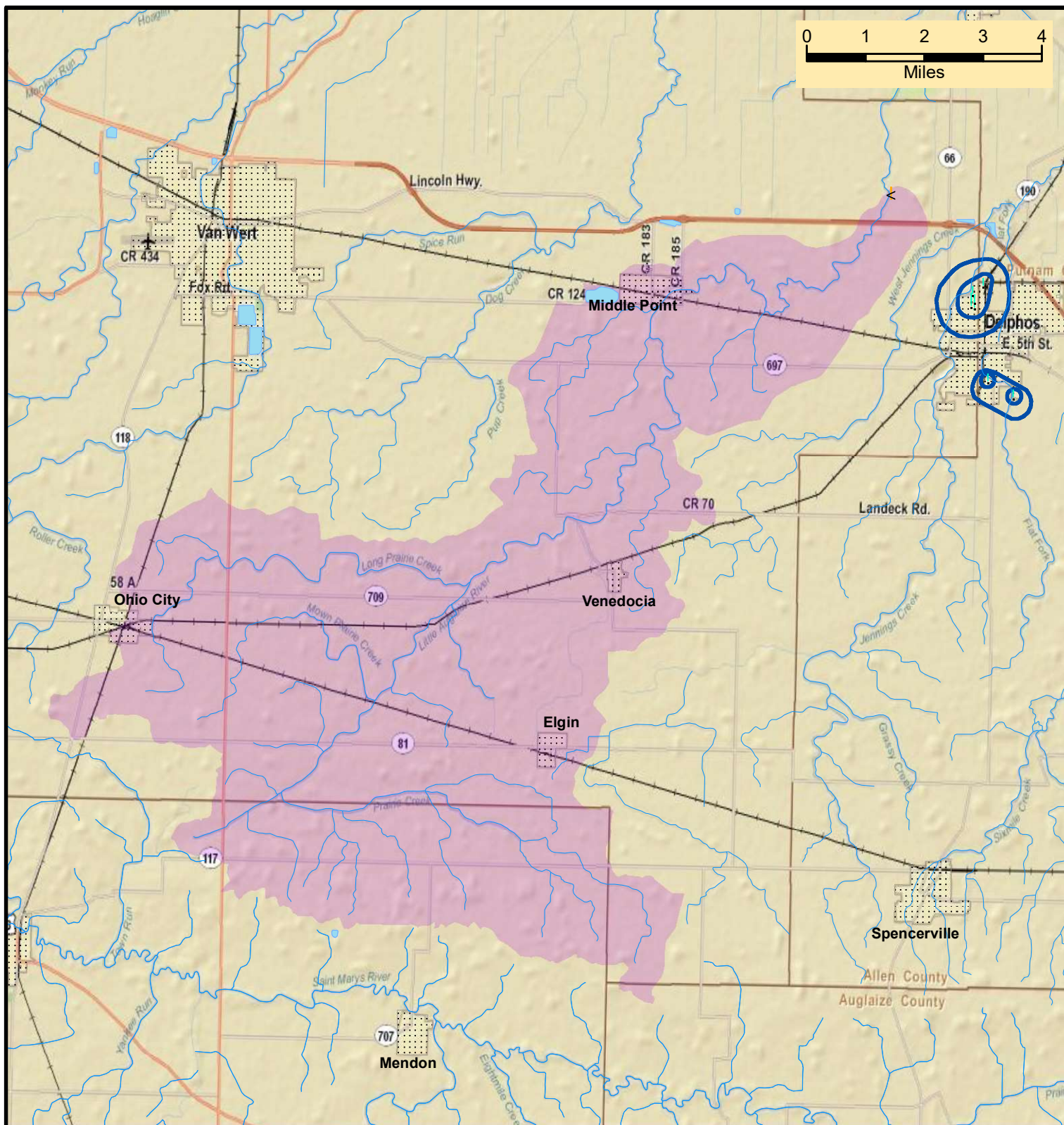
The City of Delphos and other jurisdictions comprising the protection areas are encouraged to develop a local protection plan to protect the source of drinking water or to update current emergency management plans as applicable. Local watershed planning efforts may also be underway to guide stream restoration and protection activities. These efforts can also serve to benefit the protection of drinking water sources. Guidance on how to form a Drinking Water Protection Team and

protection plan is available from the Ohio EPA by calling (614) 644-2752.

**For More Information.** Additional information on protective strategies and how this assessment was completed is included in the detailed Drinking Water Source Assessment Report for the City of Delphos. For information on how to obtain a copy of this report, please visit Ohio EPA's Source Water Assessment and Protection Program Web page at: <http://www.epa.state.oh.us/ddagw/pdu/swap.html> or contact the City of Delphos for a

copy.

Current information on the quality of the treated water supplied by the City of Delphos Public Water System is available in the Consumer Confidence Report (CCR) for the City of Delphos Public Water System. The CCR is distributed annually and it reports on detected contaminants and any associated health risks from data collected during the past five years. Consumer Confidence Reports are available from the City of Delphos.



**Summary Figure - Drinking Water Source Protection Areas for the City of Delphos.**



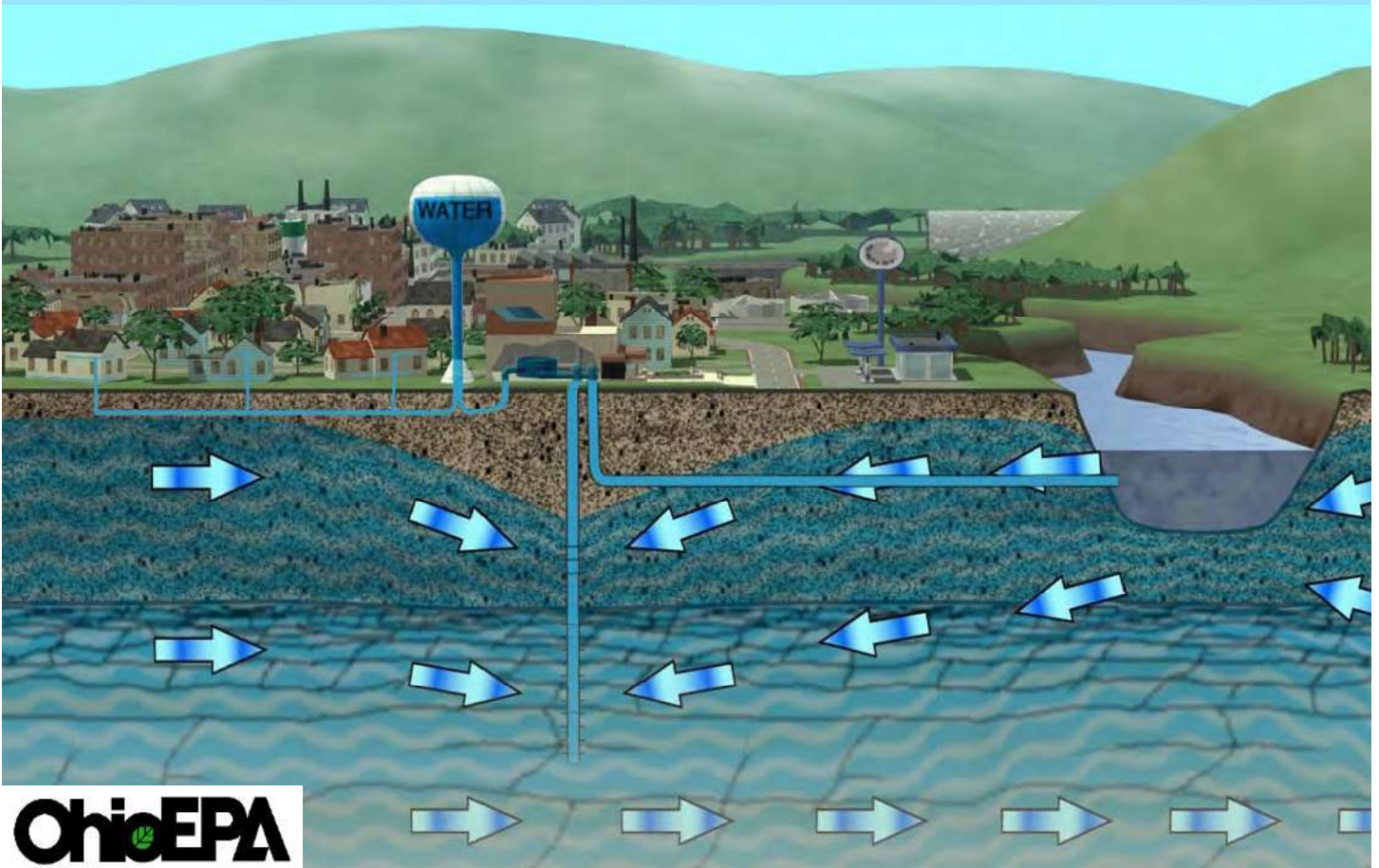
# **Drinking Water Source Assessment for the City of Delphos**

**Public Water System # 0200412**

**Van Wert and Allen Counties**

**Prepared by:  
Ohio Environmental Protection Agency  
Division of Surface Water  
Division of Drinking and Ground Waters  
Northeast District and Central Offices**

**April, 2003  
Revised October, 2007**



## ***How to Use this Assessment***

Clean and safe drinking water is essential to everyone. Protecting the source of drinking water is a wise and cost effective investment. The purpose of this drinking water source assessment is to provide information your community can use to develop a local Drinking Water Protection Program. The Drinking Water Source Assessment benefits your community by providing the following:

### ***A basis for focusing limited resources within the community to protect the drinking water source(s).***

The assessment provides your community with information regarding activities within the Drinking Water Source Protection Area that directly affect your water supply source area. It is within this area that a release of contaminants, from a spill or improper usage, may travel through the watershed and reach the surface water intake. By examining where the source waters are most sensitive to contaminants, and where potential contaminants are located, the assessment identifies the potential risks that should be addressed first.

