DRINKING WATER SOURCE PROTECTION PLAN
for the
VILLAGE OF ARCHBOLD

December 2012

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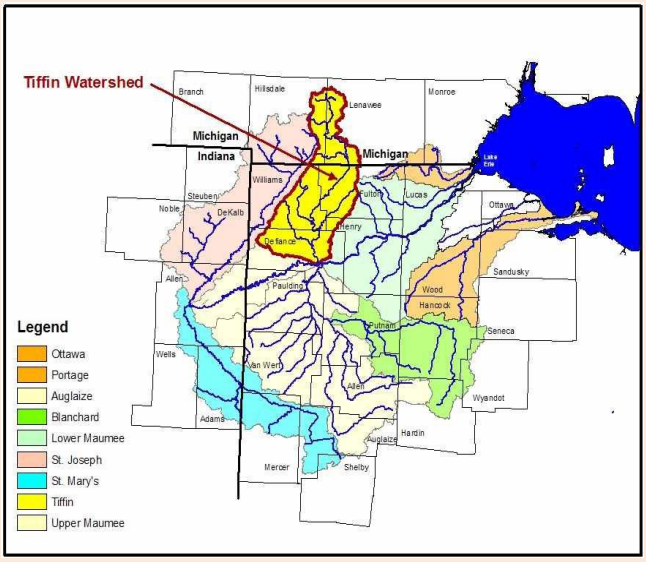
Executive Summary

The Village of Archbold operates a water treatment plant that draws raw water from the Tiffin River. As described in pages 9 to12 of this document, the water quality of the Tiffin River has been severely impacted by changes in the landscape over the last couple centuries, which were undertaken to convert northwest Ohio and southeastern Michigan into a highly productive agricultural area. As a result, the river frequently contains high levels of turbidity and pathogens. Although the village has effectively insulated its public water supply from river contaminants for over half a century by constructing upground reservoirs that enable it to pump from the river when water quality is optimal, partnering with others to improve the Tiffin River baseline water quality is very much to its advantage and to the advantage of Archbold's water customers.

Addressing nonpoint source pollution in an area as extensive and agricultural as Archbold's source water area is difficult. However, Archbold is fortunate in that the Tiffin watershed is located within the Western Lake Erie basin (WLEB), which has been the subject of countless environmental studies since the late 1960s, when the lake was famously declared "dead". An extraordinary amount of federal and state funding has been targeted to this area for water quality studies and to encourage practices that reduce the loading of nitrates and phosphates into the tributaries and streams of the Western Lake Erie Basin (Figure 1). It is clear that the Village of Archbold can achieve its source water protection goals most effectively by encouraging and coordinating with these efforts whenever possible and maintaining and extending the partnerships it has already established to encourage stewardship of the land that enables agriculture to remain productive while decreasing the impacts to water quality.

The Implementation Plan provided in the following three pages (for quick reference) summarizes activities that are ongoing in the village's source water protection area, as well as some additional activities that will be initiated in the following year or so. These activities are discussed in greater detail on pages 18 to 26.

Figure 1. The WLEB Partnership. The WLEB Partnership is a tri-state partnership led by the USACE-Buffalo District, which has conducted assessments of each of the WLEB watersheds. Upon completion of all the assessments the Partnership will develop an Implementation Strategy to provide the blueprint for moving forward all the initiatives recommended in the nine watersheds for not only water quality goals, but also flood control, recreation, fish and wildlife habitat, and commerce and navigation. As of 2012, this strategy has not yet been developed.



Implementation Plan

Bolded items indicate new strategies; others are ongoing

Activity	***Responsible Party***	***When Implemented***	***Comments***
SOURCE MANAGEMENT ACTIVITIES			
Reduce runoff from agricultural fields and ditches			
Wetland Restoration Local Incentive Program	Archbold Village Council with Fulton and Lenawee Counties SWCDs	Initiated in 2011, ongoing	See pages 21 to 22 for details
Conservation Reserve Program contracts	Fulton County NRCS staff	Ongoing	
Other conservation programs administered by SWCD	Fulton County SWCD	Ongoing	
Reduce releases from Village of Fayette wastewater treatment system			
Continue notifications from Fayette when wastewater fluids are released	Archbold WTP and Fayette WWTP staff	Ongoing	See pages 22 to 23 for details
Continue sampling for *E. coli* before pumping to reservoirs	Archbold WTP staff	Ongoing	
Fayette to begin separation of sanitary and storm water systems	**Fayette Village Council, with consultant ARCADIS**	**To be initiated in 2013**	
Reduce formation of hazardous algal blooms in reservoirs			
Continue current treatment protocol at first sight of blooms	Archbold WTP staff	Ongoing	See page 23 for details
Research methods for preventing blooms, as more techniques and effectiveness studies become available	Archbold WTP superintendent	Ongoing	
Concentrated Animal Feeding Operations			
Follow up on reports of CAFO discharges, contacting appropriate Michigan officials if warranted.	**Archbold WTP superintendent**	**As needed**	See page 23
Highways - Spills			
Install signs and surveillance camera monitoring Township Road G bridge **Investigate possibility of installing signs at U.S. Route 20 Alt bridge**	**Archbold WTP superintendent** **Archbold WTP superintendent**	**Completed December 2012** **Discussions initiated Oct. 2012; expect to be complete by Jan. 2013**	See pages 23 to 24

Activity	*Responsible Party*	*When Implemented*	*Comments*
Ask Archbold and Fayette Fire Departments and Fulton Sheriff's Dept. to notify WTP of any spills into the Tiffin River upstream from intake.	**Archbold WTP superintendent**	**Changes in contact information to be provided as they occur, or at least on annual basis.**	Archbold and Fayette Fire Depts. contacted in Nov. 2012. Fulton County Sheriff's Dept. to be contacted after placement of signs.
Contact Lenawee County (Michigan) EMA, request notification of any spills into Bean; provide contact information	**Archbold WTP superintendent**	**Completed November 2012**	
Home Fuel/Gas Storage Tanks *Home Sewage Treatmt. Systs.* *Silage Leachate* **Post links on Water Dept's web page to information on how to prevent environmental impacts from the above**	**Archbold WTP staff**	**January 2013**	See pages 17 to 18 for discussion of environmental impacts
EDUCATION AND OUTREACH			
Consumer Confidence Report. **Include info on source water protection plan in CCR.**	**PWS operator and staff**	Annually	CCR is updated annually and made available on village web site
Plant tours Continue to offer tours upon request.	PWS staff	Ongoing – as requested	
Web Page **Post information about source water protection strategies on the Water Plant's web page**	**PWS and/or Team outreach members**	**Starting January 2013 and ongoing as needed thereafter**	
SWEET Team **Invite SWEET teams to demonstrate Enviroscape to selected audiences**	**Team outreach members, with County SWEET teams**	**Starting January 2013 and ongoing thereafter**	See page 25.
Brochure **Create brochure about Archbold's source water protection plan for distribution at appropriate venues**	**Team outreach members, with OEPA assistance**	**Begin drafting January 2013 for posting on web page by March 2013**	
Festivals/Fulton County Fair **Brochures about Archbold's SWAP program will be made available and SWEET teams and/or Ohio EPA educational staff may be invited to offer public education.**	**Team outreach members**	**Starting summer 2013 and annually thereafter**	See page 32.

Activity	***Responsible Party***	***When Implemented***	***Comments***
Newspaper **Publicize conservation and source water protection efforts in the local newspaper**	**Team outreach members**	**As available**	
Bean/Tiffin Watershed Coalition **Create link to this Michigan group on the Water Plant's web page**	**Team outreach members**	**November 2012**	Contact information shared in November; link to be posted in January 2013
CONTINGENCY PLANNING			
Plans for Short and Long-term Water Shortages	PWS operator	Entered into Village ordinance in 1989	Documented in plant's contingency plan, which is reviewed and updated annually
Update Emergency Contacts PWS staff will notify EMA, LEPC and Fire Depts of Archbold and Fayette of changes in contact staff on at least an annual basis.	PWS operator	As part of annual contingency plan review/update	
Spill Response	PWS operator		Documented in plant's contingency plan, which is reviewed and updated annually
SOURCE WATER MONITORING			
Raw Water Sampling PWS staff will continue to sample raw water at intake before pumping to reservoirs	PWS staff	Ongoing	
HABs Analysis Submit specimens of algae to contracted expert, for analysis of species and cell counts	PWS staff, with contracted expert	Ongoing	

Source Water Protection Plan for the Village of Archbold

Purpose

The goal of this document is to summarize strategies that are ongoing and/or will be pursued in the future to minimize the threats of contamination or water shortage to Archbold's source of drinking water—the Tiffin River. Although Archbold treats the water to meet federal and state drinking water standards, conventional treatment does not fully eradicate all potential contaminants, and beyond-conventional treatment is often very expensive. By completing this plan, the Village of Archbold acknowledges that implementing measures to prevent spills and releases into the Tiffin River can be a relatively economical way to help ensure the safety of the Village's drinking water, while also improving river quality for other uses.

Why should a community have a source water protection plan? Water is a vital part of all facets of our communities. It is essential to agriculture, to washing, to cooling for industry and power stations, to moving wastewater away from populated areas and above all, to drinking. In addition to being a basic necessity of life, clean, affordable water can be an important economic driver. Many manufacturing plants use significant amounts of water and can even decide plant locations based on the availability of quality water. Clean water, provided at a reasonable cost, can attract new business and residents which help fuel economic growth and prosperity.

Governments invest a significant amount of money and time in their water treatment and distribution; *keeping the water source clean keeps costs as low as possible*. When contamination occurs, it can have a huge financial impact on communities and entire financial reserves can be wiped out. Contamination also disrupts lives and businesses, creating a negative economic effect for the local community. Most importantly, when drinking water is contaminated, the health of our families and fellow citizens is put at risk.

Because it only takes one major event to drastically change the quality of your water source, it is critical to plan ahead. Protection planning can prevent a future event entirely, minimize a potential threat, or simply prepare the community for when something does happen to the water supply. A source water protection plan can also be used when evaluating potential development opportunities that may affect drinking water supplies in the future.

- ✓ It helps the village provide the safest and highest quality drinking water to its customers at the lowest possible cost.
- ✓ It establishes activities to minimize the threats to the source of drinking water.
- ✓ It helps to plan for expansion, development, zoning, and emergency response issues.

- ✓ It can provide more opportunities for funding to improve infrastructure, purchase land in the protection area, and other improvements to the water system.

Background

Source Water Protection

Source water assessment and protection (SWAP) is a non-regulatory state program administered by the Ohio Environmental Protection Agency. The program started as the Wellhead Protection Program, which was part of the 1986 amendments to the federal Safe Drinking Water Act. These amendments required states to administer a source water protection program for their systems using ground water. In 1992 Ohio's Wellhead Protection Program was approved by the U.S. Environmental Protection Agency. The wellhead protection program provided guidance and technical assistance to public water systems, who were encouraged to complete assessments and protection plans using their own resources. Ohio EPA staff reviewed the assessments and formally endorsed them, when complete.

In 1996, the Safe Drinking Water Act was amended again. Section 1453 was added, providing states with the necessary federal funding to complete source water assessments for their public water systems. At that time, the program was extended to include surface water systems and was renamed "Source Water Protection." It was the intent of Congress that public water systems use the information in their source water assessment to develop a drinking water source protection plan. The background information presented here includes information from the Archbold source water assessment report completed by Ohio EPA in 2004, but expands on it considerably, using data collected by Archbold's public water system staff and the Western Lake Erie Basin Partnership.

This plan was drafted by Scott Schultz, Archbold water plant superintendent, with assistance from Ohio EPA and in consultation with many state and local officials. A source water protection team was formed subsequently to assist with implementation of strategies, especially the outreach efforts. This team consists of:

Scott Schultz, Water Plant superintendent
Jeff Fryman, Archbold Village Council member
Charles VonSeggern, Water Plant Class III operator
Kenny Colwell, Archbold Village Council member and former wastewater treatment plant operator

Public Water System Description

The Village of Archbold is a community of 4,346 (2010 census data). The Archbold Water Department services customers in Archbold, Elmira, Burlington, Pettisville, Ridgeville and Evansport. The Tiffin River serves as the raw water source for the Village. Water is pumped from an intake on the Tiffin River near Township Road G to two above-ground reservoirs located at the water treatment plant.

The water treatment plant is a Class IV plant with an EPA rated design capacity of 7.6 million gallons per day (MGD). Currently, the plant is treating an average of 1.8 MGD. The water plant is a lime soda softening plant that utilizes lime for softening, ferric chloride as a coagulant, carbon for taste and odor, potassium permanganate for algae control, chlorine for disinfection, phosphate for corrosion control and fluoride. The reservoirs can provide approximately 172 days' worth of raw water. After treatment, the water is distributed through a Class II distribution system comprising over 66 miles of water mains.

Before 1961, Archbold pumped water from Brush Creek—which flows southwest along the eastern boundary of Archbold--into a single 25-acre upground reservoir holding 76 million gallons of water. As the village experienced growth, a second reservoir was constructed next to the first one, covering 45 acres and holding 236 million gallons of water. However, the volume of water in Brush Creek proved inadequate to meet the village's needs, especially during periods of low precipitation. In 1976 the water level in the reservoirs fell so low that the village made plans to install a temporary water line to another raw water source. This near-emergency led the village to construct another water line to a new pumping station on the Tiffin River six miles north. Since 1978, the intake to Brush Creek has not been used.

Description of Source Water Area

The Tiffin River is a 59-mile tributary of the Maumee River that originates in Devils Lake (Lenawee County, Michigan) and flows southwesterly to join the Maumee River two miles west of Defiance, Ohio. The Tiffin River watershed covers 777 square miles in portions of Williams, Fulton, Defiance and Henry Counties in northwest Ohio, and Hillsdale and Lenawee Counties in southeast Michigan (Figure 2a). Its average fall is 1.2 feet per mile.

The upper section of the river north of the Ohio Turnpike (I-80/90), is known as "Bean Creek. The Bean's main tributaries are: St. Joseph Creek, an excellent-quality stream in its headwaters, with numerous mussel species; Lime Creek, which has stretches listed as impaired; and Silver Creek (2009, U.S. ACE).

The source water protection area for Archbold's intake comprises only that portion of the Tiffin watershed that drains into the river upstream from the intake. This area is shown in Figure 2b. It covers approximately 338 square miles, or about 43% of the total watershed area. This area lies within the Eastern Corn Belt Plains and Huron/Erie Lake Plains Ecoregions, which are characterized by smooth plains with beech/maple hardwood forest, and soils that are good for cropland. Today, much of the original hardwood forest has been replaced with an intensive agricultural base.

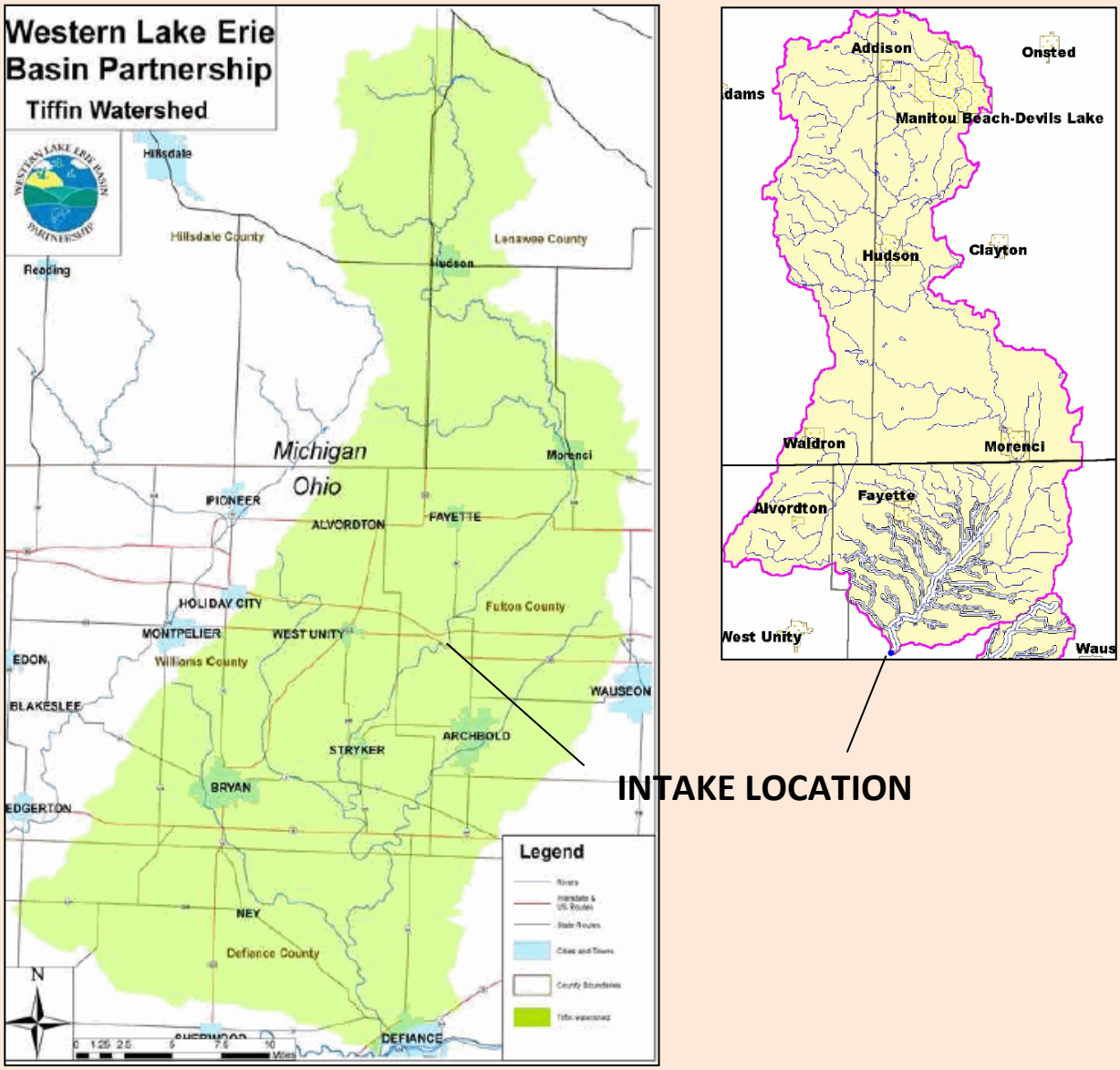


Figure 2. The Tiffin watershed (2a), and the portion that is Archbold's source water area (2b).
Map Sources: 2a – Tiffin River Watershed Assessment, USACE, August 3, 2009
2b - Archbold Drinking Water Source Protection Assessment, Ohio EPA, 2004

Within the protection area, the predominant land use is agriculture (75.8%), followed by wooded (21.6%), shrub (1.3%), nonforested wetlands (0.55%), urban (0.41%), open water (0.26%) and barren (0.09%). Soils are poorly to very poorly drained, which has prompted extensive ditching and tiling to make farming possible. This change in the landscape and land use is a major contributor to the deteriorated water quality and has contributed to local flooding. In fact, a significant amount of acreage along the Tiffin River is prone to heavy flooding about three times a year (Figure 3a). As a result, several miles of the riparian area upstream from the intake have been designated as a wetland conservation area (Figure 3b).