### ***A basis for informed decision-making regarding land use within the community.***

The assessment provides your community with a significant amount of information regarding where your drinking water comes from (the source) and what the risks are to the quality of that source. This information allows your community planning authorities to make informed decisions regarding proposed land uses within the protection area that are compatible with both your drinking water resource and the vision of growth embraced by your community.

### ***A start to a comprehensive plan for the watershed and source water area.***

This assessment can be the beginning of a comprehensive plan for the water resource, one that addresses all of the uses the water resource provides. An ecologically healthy lake, stream and watershed will provide a stable, high quality resource for drinking water.

For information about developing a local Drinking Water Source Protection Program, please contact the Ohio EPA Division of Drinking and Ground Waters at (614) 644-2752 or visit the Division's web site at <http://www.epa.state.oh.us/ddagw/pdu/swap.html>.

## **1.0 INTRODUCTION**

The 1996 Amendments to the Safe Drinking Water Act established a program for states to assess the drinking water source for all public water systems. The Source Water Assessment and Protection (SWAP) Program is designed to help Ohio's public water systems protect their sources of drinking water from becoming contaminated.

The purpose of this assessment is to identify where and how the City of Delphos' source waters are at risk of contamination. The report

- identifies the drinking water protection areas;
- inventories the potential contaminant sources within those areas;
- and discusses the susceptibility of the source water to contamination.

Finally, the report suggests actions that the public water supplier and local community may take to reduce risks of contaminating their source of drinking water and ensure the long term availability of abundant and safe drinking water resources.

Results and recommendations presented in this report are based on the information available at the time of publication. Ohio EPA recognizes that additional information may become available in the future that could be used to more accurately determine the drinking water source protection area. Also, changes in land use may occur after Ohio EPA completes the potential contaminant source inventory. This report should be used as a starting point to develop a plan to protect drinking water resources.

This report was initially written by Richard Kroeger, Ohio EPA, Division of Drinking and Ground Waters, Northwest District Office. An update was prepared by Brian Gara, Ohio EPA, Division of Surface Water, Central Office.

## **2.0 PUBLIC WATER SYSTEM DESCRIPTION**

The City of Delphos operates a community public water system that serves a population of approximately 7,000 people through 2750 service connections. A community public water system is a system that regularly supplies drinking water from its own sources to at least 15 service connections used by year-round residents of the area or regularly serves 25 or more people throughout the entire year.

The water treatment system obtains its water from both surface and ground water sources. This system operates 8 wells that pump approximately 997,000 gallons of water per day from a carbonate bedrock aquifer (water-rich zone). Additionally, an above ground reservoir was constructed in 2006 and brought online in 2007. Water is pumped from the Little Auglaize River into the above ground reservoir for storage prior to treatment. The new system's overall treatment capacity is approximately 3.75 million gallons per day, but current average production is 0.98 million gallons per day. The City of Delphos' water treatment system consists of coagulation, flocculation, stabilization, fluoridation, lime softening, sedimentation, filtration, and disinfection.

### 3.0 DRINKING WATER SOURCE PROTECTION AREA – SURFACE WATER

The **Drinking Water Source Protection Area** (protection area) for a system using an inland stream is defined as the drainage area upstream of the point where the water is withdrawn from a surface source such as a stream, lake or reservoir. The surface water protection area is subdivided into corridor and emergency management zones. An illustration of the protection areas for the Village of Delphos Public Water System is shown in Figure 1. Figures 2 and 3 show the corridor management zone and emergency management zone, respectively.

The **Corridor Management Zone, (CMZ)**, is an area along streams and tributaries within the source water assessment area that warrants delineation, inventory, and management. Typically, this zone runs a total of ten miles upstream from the intake, and includes the tributaries that drain into it. The zone is 1,000 feet wide on each side of the Little Auglaize River mainstem and 500 feet wide on each side of any tributaries.

The **Emergency Management Zone, (EMZ)**, is defined as an area in the immediate vicinity of the surface water intake in which the public water system operator has little or no time to respond to a spill. The boundary of the emergency management zone is delineated in cooperation with the water supplier. Figure 3 shows the boundary of the emergency management zone for the Village of Delphos Public Water System. The Village of Delphos' Emergency Management Zone (EMZ) is an area in the immediate vicinity of the Little Auglaize River intake structure. This zone is defined as a semi-circle that extends 500 feet upstream and 100 feet downstream of the intake.

The corridor and emergency management zones were the focus of field and windshield surveys to inventory potential contaminant sources. Information was also collected during interviews with water treatment plant personnel.

### 4.0 RESOURCE CHARACTERIZATION – SURFACE WATER

#### ***Hydrologic Setting***

The Little Auglaize River serves as the surface water source for the City of Delphos. The Little Auglaize River is approximately 47 miles in length with a drainage area of 405 square miles, and flows into the Auglaize River. The water system intake is located approximately 24 miles from the mouth. The protection area comprises approximately 77 square miles. The average fall of the Little Auglaize River is approximately 1.2 feet per mile. Annual average precipitation in the protection area is approximately 35 to 37 inches, of which 10 inches become surface runoff.

#### ***Land Use***

Figure 4 shows the land use for the protection area. The predominant land use is row crops (88.1%), deciduous forest (6.0%) and woody wetlands (2.5%). The percentage cover for other land uses includes: 1.4% pasture, 1.0% residential, 0.6% open water, and 0.1% commercial/industrial/transportation.

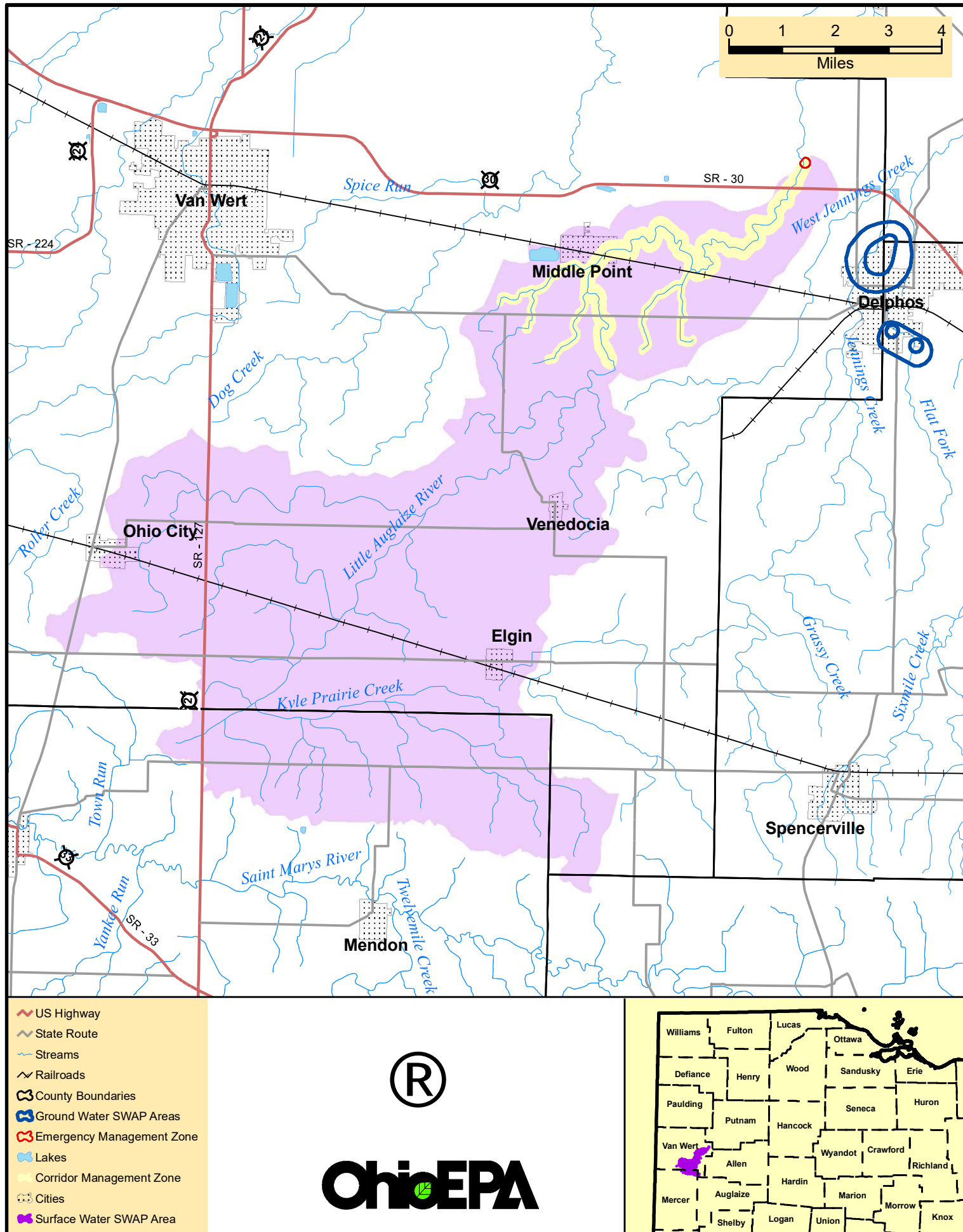


Figure 1 - Drinking Water Source Protection Areas for the City of Delphos.