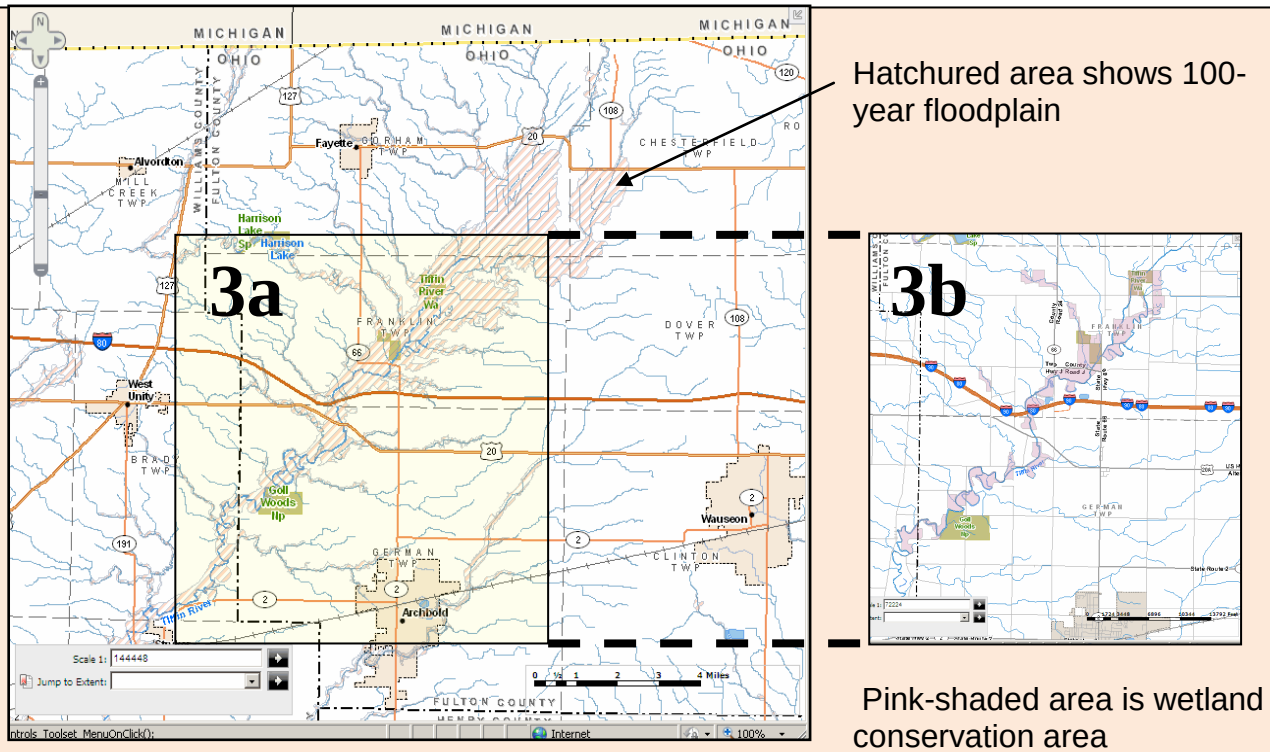


Figure 3. 100-year floodplain (3a) and wetland conservation areas (3b) along Tiffin River. Source of maps: Ohio Dept. of Natural Resources' Earth Resources Information Network (ERIN), accessed November 2012.

Source Water Quality

The primary water quality impacts in the Tiffin River at the Archbold intake are soil disturbance (technically known as "hydromodification"), runoff from agricultural fields, and pathogens from upstream septic overflows.

Hydromodification. The Tiffin River receives flow from numerous agricultural drainage ditches, which typically are straight, following property boundaries, and U-shaped in cross-section (Figure 4). Both features allow for unusually rapid flow, which intensifies erosion of the ditch banks and channel, resulting in higher turbidity levels in the river. High turbidity levels are often associated with greater levels of disease-causing microorganisms (viruses, parasites, and bacteria). A review of 853 turbidity data points collected by Archbold water treatment plant staff at the Tiffin River intake from 2007-2011 shows that the average turbidity level was 61 NTUs (nephelometric[1] turbidity units) during this five-year period, and turbidity levels spiked to over 600 NTUs every Spring, with a maximum value of 766 NTUs in April 2010 (Figure 5). A public water system is required to treat the water until it registers below 0.3 NTU in 95 percent of the samples for the month; in all cases water quality must not exceed one NTU before the water can be released to the distribution system for public consumption.

Figure 4. Typical northern Ohio agricultural drainage ditch. *Source: 2009 Tiffin River Watershed Assessment, p. 51*

Additionally, soil particles carry organic material that may combine with chlorine to form disinfection byproducts (primarily trihalomethanes and haloacetic acids), which may increase the risk of cancer. The Maximum Contaminant Limit (MCL) for trihalo-methanes as a group is 80 ug/l as an annual average; the MCL for haloacetic acids as a group is 60 ug/l as an annual average. Removing disinfection byproducts is difficult and expensive, raising the costs of providing safe drinking water.

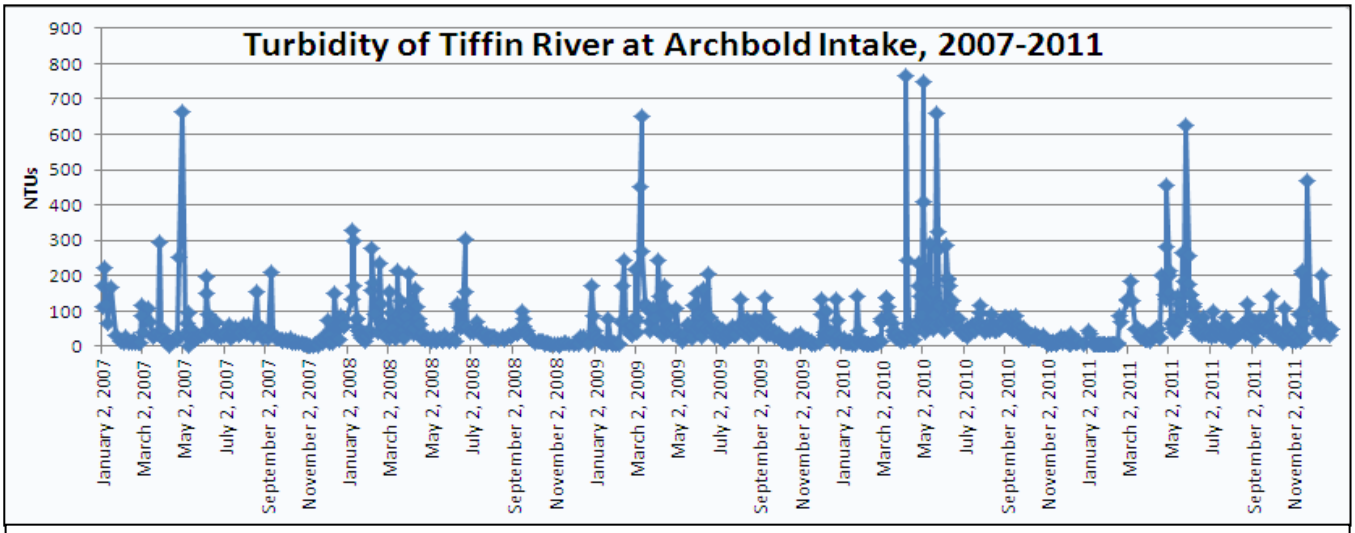


Figure 5. Turbidity levels (measured as NTUs) in the Tiffin River at the Archbold Water System's intake, 2007-2011. *Source of data: Village of Archbold Public Water System*

[1] A nephelometer is an instrument that measures the concentration of particles in a fluid by beaming a light through the fluid and measuring the amount of light reflected onto a detector by the particles.

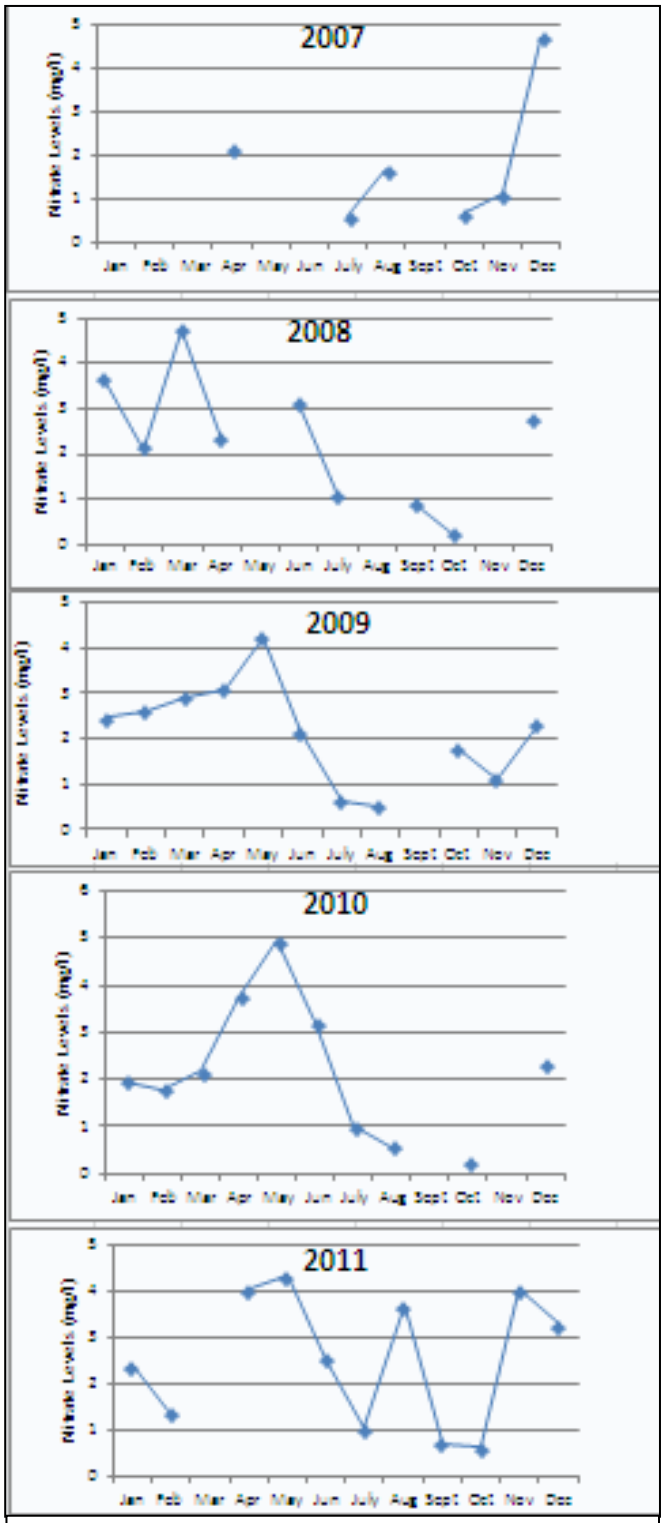


Figure 6. Nitrate levels in mg/l (ppm) in the Tiffin River, 2007-2011. *Source of data: Village of Archbold Public Water System*