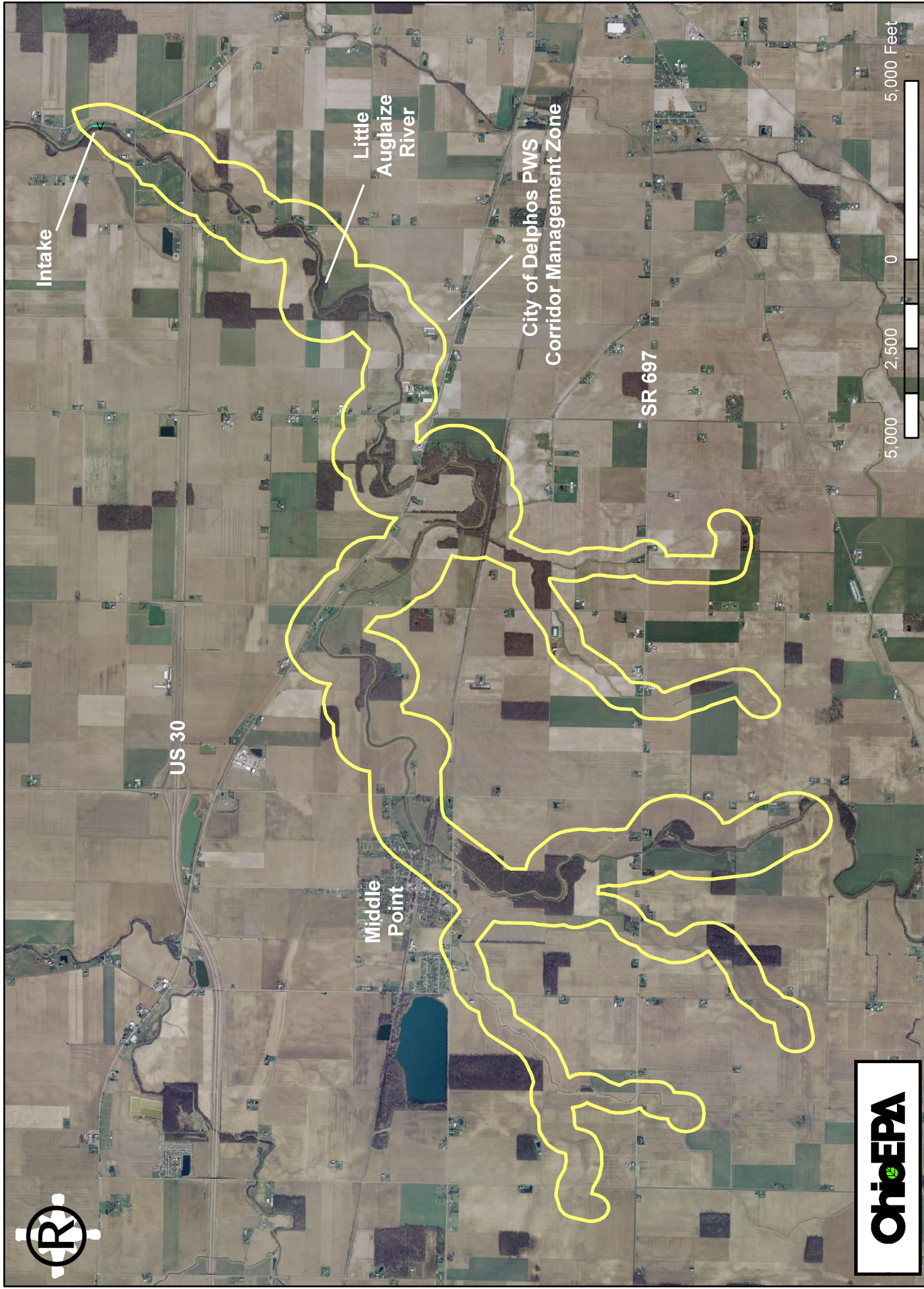


Figure 2 - Corridor Management Zone (CMZ) for the City of Delphos Little Auglaize River intake. Displayed with the 2006 Ohio Statewide Imagery Program (OSIP) aerial photography.





Intake

City of Delphos PWS  
Emergency Management Zone

Little Auglaize River

Shenk Road

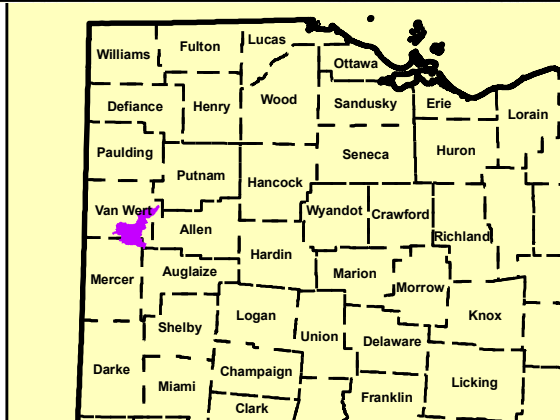
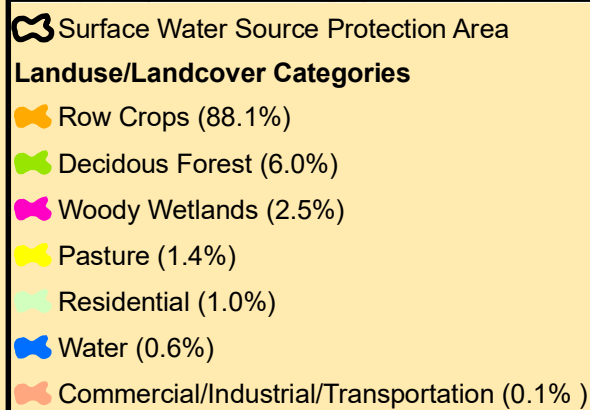
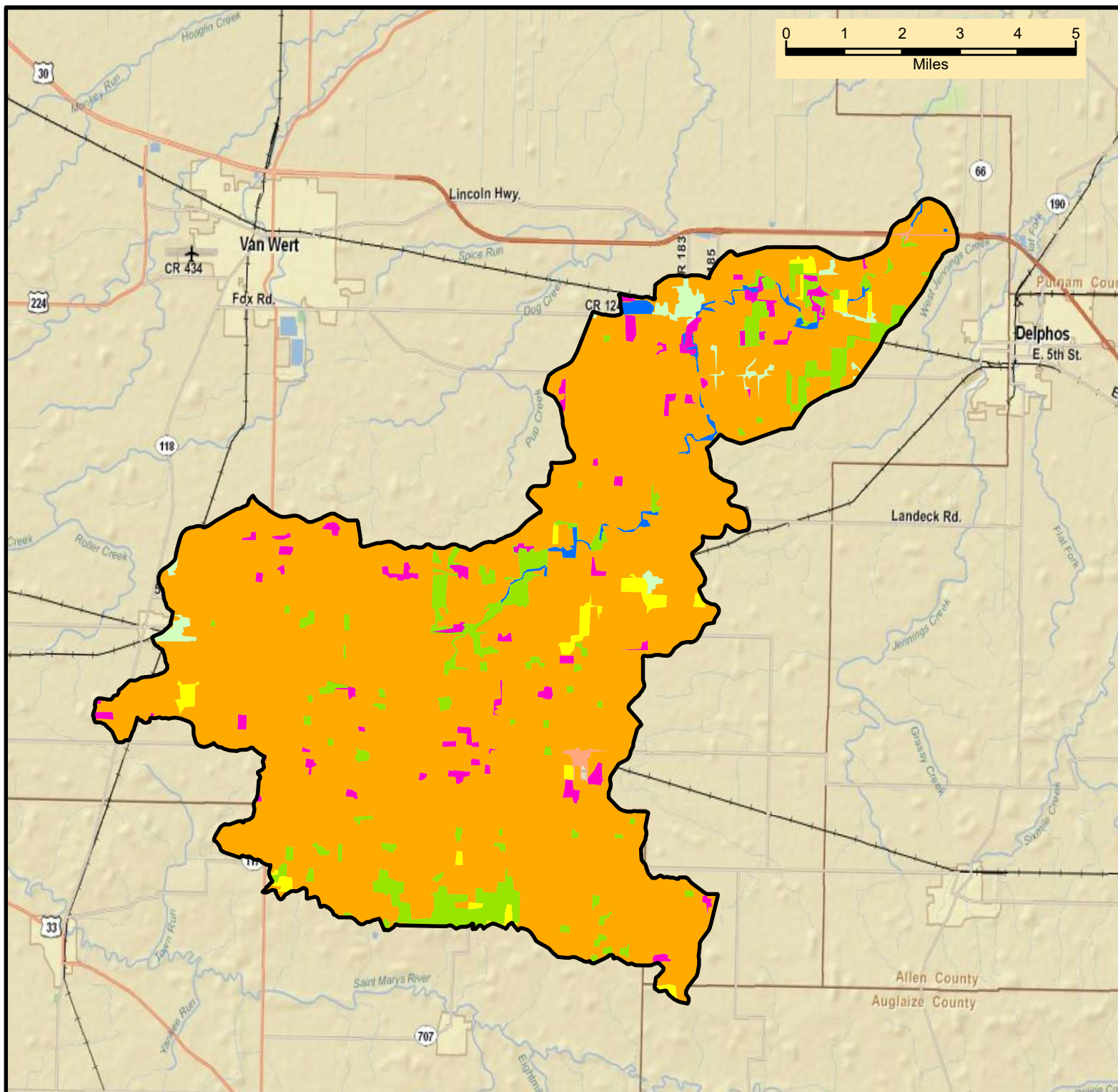
John Brickner Road

OhioEPA

350 175 0 350 Feet

Figure 3 - Emergency Management Zone (EMZ) for the City of Delphos Little Auglaize River intake. Displayed with the 2006 Ohio Statewide Imagery Program (OSIP) aerial photography.





**Figure 4 - Land Cover for the City of Delphos' Surface Water Source Protection Area.**

## **5.0 POTENTIAL CONTAMINANT SOURCES – SURFACE WATER PROTECTION AREA**

A review of available regulated facility data bases and a field survey of the corridor management zone indicate that 18 potential contaminant sources are present in the corridor management zone. None are within the emergency management zone. Table 2 provides a list of the identified potential contaminant sources in the vicinity of the corridor management zone. A map of potential contaminant sources in the corridor management zone is shown in Figure 5.

It is important to note that this inventory represents *potential* contaminant sources, and includes any source that has the *potential* to release a contaminant to surface or ground waters in the protection area. It is beyond the scope of this study to determine whether any specific potential source is actually releasing a contaminant, or to what extent any potential source(s) may be contributing to the overall pollutant load. The information derived from these databases should be verified and updated before initiating efforts for a specific contaminant source.

The transportation network is also a potential source of contamination through vehicular accidents that release hazardous materials. Approximately 237 miles of roads and 29 miles of active rail lines traverse the City of Delphos surface water source area, creating a total of 146 road and 8 rail crossings of the Little Auglaize River or its tributaries within the protection area. Approximately 25 of these road and rail crossings occur within the corridor management zone. Of special note is the crossing of US Highway 30 over the Little Auglaize River, which is located only ½ mile upstream of the intake.

## **6.0 RESOURCE CHARACTERIZATION – GROUND WATER**

The carbonate bedrock aquifer supplying the City of Delphos' wells is covered by 13 to 38 feet of low-permeability material, which provides some protection from contamination. Depth to water in this aquifer is about 25 feet below the ground surface. Soils in the area are silty clay loams which are very poorly drained, meaning that much of the rainfall and snowmelt will not infiltrate into the soil, instead it will run off or pond. The topography is generally level with no relief. Ground water in this area is replenished by the gradual flow of water underground from higher to lower elevations. At the City of Delphos wellfield, ground water flows generally toward the north and northeast, based on a water table elevation map completed by the Ohio Department of Natural Resources.

## **7.0 DRINKING WATER SOURCE PROTECTION AREA – GROUND WATER**

The ground water source protection areas for the City of Delphos' wells are illustrated in Figure 6, which shows two separate wellfields in the vicinity of Delphos. The "inner protection zone" is the area that provides ground water to the City of Delphos's well 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 "outer protection zone" is the additional area that contributes water when the well is pumped for five years. Together, they comprise the drinking water source protection area.

### ***Method Selection***

An analytic element model computer program called WhAEM was used to determine the areal



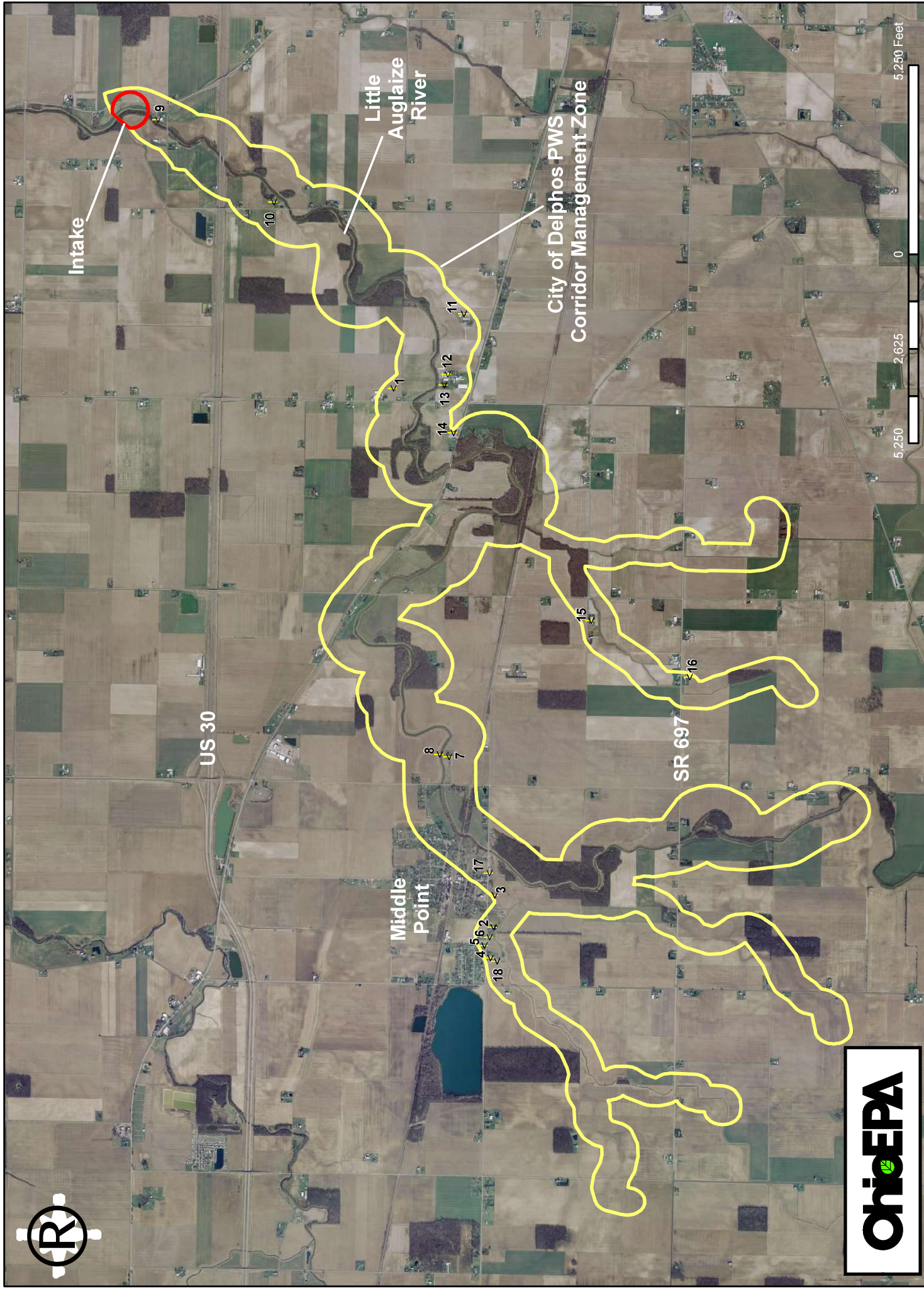
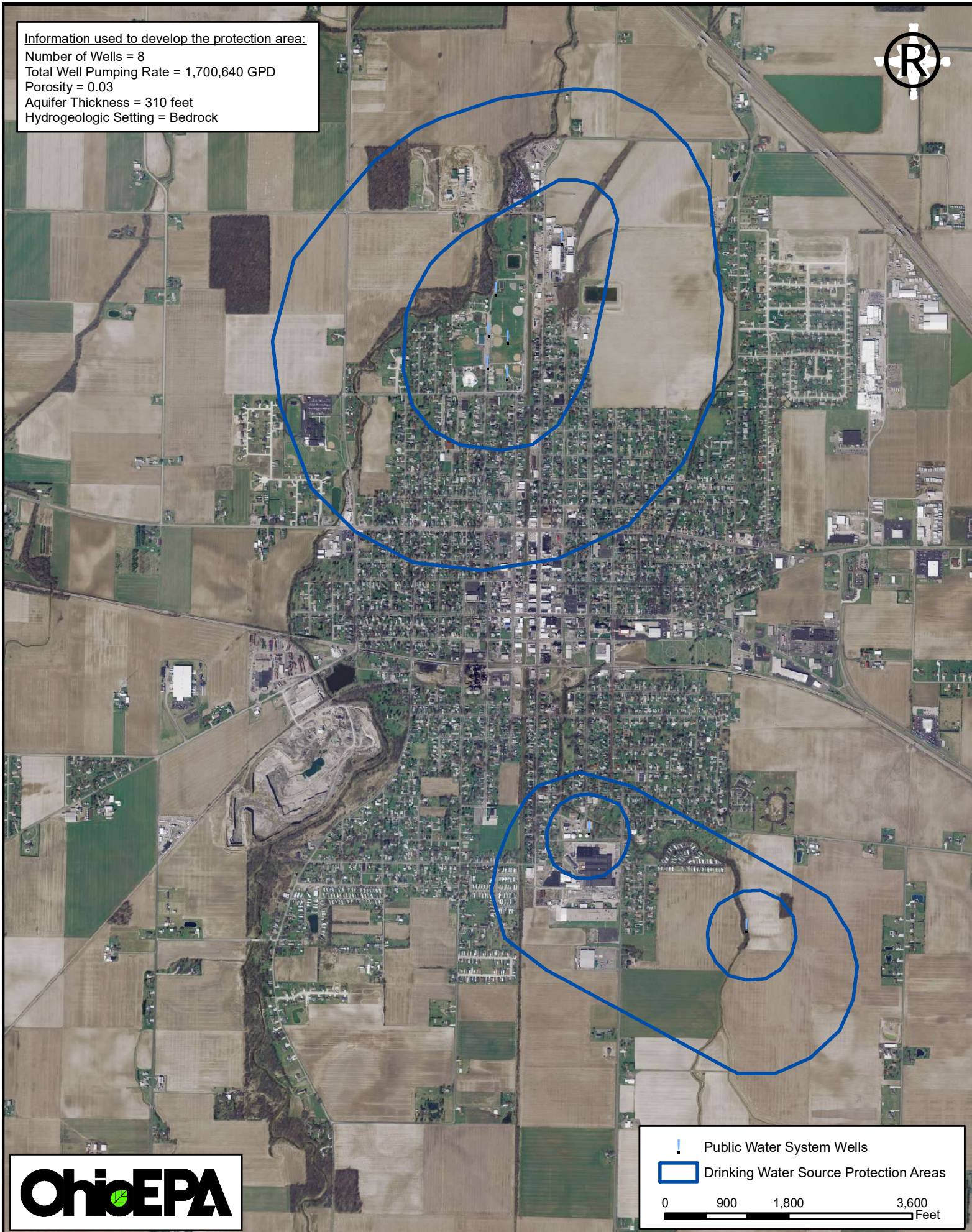


Figure 5 - Potential Contaminant Sources located within the Corridor Management Zone (CMZ) for the City of Delphos Little Auglaize River intake. Displayed with the 2006 Ohio Statewide Imagery Program (OSIP) aerial photography.