Nutrients and Pesticides. In an area as agricultural as Fulton County, seasonal applications of nutrients (primarily nitrate and phosphate) and pesticides have a significant impact on water quality. Nitrate has health impacts that include methemo-globinemia, known as "blue-baby syndrome". Nitrate levels measured at the Archbold intake from 2007-2011 are shown in Figure 6. Like turbidity, they tend to be highest in the Spring, when crops are being fertilized and runoff is greatest; however, they have remained well below the MCL of 10 mg/l. Nitrate is especially problematic to treat; it passes through a conventional treatment plant almost unchanged, so eradication requires reverse osmosis, ion-exchange, or other specialized treatment that is very costly.

Phosphate has no direct health impacts on humans, butencourages the growth of algae. When the algae die, they decompose and release organic compounds that result in taste and odor issues for drinking water as well as an increase in disinfection byproducts. Cyanobacteria, ("blue-green algae"), have become a major concern in Ohio due to their ability to form toxins that are dangerous for humans to bathe in or drink. Most public water suppliers use activated carbon to treat taste and odor and toxins released by cyanobacteria, but carbon treatment is very expensive.

Pesticides are commonly found in agricultural rivers; however, recent water quality data for these compounds in the Tiffin River are limited to Archbold's compliance data, which only measure treated water. From 2000-2012, only atrazine and simazine were detected in the treated drinking water, but at trace levels, well below their health standards.

In 2013 Ohio EPA will conduct an assessment of the Tiffin River watershed, which will include sampling for nitrates and nitrites throughout the watershed. It will also include sampling at the Archbold intake for nitrate and atrazine.

Pathogens. Data collected from 2007-2011 indicate that *E.coli* colonies/100 ml regularly measure in the hundreds at the intake, though they frequently measure in the thousands. Before distributing water for public consumption, a public water supplier is required to disinfect the water until no *E. coli* can be detected. The sources of pathogens include the Village of Fayette's wastewater treatment system, Concentrated Animal Feeding Operations, and local septic systems. These sources are discussed in more detail under the Potential Contaminant Source Inventory section.

Stream Designation for Aquatic Life

The United States Environmental Protection Agency (U.S. EPA) lists the entire Tiffin River watershed as impaired or slightly impaired for aquatic life use. Siltation and other habitat alterations are listed as the main contributors to impairment. Two TMDLs[2], one for pathogens and one for *E. coli*, have been conducted for sections of the watershed located in Lenawee and Hillsdale Counties in Michigan. The most recent studies conducted by Ohio EPA for the Tiffin River watershed are from 1992. They indicate that impairments are associated with high flow conditions following a rainfall event. A TMDL for the Ohio portion has not yet been completed; however, Ohio EPA water quality studies (chemical and biological) are scheduled for 2013, which will determine whether the waters are still impaired. If so, a TMDL will be scheduled.

Figure 7. Overland flow across a plowed field into a ditch—a source of suspended solids, nitrate and pesticides. *Source:http://www.limno.com/pdfs/2012_Redder_IAGLR_TIFFIN.pdf*

[2] TMDL is the acronym for Total Maximum Daily Load. It is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. In Ohio, such studies are performed by Ohio EPA, Division of Surface Water.

Identification of Local Source Water Concerns

Area of Focus

While the entire source water area contributes to Archbold's water supply, it is impractical to focus on such a large area, especially when a significant portion of it lies in another state. Instead, Ohio EPA encourages a community to focus its efforts on the "corridor management zone" (CMZ), which is defined as a zone that extends upstream ten miles from the intake that is 1,000 feet wide on each side of the main stem and 500 feet wide on each side of the tributaries (Figure 8). This area includes the emergency management zone (EMZ), which is defined as a semi-circle that extends 500 feet upstream and 100 feet downstream of the intake. It is especially important that potential contaminant sources be minimized within the EMZ, as a spill at this location could easily result in contaminants entering the intake before the public water supplier even becomes aware of the accident.

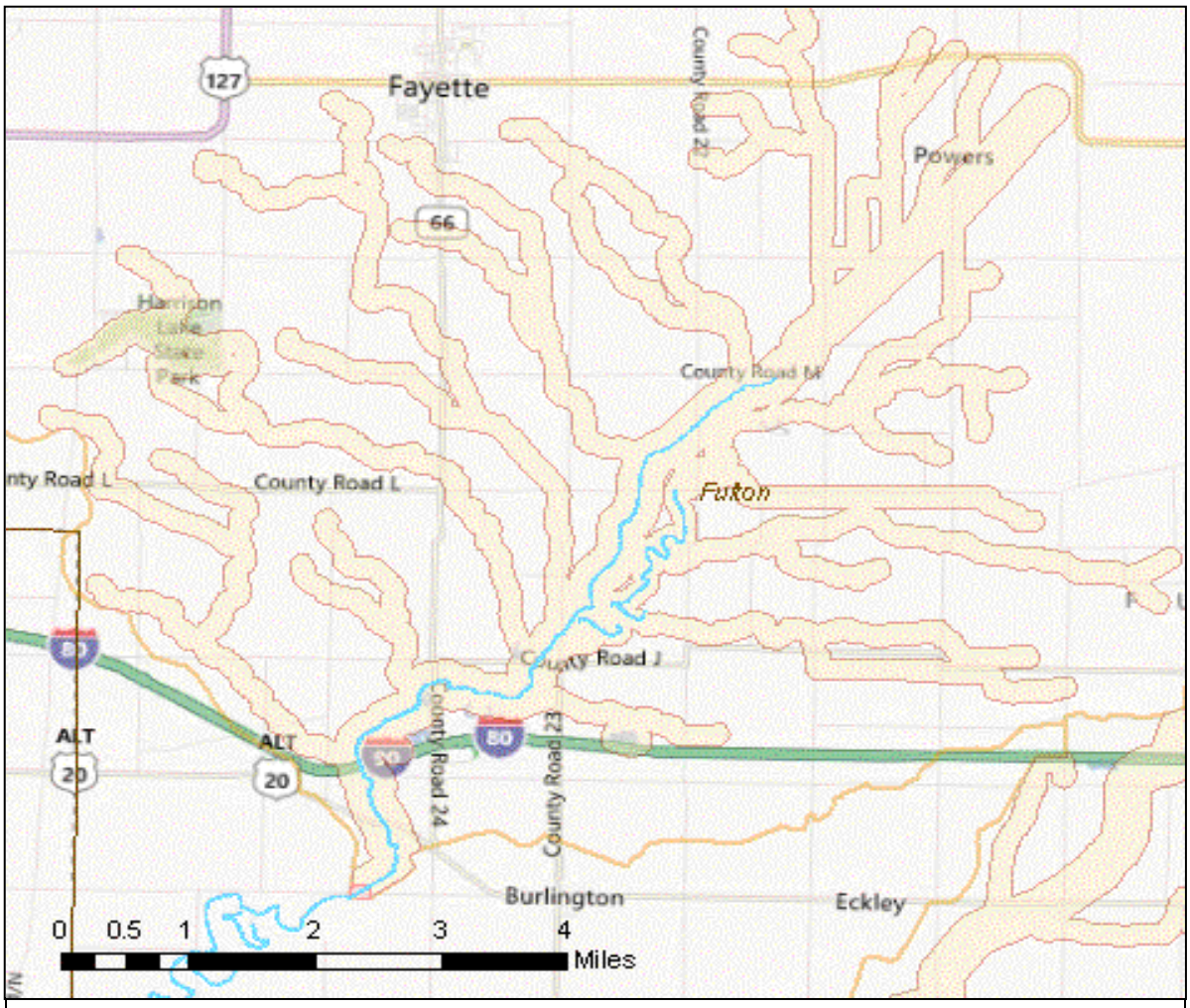


Figure 8. The Corridor Management Zone for the Village of Archbold shown in orange; the Emergency Management Zone is shown in pink. *Source: Ohio EPA, 2004.*

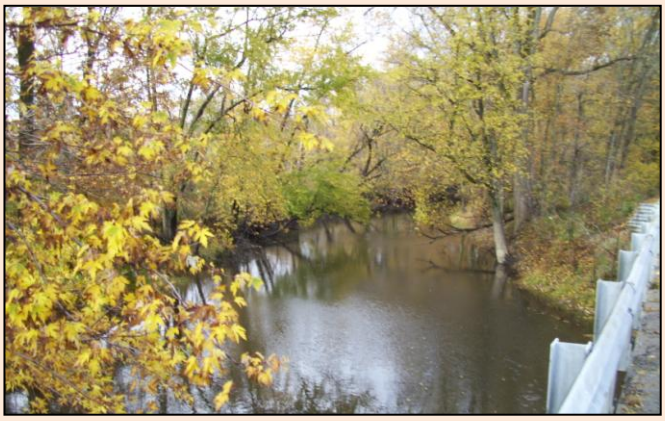



Figure 9. The Tiffin River at the Archbold intake, looking southwest/downstream (left) and northeast/upstream (right). Note exposed tree roots in the upstream photo—a testament to bank erosion exacerbated by channelization and stream-straightening. *Source: Ohio EPA*

Potential Contaminant Source Inventory

To develop appropriate strategies for preventing contamination of Archbold's source water, it is necessary to drive through the area and note the types of activities or facilities occurring within it. Ohio EPA staff conducted a comprehensive inventory of the CMZ area in 2004, and a more cursory inventory was conducted in 2012, to verify that no major changes had occurred since then.

It is clear that the main facilities within this area are family farms, many of which have silos that presumably store either grain or **silage** (Figure 10). The fermentation process of silo or pit silage releases a liquid effluent containing corrosive lactic and acetic acids.

According to the Agricultural Environmental Management (AEM) worksheet:

When silage is harvested and stored properly, it should have minimal impact on water quality. However, if silage is not handled or stored properly, liquid (called seepage or leachate) or runoff carrying silage liquid may escape from the silo. Seepage contains high concentrations of nutrients, acid and has a high Biological Oxygen Demand (BOD).

If seepage enters a surface water source, it readily feeds bacteria that can rob the water of oxygen. Its oxygen consumption is approximately twice as great as manure and 100 times greater than municipal sewage. This concentrated waste can lead to the death of fish and other kinds of aquatic life.

Seepage can increase the levels of acid, ammonia and nitrate present in the water. It gives the water an unpleasant smell and can cause health problems for humans and animals.

Figure 10. Typical farm with silos in Archbold's source water protection area.
Source: Ohio EPA

Figure 11. Large (estimated 2,000-gallon) above-ground storage tank in Archbold's source water area. *Source: Ohio EPA*

Storage tanks of various sizes can be seen at many farm homes, which presumably contain home fuel oil or gasoline and diesel fuel for farm and lawn equipment (Figure 11). These tanks can pose a concern if they leak, especially if they are located close to a tributary. Propane tanks for home heating are also commonly seen, but these are not considered a threat to water quality. Most rural homes also have **home sewage treatment systems** that can contribute pathogens and nitrate to the source water if they malfunction.

Other types of facilities noted during the 2012 inventory include several junkyards, a township building that likely stockpiles road salt for use during the winter season, and a major agricultural chemicals distributor.

Sewage plant releases from the Village of Fayette are an ongoing source of pathogens in the source water. Fayette, which is located approximately six miles north of the Archbold intake, periodically releases fluids from its wastewater treatment sludge lagoons into a tributary of the Tiffin River. The plant's outfall is approximately ten river miles from the intake. In addition, the village has 19 combined sewer overflow outlets, which allow untreated sewage to enter the tributary when storm water threatens to overwhelm the sewage treatment plant. Overflow modeling suggests 0.5 inch of rain in 30 minutes would result in about 700,000 gallons of combined sewage overflows into Spring Creek at a peak rate of 20 million gallons per day (2009, Tiffin River Watershed Assessment).

Roads and bridges are another potential source of contamination from salt runoff and spills. Most of the roads within the CMZ area are two-lane township/county roads that are traveled mostly by local residents. However, **Interstate 80/90**, the Ohio turnpike, is a major tollway across northern Ohio, linking the major cities along the south shore of Lake Erie (Figure 12). It is heavily traveled by large trucks and crosses the Tiffin River approximately 1.2 river miles upstream from the intake. **U.S. Route 20-Alt** is a well-traveled two-lane road that crosses the Tiffin River a half mile upstream from the intake. **Township Road G** is not heavily traveled, but it crosses the Tiffin River at the intake.

Figure 12. On October 29, 2012, a truck on the Ohio Turnpike overturned in northwest Ohio, due to wet roads and buffeting from winds associated with Hurricane Sandy. The cargo was nonhazardous but over 100 gallons of diesel fuel was spilled. *Source: http://www.13abc.com/story/19952457/o*

State Route 66 (County Road 24), which runs north-south through the protection area, is heavily traveled because it links Archbold to I-80/90. It crosses the Tiffin River approximately three river miles upstream from the intake.

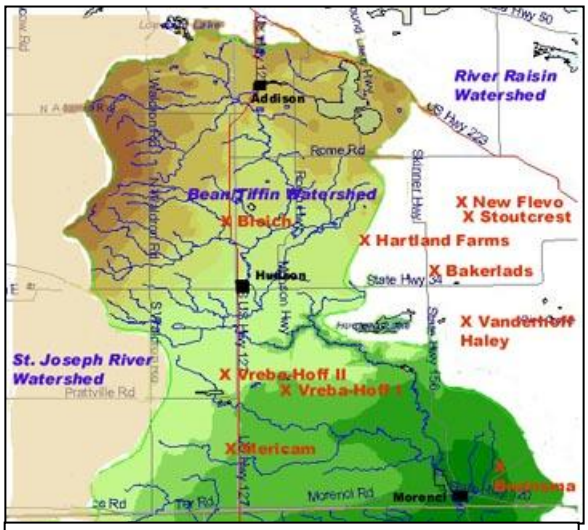


Figure 13. Map of CAFOs in Upper Tiffin/Bean watershed (shown as red Xs)
Source: www.nocafos.org

Figure 14. Photo of liquid manure discharge flowing over frozen stream.
Source: www.nocafos.org

Concentrated Animal Feeding Operations (CAFOs) are numerous in the upper watershed, around the town of Hudson, Michigan (Figure 13). Dairy CAFOs confine 700 or more cows, often several thousand cows, in long steel barns year-round. Disposing of the waste produced daily by thousands of cows can be very difficult, especially in the winter when plants are not growing and taking up the nutrients, and fields are frozen. Such circumstances have led to illegal discharges of raw manure into tributaries of the Bean/Tiffin River (Figure 14). According to Environmentally Concerned Citizens of South Central Michigan, twelve livestock factories have been built near Hudson within the last twelve years, and since 2000 there have been 1,091 violations and discharges confirmed by the Michigan Department of Environmental Quality. Currently (2012), four CAFOs are in operation. There is only one CAFO in the Ohio portion of the source water area, a 1,838-cow dairy located near Alvordton in Williams County, outside the Corridor Management Zone.

Sludge Fields. Sludge fields are fields whose owners have contracted at some point with a wastewater treatment plant to allow the solids separated out of wastewater to be spread across the fields, for fertilizing and conditioning the soil. The primary concern with Class B biosolids is microorganisms and high levels of certain metals. More recently, some researchers have expressed concern that biosolids contain pharma-ceuticals such as estrogen that can act as endocrine disruptors. However, land application conducted in accordance with regulations and best practices is not generally an environmental concern, and in fact is regarded as a beneficial use.

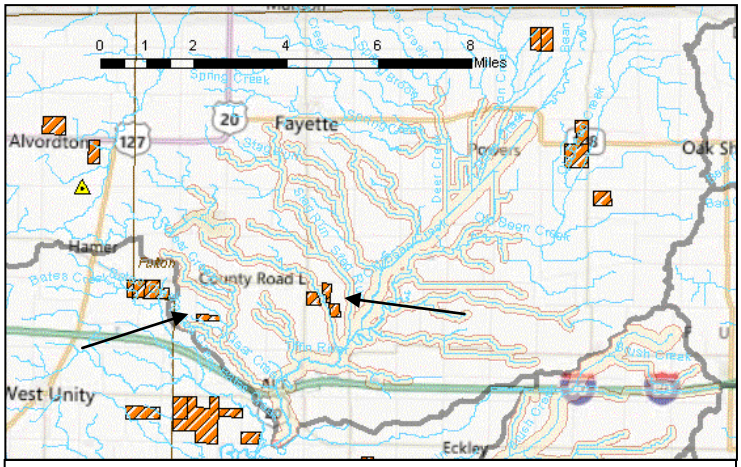


Figure 15. Locations of sludge fields (orange and yellow striped shapes) within Archbold's source water protection area (Ohio portion). Yellow triangle denotes location of Ohio CAFO.

In Ohio, Class B biosolids may not be land-applied in the emergency management zone of a source water protection area (according to Ohio Administrative Code 3745-40). In Archbold's protection area, biosolids are not applied anywhere near the emergency management zone. It appears that the closest permitted fields are three bordering Mill Creek on either side of County Road 24, about four stream miles upstream from Archbold's intake, and two much smaller fields between two tributaries to Clear Creek, approximately 3.5 stream miles upstream from the intake (see arrows in Figure 15). These fields may or may not be actively receiving sludge from year to year; owners are not required to report changes in status.

Prioritization of Potential Contaminant Sources

Run-off from farm fields, both overland and through drainage tiles, has the greatest ongoing impact on drinking water quality. This is the primary source of nitrates, pesticides, and turbidity in Archbold's source water. Also, the Village of Fayette's **wastewater treatment plant releases** are a major periodic source of pathogens in the source water and deserve top prioritization. Finally, **cyanobacteria** warrants high priority due to the acute health effects of ingesting toxins, and the difficulty of diagnosing and treating blooms.

The **CAFOs** in the upper watershed (primarily in Michigan) also are a significant source of pathogens, but due to their distance from the intake must be considered a lower priority. **Township Road G**, on the other hand, is within the Emergency Management Zone so a spill there would be of great concern; however, the road is lightly traveled. **I-80/90 and U.S. Route 20Alt** must also be included in this second-tier category due to their proximity to the EMZ and their traffic loads.