Information used to develop the protection area:

Number of Wells = 8  
Total Well Pumping Rate = 1,700,640 GPD  
Porosity = 0.03  
Aquifer Thickness = 310 feet  
Hydrogeologic Setting = Bedrock



**OhioEPA**

Public Water System Wells  
Drinking Water Source Protection Areas  
0 900 1,800 3,600 Feet

Figure 6 - Ground Water Source Protection Areas for the wellfields near the City of Delphos. Displayed with the 2006 Ohio Statewide Imagery Program (OSIP) aerial photography.



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 the City of Delphos's source water assessment.

### ***Model Set-up***

The WhAEM model for the City of Delphos simulates the characteristics of the carbonate bedrock aquifer. It is based on a ground water map created by the United States Geological Survey that shows the water levels and the ground water flow direction in the carbonate aquifer of western Ohio. In this area there are no known natural flow boundaries near the wellfield.

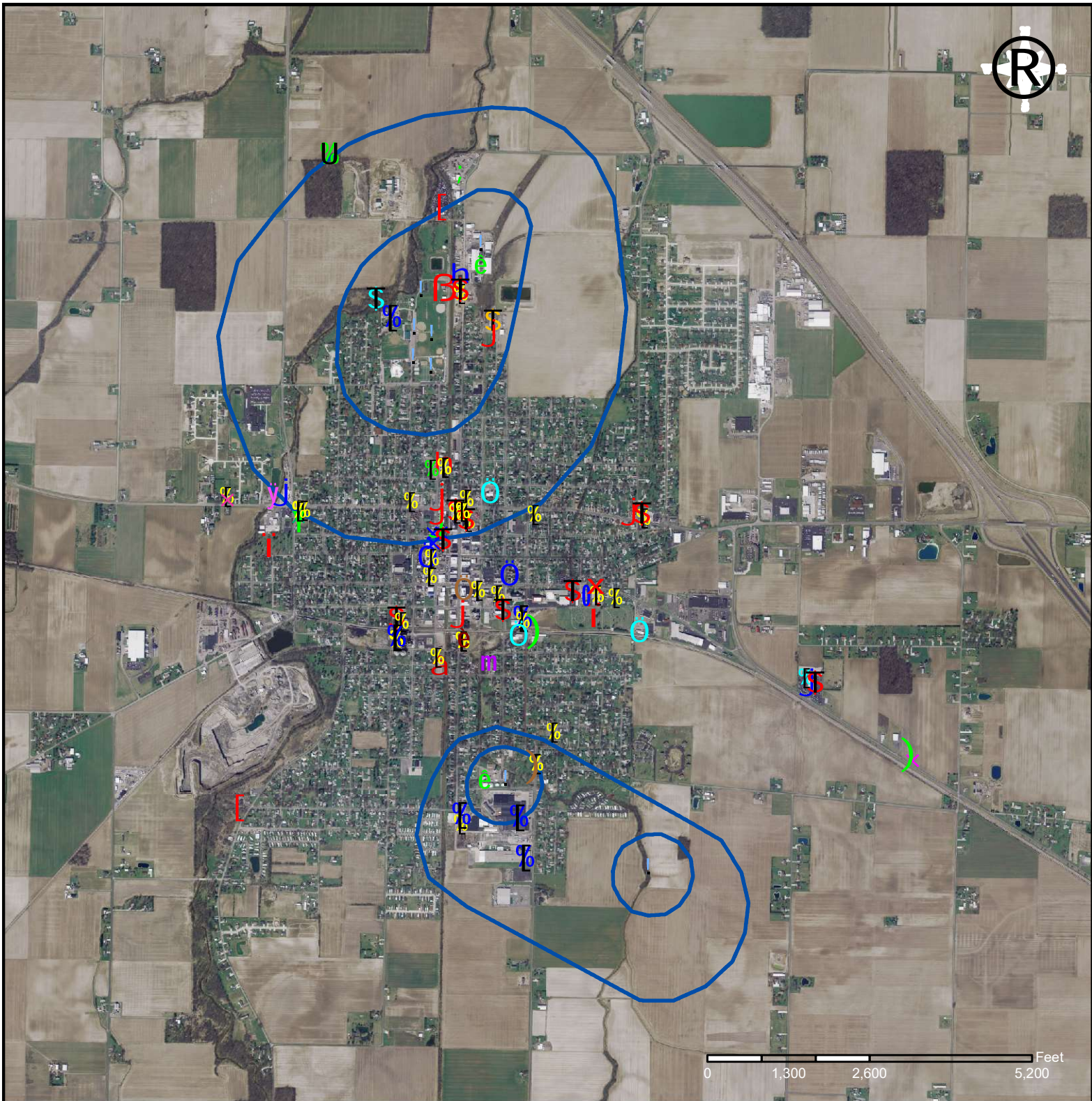
### ***Model Values***

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**. For this model, a total pumping rate of 1,700,640 gallons per day was used. Considering the large lateral spacing of the wells in the system, the pumping rate was based on the combined pump capacities for each well. An aquifer thickness of 310 feet was used, based on well logs and glacial aquifer maps. Site specific information on the hydraulic conductivity of the carbonate bedrock was not available, and measured porosity values were unavailable. In these cases, the values used in the model were based on values typically found in these kinds of rock. They were: 3% porosity, and 9 feet per day hydraulic conductivity for the 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 the 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](http://www.epa.state.oh.us/ddagw/pdu/swap.html) (Ohio EPA, 2007) on the Ohio EPA's Source Water Assessment and Protection Web page ([www.epa.state.oh.us/ddagw/pdu/swap.html](http://www.epa.state.oh.us/ddagw/pdu/swap.html)).

## **8.0 POTENTIAL CONTAMINANT SOURCES – GROUND WATER**

On August 5, 2003 an inventory of potential contaminant sources located within the drinking water source protection area for the city wells was conducted by the Ohio EPA with the assistance of the City of Delphos personnel. Thirty-three types of potential sources of contamination were identified within and surrounding the protection area (see Figure 7). 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 staff were able to observe on the day of the site visit. Therefore, the City of Delphos staff should be alert to the possible presence of potential sources of contamination that are not on this list.



Information used to develop the protection area:

Number of Wells = 8  
 Total Well Pumping Rate = 1,700,640 GPD  
 Porosity = 0.03  
 Aquifer Thickness = 310 feet  
 Hydrogeologic Setting = Bedrock



- |   |   |   |
|---|---|---|
| <ul style="list-style-type: none"> <li>U Above Ground Storage Tank</li> <li>J Auto Repair/Body Shop</li> <li>x Barber/Beauty Shop</li> <li>J Car/Boat/Camper Dealer</li> <li>J Car Wash</li> <li>x Carpet/Tile Store</li> <li>o Cemetery</li> <li>o Farm Chemical Distributor</li> <li>h Farm Machinery Repair Area</li> <li>h Fleet/Truck/Bus Terminal</li> <li>o Food Processor</li> <li>o Funeral Service/Crematory</li> <li>J Pesticide -Producing Facility (SSTS)</li> </ul> | <ul style="list-style-type: none"> <li>o Furniture Repair/Finishing/Manufacturing</li> <li>e Gas Station (Existing/Abandoned/Historical)</li> <li>h Garage (Municipal)</li> <li>o Gas Line</li> <li>y Greenhouse/Nursery</li> <li>S Hazardous Waste Handlers(RCRIS)</li> <li>o Inactive/Closed Landfill</li> <li>J Junk Yard (Scrap &amp; Auto)</li> <li>x Laundromat</li> <li>J Leaking Underground Tank</li> <li>m Machine/Metalworking Shop</li> <li>J NPDES Permitted Facility (PCS)</li> </ul> | <ul style="list-style-type: none"> <li>x Print/Photo Shop</li> <li>e Recycling Facility</li> <li>o Regulated Under Several EPA Programs</li> <li>o Salt Storage Area</li> <li>o Sewer Line</li> <li>a Town Gas Site</li> <li>o Underground Storage Tank: Non-Leaking</li> <li>x Welding Shop</li> <li>y Electrical Substation</li> <li>o Public Water System Wells</li> <li>o Drinking Water Source Protection Areas</li> </ul> |
|---|---|---|

**Figure 7 - Potential Contaminant Sources located within the Ground Water SWAP Area for the City of Delphos. Displayed with the 2006 Ohio Statewide Imagery Program (OSIP) aerial photography.**



## **9.0 WATER QUALITY – BOTH SOURCES**

A review of the City of Delphos' compliance monitoring data from 1991-2006 revealed that the system had no health based or maximum contaminant level (MCLs) violations. There is some evidence indicating the quality of water provided by the City of Delphos has been impacted. Samples collected on February 23, 1993 and January 10, 1994 contained carbon tetrachloride above the concentration of concern of 0.5 ug/L with concentrations of 0.7 and 0.6 ug/L. This indicates a manmade influence. These concentrations are below the federal and state drinking water standard of 5 ug/L. However, in water quality tests conducted after January 10, 1994, carbon tetrachloride concentrations have consistently been below the concentration of concern of 0.5 ug/L.

Table 1 lists contaminants where at least one result was above the level of detection, and does not include all contaminants tested for by the public water system. Please note that this water quality evaluation has some limitations:

- 1) The data evaluated is for treated water samples only, as the Ohio EPA's quality requirements are for the water being provided to the public, not the water before treatment.
- 2) 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.