A third tier category is the **silage operations, above-ground storage tanks,** and **septic systems**. Because there are so many of them the statistical probability of malfunctions occurring at any given time is not low, but the threat to the source water decreases the farther away these sites are from the intake and from any ditches that lead to tributaries within the source water area. **Sludge application fields** may be a concern if sludge is applied just before a rainstorm.

Protective Strategies

Protective strategies for source water protection areas are presented in four categories: strategies targeted to specific types of activities or facilities; contingency planning; public education, and source water monitoring.

Specific Contaminant Source Strategies

Run-off from agricultural fields. As noted above, run-off from agricultural fields is the subject of innumerable studies and programs throughout northwest Ohio, with initiatives being sponsored or coordinated by the WLEB Partnership, the Fulton County Regional Planning Commission, and other organizations. However, the following efforts warrant highlighting as especially relevant to, or focused on, Archbold's source water protection area.

- *Wetland Restoration Local Incentive Program.* In September 2011 Archbold's Village Council passed Resolution 11-50, which established a partnership with the Fulton County Soil and Water Conservation District and the Lenawee County (Michigan) Soil Conservation District to promote the improvement of water quality of the Upper Tiffin River and Bean Creek by establishing permanent easements, restoring wetlands on them, and financially supporting them. Over the next six years the Village of Archbold will contribute $75.00 per acre, up to a maximum of $10,000, for acreage designated by the SWCDs within project boundaries. See Appendix C. (A previous partnership in 1995 developed wetlands along Brush Creek, which is no longer contributing to Archbold's source water, but does help to improve the overall quality of the Tiffin River.)

- *Local Conservation Reserve Areas.* October 2012 data from the Farm Services Agency indicate that currently 2,803 acres within the Ohio portion of Archbold's source water area are enrolled in one or more types of conservation reserve programs (CRP), which are funded by the Farm Bill. These include:

    - permanent wildlife habitat (37 locations comprising 712 acres)
    - established grasslands (33 practices comprising 615 acres),
    - wetland restoration (24 locations comprising 483 acres)
    - grass filter strips (153 locations comprising 406 acres),
    - cool-season grasses (18 locations comprising 252 acres)

    The balance includes warm season grasses, tree-lined riparian buffers, wetland restoration, rare and declining habitat restoration, field windbreaks, and grass waterways.

    The Fulton County Soil and Water Conservation District (SWCD) has worked with landowners for many years to install wetlands in the Tiffin River watershed. The Tiffin is notorious for spring floods, and many of the low-lying crop fields were enrolled in the Wetland Reserve Program in the years 1995-2005.

The current high price of corn and the demand for hay for livestock during the 2012 summer drought have been disincentives for producers to keep agricultural acreage in conservation programs, so farmers who have honored their contracts and entered into new contracts deserve an expression of appreciation from those who use the Tiffin River downstream.

- *Other Conservation Efforts.* November 2012 data from the Natural Resources Conservation Service (NRCS) indicate that from 2005-2012, 873 acres in the Ohio portion of the SWAP area were enrolled in various Environmental Quality Incentive Program (EQIP)[3] efforts, as follows:

    - Manure storage buildings 2 acres
    - Pasture seedlings 45 acres
    - Mulch tillage (leaving over 30% residue as cover) 156 acres
    - No-till systems 597 acres
    - Cover crops 73 acres

    Presumably practices are also occurring on acreage that is not reflected in the 2005-2012 figures, either because the practice involved a one-time installation (like a building) conducted before 2005, or because the practice has been implemented without EQIP funds Fulton County SWCD staff estimate that roughly 2% of the cropland is this area currently is in no-till, and perhaps 25% of the agricultural land has grass filter strips along ditches or tributaries that cross or border the property. The SWCD has recently been encouraging producers to plant winter cover crops in the Tiffin watershed instead of tilling the soil in the fall.

Fayette's Wastewater Treatment Plant Releases. Fayette's wastewater treatment officials notify the Archbold public water supplier before any planned releases, and Archbold closes its intake during the period that the polluted water is expected to pass (on average it takes three days for flow to reach Archbold's intake from Fayette). However, unscheduled releases may occur during heavy rains, allowing raw sewage to combine with storm water and flow into Spring Creek, which empties into the Tiffin River. To protect the water supply from such releases, the Village of Archbold regularly monitors the river at its intake for *E. coli* and does not pump water from the river when counts are elevated.

The Village of Fayette has been working for several years to obtain funding for a Combined Sewer Separation Project. In 2010 the village council voted to raise sewer rates. In September 2012 they were awarded a $600,000 Community Development Block Grant from HUD. A zero-percent loan from Ohio EPA, combined with principal forgiveness of over 4.5 million dollars, is expected to cover the remaining costs of the construction, which will involve installing 3,680 linear feet of pipe for the storm sewer, and 27,770 linear feet of pipe for the sanitary sewer. The loan is scheduled to be awarded in December, 2012 and construction should begin in 2013. By eliminating

[3] EQIP is a program funded by the U.S. Farm Bill that provides grants (with match required) to implement conservation-oriented practices on working farm land.

releases of untreated sewage into the Tiffin River, this project greatly benefits the Village of Archbold's public drinking water source.

Cyanobacteria. The Archbold water treatment plant samples weekly for cyano-bacteria. A microbiologist with expertise in phytoplankton reviews the data and provides prompt, detailed reports. The plant personnel generally begin treating the reservoir with potassium permanganate as a bloom begins to develop, to keep it in check. If the bloom continues to develop, an algaecide called PAK 27 is usually effective in controlling it. As a last resort, copper sulfate—a potent algaecide--is applied, but copper sulfate is expensive and imposes additional monitoring requirements.

The smaller reservoir has aeration equipment, which helps prevent the formation of algae and cyanobacteria. Installing aeration in the larger reservoir has been discussed and priced, but is on hold until a new anion resin treatment unit—designed to reduce TOC and disinfection byproducts—is installed. Other potential methods of preventing formation of cyanobacteria and algae include the use of Aquashade (a colorant), introducing fish that eat large amounts of algae, and applying alum, to bind up the phosphorus in the water. However, there are problems and uncertainties associated with all of these methods; aeration seems the least problematic.

CAFOs. Most of the CAFOs that impact the Tiffin River are located in Michigan. A group called Environmentally Concerned Citizens of South Central Michigan has been very active in monitoring streams near CAFOs and reporting discharges to the authorities. The State of Michigan allows the spraying of liquid manure on snow-covered, frozen fields. The Village of Archbold will work with Michigan authorities to eliminate such discharges. Also, in November 2012 this group agreed to contact Archbold's water treatment staff whenever they detect a major release from the CAFOs.

Highways. The Village of Archbold has installed camera monitoring of the Township Road G bridge over the Tiffin River, and has obtained permission from the Ohio Department of Transportation to post signs at the bridge over U.S. Route 20 Alt, notifying travelers to report any spills to 9-1-1. Also, when conducting the annual contingency plan update, they will review the contact list last provided to the local LEPC, the Fulton County Sheriff, and to the Archbold and Fayette Fire Departments, to ensure they still have the correct names/numbers to call at the Archbold treatment plant if a spill occurs impacting the Tiffin River upstream of the intake.

Home Gasoline/Diesel Storage Tanks. If there are above-ground storage tanks holding more than 1,320 US gallons on a property, or a single tank containing more than 660 gallons, and a spill from the tanks could reasonably be expected to flow into a stream, the property owner is required to have a Spill Prevention, Control and Counter-measures Plan on site. However, they are not required to submit the plan to U.S. EPA unless they are holding more than 10,000 gallons, so compliance is difficult to track or verify. On the Archbold village website, under Water Department, there are bulletins describing how to manage both above-ground and underground storage tanks.

Home Sewage Treatment Systems. The Fulton County Health Department permits and inspects new septic systems, certifies septic system cleaners, and responds to reports of septic nuisances. On the Archbold village website, under Water Department, there are bulletins describing how to manage septic systems.

Silage Leachate. Silo construction and operation is not regulated in Ohio. The USDA Natural Resources Conservation Service does provide guidance on best practices. For example, it recommends a minimum cubic foot (7.48 gallons) of leachate storage capacity for each ton of material placed in storage if and when containment becomes necessary. In general, formation of silage leachate can be minimized by preventing precipitation from entering, constructing the silo from appropriate, leak-resistant materials, and cutting silage material at the proper moisture level. Information on the environmental impacts of silage leachate is available on Archbold's village website, under Water Department.

Drinking Water Shortage/Emergency Response

A well-formulated contingency plan enables a utility to prepare for, respond to, and recover from crisis conditions without wasting time on futile or unnecessary efforts or spending funds unnecessarily. The plan defines the duties, responsibilities, and functions of all water system personnel with respect to each specific emergency condition. The Archbold Water Department has developed procedures to address specific situations that can be expected to arise, and these are documented in the Plant Contingency Plan, which is updated annually. Copies are kept at the water treatment plant, the wastewater treatment plan, the engineering office, the fire department, and the municipal building.

The following are issues that are specific to drinking water source protection. This information has been included in the water plant contingency plan.

Emergency Response - Contamination in the Tiffin River

The Archbold public water system is well insulated against contamination in the Tiffin River because it has 100 days' worth of storage in two upground reservoirs. This enables the water supplier to pump only when raw water testing at the intake indicates the water quality in the Tiffin River is optimal. If a spill was reported in the Tiffin River, the water supplier would take the following steps:

1. Determine the following information:
   a. Who made the first observation? What is their phone number and location
   b. When did it happen?
   c. What was spilled?
   d. Where is it? (How long before it would reach the intake?)
   e. Has the spill been reported to Ohio EPA?
   f. Has the fire department or hazardous materials response team been notified?
   g. Has the property owner been notified?

2. If no notifications have been made, immediately contact emergency personnel and agencies found in Appendix A of the contingency plan.