It should be recognized that sampling results presented in this report can only provide information on the quality of the water at the time the sample was collected. Water quality may change over time due to a number of reasons. Therefore, it is recommended that the reader also consult the most recent Consumer Confidence Report (CCR) for the City of Delphos public water system. All public water systems are required to annually prepare and distribute the CCR to their customers. The report is a good source of information on health effects associated with detected contaminants and contains information on the community's drinking water, including the source of the water, contaminants detected, the likely sources of detected contaminants, and the potential health effects of contaminants at levels above the drinking water standards. Consumer Confidence Reports are available from the City of Delphos.

## **10.0 SUSCEPTIBILITY ANALYSIS – BOTH SOURCES**

For the purposes of source water assessments, all surface waters are considered to be susceptible to contamination. By their nature surface waters are accessible and can be easily contaminated by chemicals and pathogens. Also, compared to ground water, they tend to move swiftly, so an upstream spill may rapidly arrive at the public drinking water intake with little warning or time to prepare.

It is important to note that this assessment is based on available data, and therefore may not reflect current conditions in all cases. Water quality, land uses and other activities that are potential sources of contamination may change with time. While the source water for the City of Delphos is considered susceptible to contamination, historically, the Delphos Public Water System has effectively treated this source water to meet drinking water quality standards.

Based on the information compiled for this assessment, the City of Delphos' protection area is susceptible to contamination from agricultural runoff, feed lot runoff, gas line rupture, and waste water treatment (package plant) discharges. In addition, the source water is susceptible to contamination through motor vehicle accidents or spills at sites where the corridor management zone is crossed by

roads or underground gas lines.

This assessment also indicates that the City of Delphos's ground water source of drinking water has a high susceptibility to contamination due to:

- presence of a relatively thin protective layer of clay overlying the aquifer,
- shallow depth (less than 25 feet below ground surface) of the aquifer,
- presence of significant potential contaminant sources in the protection area.
- and the presence of manmade contaminants in treated water.

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

## 11.0 PROTECTIVE STRATEGIES – BOTH SOURCES

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

1. Protect the community's investment in its water supply.
2. Protect the health of the community residents by preventing contamination of its drinking water source.
3. Support the continued economic growth of a community by meeting its water supply needs.
4. Preserve the ground water resource for future generations.
5. Reduce regulatory monitoring costs.

Ohio EPA encourages the City of Delphos to develop and implement an effective Drinking Water Source Protection Plan. The plan can be developed from the information provided in this Drinking Water Source 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.

Three guidance documents are available from Ohio EPA to assist with development of a Drinking Water Source Protection and Management Plan. *A Guide to Developing Local Watershed Action Plans in Ohio* is available on the internet at [www.epa.state.oh.us/dsw/nps/wsguide.pdf](http://www.epa.state.oh.us/dsw/nps/wsguide.pdf), *Developing Local Drinking Water Source Protection Plans in Ohio* at [www.epa.state.oh.us/ddagw/Documents/swap\\_psd.pdf](http://www.epa.state.oh.us/ddagw/Documents/swap_psd.pdf), and *Developing Source Water Protection Plans For Public Drinking Water Systems Using Inland Surface Waters* at [www.epa.state.oh.us/ddagw/Documents/swap\\_sw\\_protplan\\_FINAL.pdf](http://www.epa.state.oh.us/ddagw/Documents/swap_sw_protplan_FINAL.pdf)

Other general source water protection efforts may include:

**Education and Outreach:** Informing people who live, work, or own property within the protection area about the benefits of drinking water protection is very important. Although some

communities develop their own educational outreach resources, assistance is available at no cost from various agencies. For example, staff from Ohio EPA's Office of Pollution Prevention can visit businesses (free of charge) and provide recommendations on how they can modify their processes, materials and practices to generate less pollution in a cost-effective and technically feasible manner. An effort should be made to educate homeowners and businesses of the potential threat their activities can pose to the water supply. Education could also focus on increasing public awareness of illegal dumping and drinking water protection.

**Coordination with Existing Activities:** Many local groups are engaged in programs that complement a public water system's drinking water source protection efforts. Working with groups such as the Natural Resources Conservation Service, the Soil and Water Conservation Service, the Farm Bureau, or a local watershed planning organization ensures coordination of their respective programs.

The City of Delphos and stakeholders within the protection area are encouraged to develop a local program to protect the source waters. A local program is capable of responding to changing conditions within the watershed and can bring together the local governments and stakeholders needed for an effective protection effort. Source water protection efforts could benefit the community by allowing the Delphos water treatment plant to more fully use its surface water resource. Protecting the source water can also benefit those in the protection area who are not using the Little Auglaize River for drinking water. High quality source water enhances other uses such as fishing, recreation, and water supply for agriculture or industry.

**Emergency Response Planning:** The City of Delphos should prepare a plan that includes early warning of spills and coordination of response and remediation activities for spills that may enter the Little Auglaize River or Delphos' wellfield. This plan should include emergency response actions for the City of Delphos, such as the placement of absorbent booms to control oil spills, or the ability to mechanically add oxygen to oxidize chemicals with a high oxygen demand. Different response plans could be developed for different types of contamination. The emergency response plan may also contain strategies for dealing with unexpected levels of runoff containing chemicals such as fertilizers and pesticides from adjacent land uses. Though it may be less catastrophic than a major spill, this kind of contamination is more prevalent and is harder to detect and contain.

**Water Quality Monitoring:** Monitoring does not directly prevent contamination, but the protection plan will be more effective if the City of Delphos conducts periodic monitoring of raw water quality and quantity from the Little Auglaize River. For example, monitoring data can be used to (1) determine optimal conditions or seasons for pumping water to the reservoirs; (2) estimate time-of-travel for a chemical to reach the water treatment intake from various locations in the Little Auglaize River; (3) track water quality trends; and (4) evaluate the effectiveness of selected protective strategies. Sampling locations and schedules could be modified on an emergency basis to monitor spills or the runoff of contaminants that may enter the reservoirs. The City may also want to monitor raw water quality in its ground water wells to ensure that the back-up source is not impacted.

**Zoning Ordinances:** A water protection zoning ordinance is a regulatory control that typically places some restrictions or standards on activities conducted within a specified zone (such as the corridor management zone and/or the emergency management zone). Such ordinances enable the municipality to require people who live or work in this area to avoid contaminating the source of the municipality's drinking water. Ordinances can help ensure best management

practices are being employed at local businesses and can help reduce the volume of contaminants stored within the protection areas. The City of Delphos may want to consider working with the counties, townships, and municipalities in the protection areas to develop zoning overlays that require specific standards for chemical storage, handling of waste materials, and other source control strategies. Several communities in Ohio have enacted very successful drinking water source protection ordinances. Copies can be obtained by contacting Craig Smith at (614) 644-2752.

**Regulatory Compliance:** Where possible, the City of Delphos can monitor the compliance of potential contaminant sources with existing regulations through inspections and/or contact with regulatory agencies. If routine inspections are a regulatory requirement, they provide an excellent opportunity to educate an important segment of the community about the importance of drinking water source protection. Inspections also provide an opportunity to encourage improved materials handling procedures, hazardous materials training, waste and disposal assessments, facility spill/contingency planning, and pollution prevention initiatives.

**Future Development:** Currently, the protection area for the surface water source is not under a great deal of development. The effect of development on the source water should be considered when planning future land use and developing zoning. Residential and commercial land uses will increase the amount of impervious surfaces such as roofs, roads and parking lots in the protection area. Increases in impervious surfaces can affect the transport of contaminant materials to the stream through storm water collection systems. Contaminants such as metals, oil and grease, nutrients, and bacteria are commonly transported in urban runoff.

**Agricultural Activities:** Provide education to local farmers on the use of best management practices to reduce agricultural and animal feedlot runoff, use of proper manure handling facilities, proper handling and road safety with agricultural chemicals, and other methods to control or reduce impacts to surface waters.

**Transportation Routes:** There is a potential for spills along roads within the protection area. The City of Delphos may want to consider contacting the local fire department and local emergency planning agency about the location of the drinking water source protection area, so that strategies can be developed to prevent spilled materials from impacting the Little Auglaize River or the Delphos Wellfields.

Ohio EPA encourages the City of Delphos to incorporate the types of protective strategies listed above into a drinking water source protection plan. For more information on drinking water source protection please contact the Drinking Water Protection staff at (614) 644-2752.

## References

Eagon and Associates, Inc., 1995, *Pumping Test Evaluation City Park Well No. 9 Delphos, Ohio*.

Eagon and Associates, Inc., 1999, *Pumping Test Evaluation Delphos Well No. 2 Amanda Township Wellfield Allen County, Ohio*.

Ohio EPA public drinking water files.



Ohio Department of Natural Resources, 1970, *Ground Water for Planning in Northwest Ohio - A Study of the Carbonate Rock Aquifer*, Ohio Water Plan Inventory Report No. 22.

Ohio Department of Natural Resources, 2000, Glacial Aquifer Map (digital).

Ohio EPA, 2002, *Drinking Water Source Protection Area Delineation Guidelines & Process Manual*, Draft (February, 2002).

U.S. Department of Agriculture, 1965, *Soil Survey Allen County, Ohio*.