3. If it is safe to do so, visit the scene to make contact with on-scene personnel and agencies.

4. Complete the following as soon as possible.
    a. Perform a physical check on the pumping stations and their structural integrity.
    b. If it is determined that contamination did occur, immediately shut down all raw water pumping.
    c. Proper precautions must be taken during sampling to prevent exposure to the contaminant.
    d. If the system needs to be temporarily shut down as a result of the contamination, shut-down procedures are located in Section K of the Plant Contingency Plan. Water curtailment can be found in Section O of the Plant Contingency Plan.

5. Once raw water pumping has been turned off, obtain the following information:
    a. Who is responsible for the cleanup? Get phone numbers and other contact information
    b. What contractors or consultants have been sent by the responsible party?
    c. What actions have they taken?
    d. How long is clean-up expected to take?
    e. If water curtailment is necessary, Section E of the Plant Contingency Plan provides for obtaining alternate water sources for consumers, via water trucks or purchased bottled water.

Emergency Response – Contamination in the Reservoirs

The primary threat to the reservoirs is the development of cyanobacteria (blue-green algae), especially during the warm season. If only one of the two reservoirs is affected, the Village can isolate the affected reservoir until sampling indicates that no cyanotoxins are present.

If both reservoirs are affected, the public water supplier is prepared to treat the water with activated carbon, which appears to be effective in removing cyanotoxins. If treatment proved inadequate, Archbold would initiate the short-term alternate water procedures (water trucks, bottled water) documented in Section E of the Plant Contingency Plan.

Drinking Water Shortage – Long-Term Loss of Source

There are primarily two kinds of contingencies that may create a long-term loss-of-source for a surface water system: a drought that leaves the Tiffin River dry for an extended period of time or a catastrophic event that would undermine the structural integrity of the reservoir (e.g., earthquake). A drought so severe that it would cause the

Tiffin River to dry up seems improbable, but it is a scenario that becomes more likely over time. This is due to (1) evidence that global climate change is trending to a hotter climate; and (2) greater overall water use as population increases.

In its Ordinance 51:02 Water Use Plan (passed April 3, 1989), the village has provided a three-phase response to low flow. The first two phases relate to flow level in the Tiffin River of less than 10 MGD (Phase I) and flow levels so low that the upground reservoirs cannot be kept full (Phase II). Phase III is invoked when the Tiffin River is so low that the village is unable to pump from the river; it requires curtailment from normal usage, with the percent of cutback to be determined by the mayor. Violations are handled by giving a written warning (first offense), followed by shutting off water service for a second offense, with a payment of $100 required to have service restored.

In the most extreme circumstance, if it became necessary to obtain water from other sources, Archbold has Mutual Aid agreements with Wauseon, Stryker, Fayette, Bryan and Defiance, whereby they could obtain either raw or finished water from these communities. Defiance obtains water from the Maumee River and Wauseon obtains surface water from two tributaries to the Maumee; it also purchases water from Napoleon, which has an intake on the Maumee. Fayette, Bryan, and Stryker use ground water from wells. Combined, these five neighboring systems have over 10 million gallons per day of excess water supply capacity (based on 2012 data). The Mutual Aid Agreement is documented in Archbold's Plant Contingency Plan.

Funding for Water Emergencies

Section 34.04 of the Village's code of ordinances states: "The Village Administrator and the Director of Finance are hereby authorized , jointly or severally, to spend unappropriated monies from the Water Fund in the event of a water crisis. (Res. 82-19, passed 4-5-82)."

Planning for the Future

A. Current average water use = 1.8 million gallons per day (mgd) as of 2012
B. Current daily system design capacity) = 5.4 million gallons per day
C. Flow capacity of Tiffin River = 10 mgd on average; 4.7 mgd is 50-year low flow

Archbold is currently is using only 24% of its rated capacity of 7.6 million gallons.

Census figures indicate that Archbold has maintained a slow but steady growth in population over the past 20 years, with a steeper growth curve from 1990 to 2000, than before or after that decade (Figure 16). According to the Fulton County Comprehensive Plan, in the 1990s the County's economic attraction was enhanced by the water supply to eastern Fulton County and increased Ohio Turnpike access. At that time it was projected that population would increase substantially as a result.

However, economic growth in the 21st century has so far lagged behind the levels in the 1990s. Currently, no significant growth or decline of population is anticipated. Also, at this time Archbold is not aggressively developing and does not anticipate a sudden spike in industrial use of the water.

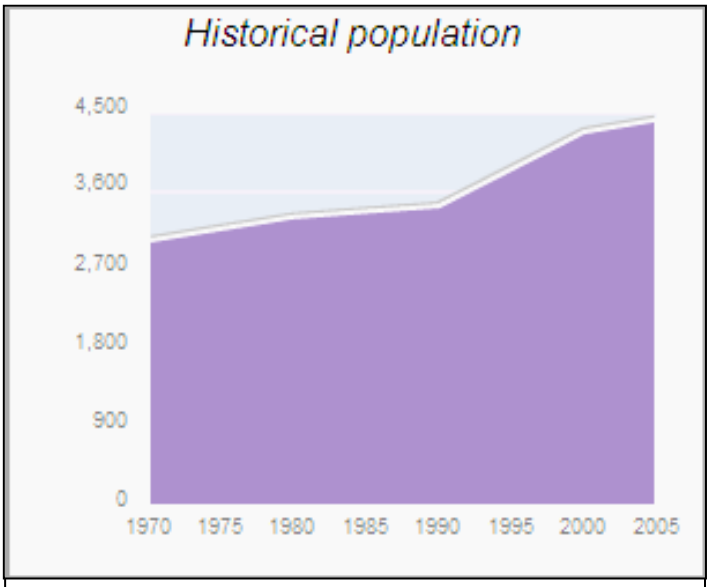


Figure 16. Graph of population trends in Village of Archbold, 1970-2005. *Source:* http://www.city-data.com/city/Archbold-Ohio.html

Based on this, Archbold does not anticipate the need to expand the treatment plant or significantly increase water usage within the next decade. In any case, the Fulton County Commissioners recently completed a feasibility study on county-wide water availability, and concluded that Archbold and Wauseon combined could provide enough treated water to supply all of Fulton County as well as the City of Napoleon, which lies in Henry County to the south.

Public Education and Outreach

Consumer Confidence Report. The Archbold public water system publishes a Consumer Confidence Report (CCR) annually, as required by the Safe Drinking Water Act and Ohio Administrative Code 3745-96. The CCR is sent to all water customers and is available on the village's web site at www.archbold.com . The CCR will be revised for 2013 to include information from this source water protection plan.

Plant Tours. The Archbold public water system staff conduct plant tours upon request. They average about a dozen requests each year, but the plant is always open for tours. The Archbold Middle School 5th graders tour the plant once a year, and science teachers tie their lessons on the hydrologic cycle with water treatment. Local Boy Scout troops also tour once a year with their parents and Scout leaders. Archbold is committed to its policy of providing plant tours to anyone requesting them.

Web Page. The Village of Archbold has a professionally designed web page that includes information on the water plant and links to other sources of information. The Water Plant web page will be expanded to include links to this document and other useful sources of information (see Appendix B).

Fulton County SWCD. The Fulton County Soil and Water Conservation District is located at the county seat of Wauseon, only eight miles northeast of Archbold. This organization plays a very prominent role in the area's community life, sponsoring numerous social events and producing a monthly newsletter. As a result, the local populace is acutely aware of the value of conservation and agricultural best management practices.

SWEET Team. Fulton County also has a Source Water Environmental Education Team (SWEET), consisting of members of the SWCD who are trained to use a "sand-tank model" and Enviroscape model (Figure 17) as visual tools for training audiences about ground water flow and surface water flow respectively. Unfortunately, the Fulton County team only has a ground water model. However, both the Williams County and Defiance County teams have an Enviroscape model. Archbold will contact SWEET teams at these counties to see about the availability of team presentations as part of a treatment plant tour to appropriate audiences, such as school children and Scout troops.

Bean/Tiffin Watershed Coalition. The Bean/Tiffin Watershed Coalition in Michigan, is very active in promoting education about the river, conducting mussel surveys, and sponsoring river cleanups. They are centered in Hudson, Michigan, near Devils Lake, which is the origin of the Bean/Tiffin. The Coalition is affiliated with the non-profit Community Action Agency of Hillsdale, Lenawee, and Jackson Counties. Archbold will provide links to this group on the water department's web page.

Figure 17. Both students and adults can learn about surface water flow and the pollutants that threaten surface water through an EnviroScape model.

Festivals. Brochures with information about Archbold's source water protection program will be made available at the Village of Fayette's annual Bull Thistle festival. Also, the Source Water Environmental Education Teams (SWEETs) at Fulton and surrounding counties will be invited to conduct presentations with their educational displays, the ground water flow model and the Enviroscape models. SWAP program staff at Ohio EPA's northwest district office in Bowling Green also will be invited to share information about the Archbold program.

Water Quality Monitoring

The Village of Archbold's water treatment plant personnel monitor raw water quality at the intake for phosphate, nitrate, total alkalinity, phenol alkalinity, pH, turbidity, hardness, calcium, *E. coli*[4], and dissolved oxygen. Frequency of monitoring varies from about twice a week to almost daily. Also, the staff monitor the upground reservoirs for cyanobacteria on a regular basis, with weekly measurements during the summer months. This monitoring is not required by Ohio EPA, but is conducted to enable the water plant personnel to optimize water treatment.

In addition, the Village of Archbold conducts compliance monitoring required by Ohio EPA, which measures the post-treatment quality of the water that enters the distribution system for public consumption. These data are made available to Archbold's customers and the general public in the annual Consumer Confidence Report, which is posted on Archbold's web site.