**Table 1. Water Quality Monitoring Summary of Treated Water**  
**City of Delphos Public Water System**  
**Ohio EPA Public Water System Compliance Monitoring Database (1991-2006)**

Contaminant (units)	Levels Found	Primary MCL	MCL Violation <sup>1</sup>	Typical Source
<b>Inorganic Contaminants</b>				
Barium (mg/l)	0.020 – 0.029	2	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Chromium (µg/l)	7.1	100	No	Discharge from steel and pulp mills; Erosion of natural deposits
Fluoride (mg/l)	1.33 – 1.73	4	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Nitrate (mg/l)	0.06 – 3.46	10	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Nitrite (mg/l)	0.10 – 3.46	1	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Sulfate (mg/l)	182 - 256	none	NA <sup>2</sup>	Erosion of natural deposits; decomposition product of organic matter; discharge from mining and industrial waters; detergents in sewage; component of precipitation in metropolitan areas
Zinc (mg/l)	0.011 – 0.016	none	NA <sup>2</sup>	Erosion of natural deposits; used as an alloy and in galvanization process; discharge from commercial and industrial facilities
<b>Radioactive Contaminants</b>				
Beta/photon emitters (pCi/L)	4.16 – 8.90	AL=50	No	Decay of natural and man-made deposits
Alpha emitters (pCi/L)	3 - 5	15	No	Erosion of natural deposits
<b>Synthetic Organic Contaminants including Pesticides and Herbicides</b>				
Atrazine (µg/l)	1.02	3	No	Herbicide runoff
<b>Volatile Organic Contaminants</b>				
Carbon tetrachloride (µg/l)	0.6 – 0.7	5	No	Discharge from chemical plants and other industrial activities
Toluene (mg/l)	0.0016	1	No	Discharge from petroleum factories
TTHMs [Total Trihalomethanes] (µg/l)	21.30 – 28.58	80	No <sup>3</sup>	By-product of drinking water chlorination
Five Haloacetic Acids [HAA5] (µg/l)	7.1 – 10.6	60	No <sup>3</sup>	By-product of drinking water chlorination

MCL = Maximum Contaminant Level (AL = Action Level).

MFL = Millions of fibers per liter

<sup>1</sup> MCL set by federal or state drinking water standards. **A sampling result that exceeds the MCL value does not necessarily indicate a violation by the public water system.** MCL violations for many contaminants are based on a running annual average.

<sup>2</sup> Secondary Maximum Contaminant Level (SMCL) for this parameter. SMCLs are non-health-related limits.

<sup>3</sup> Total Trihalomethanes (TTHMs): (MCL = 80 µg/l) calculated as the sum of the concentrations of Bromodichloromethane, Dibromochloromethane, Bromoform, and Chloroform. Five Haloacetic Acids (HAA5): (MCL = 60 µg/l) calculated as the sum of the concentrations of Monochloroacetic acid, Dichloroacetic acid, Trichloroacetic acid, Monobromoacetic acid, and Dibromoacetic acid.

**Table 2. Potential Contaminant Source Inventory – City of Delphos Surface Water, Source Protection Area Corridor Management Zone**  
*(Map ID corresponds to Figure 5)*

<b>Map ID</b>	<b>Facility Description/ Comments</b>	<b>Data Source</b>
1	Oil & Gas Well	ODNR Oil & Gas Well Database
2	Oil & Gas Well	ODNR Oil & Gas Well Database
3	Oil & Gas Well	ODNR Oil & Gas Well Database
4	Above Ground Storage Tanks	Field Inventory of SWAP area
5	Gas Lines	Field Inventory of SWAP area
6	Lagoon/Pond/Pit	Field Inventory of SWAP area
7	WWTP Facility	OEPA NPDES Database
8	WWTP Outfall	OEPA NPDES Database
9	Animal Feedlot	Field Inventory of SWAP area
10	Above Ground Storage Tanks	Field Inventory of SWAP area
11	Confined Animal Feedlot	Field Inventory of SWAP area
12	Confined Animal Feedlot	Field Inventory of SWAP area
13	Animal Waste Lagoon	Field Inventory of SWAP area
14	Fleet/truck/bus terminals	Field Inventory of SWAP area
15	Confined Animal Feedlot	Field Inventory of SWAP area
16	Confined Animal Feedlot	Field Inventory of SWAP area
17	Other Industrial (Wood Pallet Mfg)	Field Inventory of SWAP area
18	Equipment rental/repair shops	Field Inventory of SWAP area

**Table 3. Potential Contaminant Sources Located in the City of Delphos's Ground Water Source Protection Area.** Potential contaminant sources listed in the table as (\*NF\*) indicate that the potential contaminant source was not included in Ohio EPA's initial inventory, which only addressed the ground water source protection area. Ohio EPA encourages the City of Delphos to review and amend the table as necessary.

Potential Contaminant Source	Number of Sources	Environmental Concerns
<b>AGRICULTURAL SOURCES</b>		
Animal Feedlots	*NF*	Potential contaminant sources that may be found at feedlots include: concentrations of animal waste; aboveground storage tanks; underground storage tanks; and chemical storage areas. These types of facilities may be a source for nitrates, ammonia, animal pathogens, and pesticides in drinking water sources.
Animal Burial Areas	*NF*	Animal burial areas may be a source of animal pathogens and may cause elevated chemical or biological oxygen demand in water.
Animal Waste Storage / Treatment	*NF*	Animal waste storage and treatment facilities may be a source of nitrates, ammonia, and animal pathogens in surface or ground water.
Crops: Corn, Soybean, Wheat	Primary ag. use in the area.	Potential contaminant sources that may be associated with pastures include sludge application, fertilizer, and pesticide use. Cropland may be associated with nitrates, ammonia, pesticides, and pathogens in drinking water sources.
Drainage Canals / Tiles (Agricultural)	Field Tile Former Canal	Drainage canals receiving runoff from pastures, crop land, or confined animal feeding operations and agricultural drainage tiles may be a source of animal pathogens, excess nutrients, and/or pesticides in source water.
Farm Chemical Distributor	1	Among the potential contaminant sources related to these facilities are: aboveground storage tanks, underground storage tanks, and other chemical storage areas. These types of facilities may be associated with the potential for chemical leaks and spills.
Farm Machinery Repair Areas	1	Among the potential contaminant sources related to these facilities are: underground storage tanks; aboveground storage tanks; automotive fluid storage; and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, automotive fluids, and parts cleaners. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.
Greenhouses / Nurseries	1	Potential contaminants that may be associated with nurseries include nitrates, ammonia, and pesticides. Nurseries may also maintain storage areas for gasoline, diesel fuel, and other automotive fluids.
Pesticide/ Fertilizer / Petroleum Storage & Transfer Areas	*NF*	Pesticides, fertilizer, and petroleum products may be stored in liquid form in underground storage tanks, aboveground storage tanks, drums, or small containers. Pesticides and fertilizer may also be stored as a bulk solid. There is the potential for leaks and spills of during transfer operations or from storage areas.
Silage Storage (Bulk)	*NF*	Runoff or infiltration of liquids from bulk silage storage areas may be a source of excess nutrients in source water.
<b>MUNICIPAL SOURCES</b>		
Composting Facility / Yard Wastes	*NF*	Runoff or infiltration of liquids from composting facilities and yard waste storage may be a source of excess nutrients and other organic compounds in source water.
Drinking Water Treatment Plants	Village Water Plant	Among the potential contaminant sources related to these facilities are: underground storage tanks; aboveground storage tanks; and storage of chemicals used in water treatment and testing.



Potential Contaminant Source	Number of Sources	Environmental Concerns
Garages	1 Village Garage	Among the potential contaminant sources related to these facilities are: underground storage tanks; automotive fluid storage; equipment storage areas; parking lots; vehicle storage areas; vehicle maintenance areas; and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.
Recycling Facilities	1	Chemicals of concern at recycling facilities is dependant on the materials processed and the processes used at the facility. These areas may be a source of pesticides, metals, petroleum compounds, and organic chemicals.
Schools	1	Among the potential contaminant sources schools include aboveground storage tanks, underground storage tanks, lawn chemical storage, and vehicle storage, maintenance, and washing areas.
Storm Water Basins	many	Storm Water Basins may be a source of pesticides, microorganisms, nutrients, metals, petroleum products, and organic chemicals in source water.
Wastewater Treatment Plant	Village waste-water plant	Among the potential contaminant sources related to these facilities are waste treatment lagoons, aboveground storage tanks, and underground storage tanks. Wastewater treatment plants may be associated with nitrates, ammonia, pathogens, and chemical spills and leaks.
Wastewater Application Sites	*NF*	Biosolids application in excess of agronomic rates or in inappropriate locations may be a source of microorganisms, organic chemicals, metals, and nutrients, including nitrates.
<b>COMMERCIAL SOURCES</b>		
Leaking Underground Storage Tank (LUST)	31	Facilities that have reported a leaking underground storage tank (LUSTs) to Ohio's Bureau of Underground Storage Tank Regulations (BUSTR). Leaking underground storage tanks have been associated soil and water contamination related to leaks and spills of gasoline and other petroleum products. Unused underground storage tanks may be used for the improper disposal of wastes.
Auto Repair Shops / Body Shops	5	Among the potential contaminant sources related to these facilities are: underground storage tanks, automotive fluid storage, vehicle maintenance areas, and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.
Barber and Beauty Shops	3	Although the majority of chemicals found at these facilities are safe for human use, they may also store cleaning solutions. Potential contaminants that may be associated with beauty shops include cleaning fluids and solutions used for some hair treatments, such as permanents.
Car / Boat / Camper Dealerships	1	Among the potential contaminant sources related to these facilities are: underground storage tanks; automotive fluid storage; equipment storage areas; parking lots; vehicle storage areas; vehicle maintenance areas; and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.

Potential Contaminant Source	Number of Sources	Environmental Concerns
Car Washes	1	Runoff from these facilities may be a source of metals, petroleum products such as motor oil, and organic compounds in source water.
Carpet / Tile Stores	*NF*	Potential contaminants that may be associated with carpet stores include organic compounds glues and cements.
Cemeteries	2	Cemeteries have been associated with arsenic and formaldehyde contamination in ground water.
Dry Cleaners	*NF*	Potential contaminant sources at these facilities include storage and use of dry cleaning chemicals.
Equipment Rental / Repair Shop	*NF*	Among the potential contaminant sources related to these facilities are: underground storage tanks; automotive fluid storage; equipment storage areas; parking lots; equipment maintenance areas; and vehicle or parts washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.
Fleet / Truck / Bus Terminals	1	Among the potential contaminant sources related to these facilities are: underground storage tanks; automotive fluid storage; equipment storage areas; parking lots; vehicle storage areas; vehicle maintenance areas; and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.
Food Processor	3	Potential impacts to the drinking water source from food processing facilities are dependant on the specific facility.
Funeral Services and Crematories	2	Potential contaminant sources at these facilities include the storage and use of chemicals and the disposal of biological wastes.
Furniture and Fixtures Manufacturers	*NF*	Among the potential contaminant sources related to these facilities is chemical storage and use. Potential impacts to the drinking water source are dependant on the specific facility, but may include leaks and spills of organic chemicals and solvents.
Furniture Repair and Finishing Shops	1	Potential impacts to the drinking water source are dependant on the specific facility, but may include leaks and spills of organic chemicals and solvents.
Gas Stations	3	Among the potential contaminant sources related to these facilities are: underground storage tanks, automotive fluid storage, vehicle maintenance areas, and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Historic gas station locations have been associated soil and water contamination related to leaks and spills of gasoline and other petroleum products. Unused underground storage tanks may be used for the improper disposal of wastes.
Golf Courses	*NF*	Potential contaminants that may be associated with golf courses include nitrates, ammonia, and pesticides. Golf courses may also maintain storage areas for gasoline, diesel fuel, and other automotive fluids.
Hardware / Lumber / Parts Stores	*NF*	Among the potential contaminant sources related to these facilities are: wood treatment chemicals, pesticides, fertilizers, parts cleaning solvents, and other chemical storage. These types of facilities may be associated with the potential for leaks and spills chemicals stored or used at that location.

Potential Contaminant Source	Number of Sources	Environmental Concerns
Heating Oil Companies	*NF*	Potential contaminant sources commonly related to these facilities include underground and aboveground storage tanks and fuel transfer areas. These types of facilities may be associated with the potential for leaks and spills of oil and other petroleum products.
Junk Yards: Scrap and Auto	2	These types of facilities may be locations for leaks and spills of oil and other petroleum products. Waste oil and auto parts may contain metals that could contaminate drinking water sources.
Landscaping Firms	*NF*	Potential contaminants that may be associated with landscaping companies include nitrates, ammonia, and pesticides. Landscaping firms may also maintain storage areas for gasoline, diesel fuel, and other automotive fluids.
Laundromats	1	Waste water from laundromats may contain elevated levels of nutrients.
Lawn / Farm Stores	*NF*	Lawn and garden or farm supply stores may store significant quantities of pesticides and fertilizers.
Medical / Dental Offices / Clinics	*NF*	Among the potential contaminant sources related to these facilities are pathogen containing medical waste.
Paint Stores	*NF*	Paint stores may store significant quantities solvents and other organic compounds.
Pest Control Company	*NF*	Pest control companies may store significant quantities of pesticides, that if spilled could impact the drinking water source.
Photo Processing / Printing Shops	1	Chemicals of concern at photo processing facilities is dependant on the processes used at the facility, but may be a potential source of metals, solvents, and organic chemicals.
Railroad Yards / Maintenance Areas	*NF*	Among the potential contaminant sources related to these facilities are: underground storage tanks; automotive fluid storage; equipment storage areas; parking lots; vehicle storage areas; vehicle maintenance areas; and vehicle washing areas. These types of facilities may be associated with the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids. Waste oil and machining wastes may contain metals that could contaminate drinking water sources.
Research Laboratories	*NF*	The chemicals of concern stored and/or used at research laboratories is dependant on the type of research performed, and may include biological wastes, metals, solvents, and organic chemicals.
Veterinary Offices	*NF*	Among the potential contaminant sources related to these facilities are diseased and deceased animals. These types of facilities may be associated with animal pathogens.
Welding Shops	1	Wastes may contain metals that could contaminate drinking water sources. Welding shops may also store or use significant quantities of parts cleaning solvents,
<b>INDUSTRIAL SOURCES</b>		
Asphalt / Cement / Concrete Plants	1	Among the potential contaminant sources related to these facilities are: aboveground storage tanks, underground storage tanks, other liquid storage, vehicle maintenance areas, electric substations, and vehicle washing areas. These types of facilities may be associated with surface water contaminants and the potential for leaks and spills of oil, gasoline, other petroleum products, and automotive fluids.



Potential Contaminant Source	Number of Sources	Environmental Concerns
NPDES Permitted Facilities (pcs)	1	Facilities that hold a National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit program controls water pollution by regulating point sources such as pipes or man-made ditches that discharge pollutants into waters of the United States.
Multiple databases	6	This facility appears in multiple state and federal databases and is regulated through multiple programs. This facility may be associated with potential releases of hazardous materials. Environmental concerns are dependant on the materials used and other site specific conditions. Envirofacts(pads). Facilities may be authorized by U.S. EPA to use, store, transport, or dispose polychlorinated biphenyls (PCBs). These types of facilities may be associated with potential leaks and spills of PCBs or other hazardous materials.
Hazardous Waste Handlers(rcris)	6	Facilities regulated by U.S. EPA under the Resource Conservation and Recovery Act (RCRA) as hazardous waste generators or handlers. These types of facilities may be associated with potential releases of hazardous materials.
Airborne Emissions (AIRS) Facilities	*NF*	Airborne Emissions (AIRS) Facilities report releases of pollutants into the air. Airborne pollutants can be deposited in surface waters.
Foundries and Metal Fabricators	*NF*	Among the potential contaminant sources related to these facilities are: waste handling and disposal practices; aboveground storage tanks; underground storage tanks; other liquid storage; bulk material storage; and equipment storage and maintenance areas. These types of facilities may be associated with the potential for leaks and spills of oil and other chemical. Waste streams may contain metals that could contaminate drinking water sources.
Gravel Pits & Quarries	1	Among the potential contaminant sources related to these facilities are: aboveground storage tanks, underground storage tanks, other liquid storage, vehicle maintenance areas and vehicle washing areas. These types of facilities may be associated with surface water contaminants and the potential for oil, gasoline, and automotive fluid leaks and spills.
Historic hazardous materials sites	*NF*	Runoff or leachate from historic hazardous materials sites may be a source of metals, fuels, or organic compounds in source water, dependant on the materials disposed and other site specific conditions.
Machine and Metalworking Shops	2	Among the potential contaminant sources related to these facilities are: waste handling and disposal practices; aboveground storage tanks; underground storage tanks; other liquid storage; bulk material storage; and equipment storage and maintenance areas. These types of facilities may be associated with the potential for leaks and spills of oil and other chemical. Waste streams may contain metals that could contaminate drinking water sources.
Metal Finishing / Plating	1	Among the potential contaminant sources related to these facilities are: waste handling and disposal practices; aboveground storage tanks; underground storage tanks; other liquid storage; bulk material storage; and equipment storage and maintenance areas. These types of facilities may be associated with the potential for leaks and spills of oil and other chemicals. Waste streams may contain metals that could contaminate drinking water sources.
Petroleum Production and Storage Companies	*NF*	Potential contaminant sources commonly related to these facilities include underground and aboveground storage tanks and fuel transfer areas. These types of facilities may be associated with the potential for leaks and spills of oil and other petroleum products.

Potential Contaminant Source	Number of Sources	Environmental Concerns
Plastics / Synthetics Producers	*NF*	Among the potential contaminant sources related to these facilities are chemical storage in underground storage tanks, above ground storage tanks, and other storage areas. The chemicals of concern at these facilities are dependant on the materials processed and the processes used at the facility, but may include solvents and organic chemicals.
Power Plants	*NF*	Among the potential contaminant sources related to these facilities are: aboveground storage tanks, underground storage tanks, other liquid storage, electric substations, and material stockpiles. These types of facilities may be associated the potential for leaks and spills of oil, and other chemicals that may impact surface or ground water.
<b>WASTE DISPOSAL SOURCES</b>		
Abandoned Dumps	1	Runoff or leachate from historic waste disposal sites may be a source of metals, pesticides, or organic compounds in source water, dependant on the materials disposed and other site specific conditions.
Construction and Demolition Debris Landfills	*NF*	Runoff or leachate from construction and demolition debris landfills may be a source of organic compounds in source water.
Unknown Status Landfills	*NF*	Runoff or leachate from waste disposal sites may be a source of metals, pesticides, or organic compounds in source water, dependant on the materials disposed and other site specific conditions.
<b>WIDESPREAD SOURCES</b>		
Aboveground Storage Tanks	2	Above ground storage tanks present a potential for leaks and spills that could impact surface or ground water.
Septic Systems	Outside village limits	If poorly maintained, may be a source of household chemicals, excess nutrients, viruses and bacteria in drinking water sources.
Wells: Abandoned	???	Improperly sealed unused water wells create a direct pathway for potential contaminants to reach the aquifer.
Oil & Gas Wells	There are many	Potential sources of petroleum and brine, which may leak into an aquifer. Oil, brine, and other fluids may also leak from storage tanks.
Surface Water Bodies	*NF*	May provide a direct pathway for spilled chemicals, nitrates, and pesticides from the ground surface to the aquifer.
Sewage Sludge / Biosolid Application	*NF*	Biosolids application in excess of agronomic rates may be a source of metals and nutrients, including nitrates.
Highway / Transportation Route	Many	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.
Pipelines	*NF*	Spills and leaks from pipelines the potential to impact drinking water sources, even at small quantities. Condensate in natural gas pipelines may contain PCBs and other chemicals.

**Table 4: General Protective Strategies for the Potential Contaminant Sources for the City of Delphos**

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>➤ 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 home owners 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 of 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> <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>