Because the Tiffin River watershed is part of the Western Lake Erie basin, there is additional water quality monitoring being conducted by various groups from year to year. As noted previously, staff from Ohio EPA's Division of Surface Water are preparing to conduct a thorough study of the watershed in 2013. This study will include an evaluation of the water quality based on chemical analysis and biologic monitoring (i.e., the health of aquatic species who spend their life cycles partially or entirely in a limited stretch of the river).

[4] *E.coli* has been measured since 2009; before then Archbold monitored for fecal coliform, which is an indicator parameter for pathogens, but also detects non-pathogenic bacteria.

Updating the Plan

A protection plan is not a static document. Over time many issues related to protection planning will change- existing potential contaminant sources will close, new education and outreach opportunities will become available, new partners in protecting the drinking water source will be identified. The protection plan needs to plan for these and other events.

The Village of Archbold commits to reviewing the Drinking Water Source Protection Plan annually, beginning with January 2014.

Updating the SWAP Assessment
Each review of this plan will include consideration of the following questions:

Water Treatment Plant Updates
- Has the water usage increased or decreased since the last review?
- Have any new treatment protocols been added?
- Has a reservoir or intake been added or removed, or will wells be installed?
- Have there been any significant changes in flow in the Tiffin River?

Changes to the intake or the addition of wells will be reported to Ohio EPA's source water protection program so that the source water assessment can be adjusted (if necessary) to reflect new sources of drinking water.

Potential Contaminant Source Inventory
- Has the extent of the protection area changed?
- Has the community developed rapidly?
- Have land uses in and around the protection area changed?
- Has management of businesses in the protection area changed?

If the answer to any of the above questions is yes, Archbold will update the inventory or conduct a new inventory. Archbold may contact Ohio EPA's Source Water Protection staff in the district office for guidance or assistance in conducting the inventory.

Evaluating the Effectiveness of the Protective Strategies
In order to evaluate if the protective strategies in this Source Water Protection Plan are achieving the desired outcomes, Archbold will consider the following types of questions and write any changes into the Protection Plan.

- Do we have reason to be concerned about how the drinking water source protection area may be used in the future?
- Should we consider trying to better protect it through a county resolution or township ordinance?

Pollution Source Control Strategies

- Have we followed our own schedule of implementation/timeline for each of the pollution source control strategies?
- Are there new potential contaminant sources that need to be addressed with new pollution source control strategies?
- Have we implemented any new protective strategies that are not documented here?
- Did any of our strategies result in removal or elimination of a potential source?
- Did any of our strategies result in individuals modifying practices to decrease the risk of contaminating the drinking water source?
- Did our coordination with other groups (SWCDs, county EMAs, local health dept., local watershed group, etc.) contribute to the implementation of protective strategies?
- Have the partnerships developed during plan implementation been productive?

Education and Outreach

- Have we followed our own schedule of implementation/timeline for each of the educational strategies?
- Are there any new groups in the population that we need to target with education and outreach strategies?
- Have we implemented any new educational strategies that are not already documented here?
- Has education and outreach targeting any specific group resulted in actions that reduced or could potentially reduce the risk of contaminating the drinking water source (e.g., septic system owners conducting regular maintenance, farmers adopting best management practices)?
- Have we received additional funding to continue any particular education and outreach strategy?
- Have we received any accolades, awards or recognition from outside entities or organizations for our educational efforts?
- Have we had any unsolicited requests for SWAP-related education (such as requests for plant tours, requests for presenters/speakers at events, etc.)?
- Did our coordination with other groups (SWCDs, SWEET Team, local health dept., local watershed group, etc.) contribute to the successful development and dissemination of SWAP-related information?
- Did we have sufficient staff and resources to complete all the planned educational efforts?
- Have educational efforts been cost effective? Efficient? (Consider level of attendance, attentiveness and participation by audience, comments received, etc., vs. the cost to facilitate the event) Should the frequency of the outreach be increased, decreased, or remain the same?
- Have the partnerships developed during plan implementation been productive?
- Have any of the target groups contacted the public water system for additional information about something they saw or heard about through these activities?

Drinking Water Shortage/Emergency Response

- Are there any updates to the Drinking Water Shortage/Emergency Response Plan?
- Did our coordination with emergency responders at the local and county level result in better communication and handling of spill incidents that could impact our drinking water?

Raw Water Monitoring

- Have we followed our raw water monitoring plan (i.e., sampled at the specific frequency, analyzed for the appropriate parameters, etc.)?
- Have there been any significant changes to our water quality?
- Do we have sufficient water quality data or other reasons (e.g., the source was removed) to conclude that ground water monitoring can be cut back or is no longer needed?
- Are there new water quality, potential contaminant source, or land use issues that would influence the need to expand our water quality monitoring network?
- Does our raw water monitoring plan need to be updated for any reason?

Revising the Plan

Upon review, if any revisions of the SWAP Assessment Report are needed, Archbold will contact Ohio EPA's Northwest District office for guidance. Also, if the local planning team makes any substantial changes to Archbold's Protection Plan, a copy will be forwarded to Ohio EPA for concurrence. The revision will be documented on the front cover by adding "Revised [date]" beneath the date at the bottom of the page.

Primary References

Ohio EPA, 2004, Drinking Water Source Assessment Report for the Village of Archbold

U.S. Army Corps of Engineers, 2009, Western Lake Erie Basin Study: Tiffin River Watershed Assessment

Village of Archbold, Division of Water, water quality files

Appendix A

Members of the Western Lake Erie Basin Partnership

U.S. Army Corps of Engineers

U.S. Department of Agriculture, Natural Resources Conservation Service

U.S. Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Geological Survey, Ohio Water Science Center

Governor of Indiana

Governor of Michigan

Governor of OHIO EPA

Indiana State Technical Committee

Michigan State Technical Committee

Ohio Department of Natural Resources, Division of Soil and Water Conservation

National Association of Conservation Districts

Maumee River Basin Partnership of Local Governments

Appendix B

Source Water Protection Information Posted on Archbold's Division of Water Web Site

DOCUMENTS

Archbold:

- Drinking Water Source Assessment Report for the Village of Archbold, 2004, Ohio EPA
- Drinking Water Source Protection Plan for the Village of Archbold, 2012
- Drinking Water Source Assessment Brochure for Village of Archbold (*in development, 2013*)
- Source Water Protection Bulletins on:
  --Above Ground Storage Tanks
  --Agricultural Fertilizer Application
  ---Livestock Waste
  --Sanitary Sewer Overflows and Combined Sewer Overflows
  --Septic Systems
  --Small Scale Application of Pesticides
  --Storm Water Runoff
  --Underground Storage Tanks
  --Silage

LINKS

Bean/Tiffin Watershed Coalition:
www.**bean**creek**watershed**.org/

Tiffin River Watershed Assessment:
http://www.wleb.org/documents/assessments/Tiffin%20Watershed%20Final%20Assessment%20091509.pdf (10.4 MB)

Fulton County Soil and Water Conservation District:
www.fultoncountyoh.com/swcd
Click on Resources PDF downloads Soil Survey. Provides soil properties, soil and water features, and water management. This report contains information that can be used in land planning programs in Fulton County**.**

The Ohio State Extension Office-Fulton County:
http://fulton.osu.edu/news/oil-spill-prevention-control-and-countermeasures-plan-for-the-farm
This site has educational information that helps farmers develop and Oil Spill Prevention Control and Countermeasures Plan (SPCC). The plan identifies stored products, their proximity to water and efforts to prevent pollution from these facilities.

Fulton County Comprehensive Development Plan:
http://www.fultoncountyoh.com/DocumentCenter/Home/View/381

Hillsdale County Community Center Tools and Techniques:
www.hillsdalecounty.infor/planningeduc0002.asp
This link contains information about planning, zoning and other techniques for protecting important community resources. Each link has practical suggestions for preserving and enhancing local resources such as land, water, and quality of life.

Ohio EPA:
www.epa.ohio.gov/ddagw
You will find information on educational materials, updates, guidance documents and fact sheets. The source water materials can be found under the Source Water Assessment Program link.

Ohio Department of Natural Resources:
http://www.dnr.state.oh.us/tabid/23035/Default.aspx
Agricultural Pollution Abatement Rules that apply to the control of pollutants from areas within the state used for agricultural production or silvicultural operations including land used for:

- production or keeping of animals
- production of agricultural crops, and
- private, commercial and public woodlands

Michigan Department of Environmental Quality (DFQ):
www.michigan.gov/deq
Provides links to soil erosion and sedimentation control, soil and water quality practices, surface water assessment, wetlands protection, pollution prevention, water quality monitoring. Links to approved watershed plans in Michigan.

U.S. EPA
http://water.epa.gov/drink/index.cfm
Fact sheets and resource materials including information for public education.

Source Water Collaborative
www.protectdrinkingwater.org
Collaborative with governmental and nongovernmental entities working together to promote source water protection. Also provides educational materials and links to other useful web sites. "Your Water, Your Decision" is a free template for constructing a local source water protection brochure.

SMART About Water, National Environmental Service:
www.nesc.wvu.edu/smart/index.cfmRCAP and the National Environmental Service Center created this site focusing on source water protection planning and implementation. Includes public education and information materials including social marketing for source water protection.

Appendix C

Village of Archbold Resolution 11-50

RESOLUTION NO. 11-50

AUTHORIZING THE VILLAGE ADMINISTRATOR TO ENTER INTO AGREEMENTS WITH THE FULTON COUNTY, OHIO SOIL AND WATER CONSERVATION DISTRICT AND/OR THE LENAWEE COUNTY, MICHIGAN SOIL AND WATER CONSERVATION DISTRICT ON THE DEVELOPMENT OF PERMANENT EASEMENTS ALONG THE UPPER TIFFIN RIVER AND BEAN CREEK BY SUPPORTING THE WETLANDS RESERVE PROGRAM AND DECLARING AN EMERGENCY

WHEREAS, the Council of the Village of Archbold, Ohio, desires to enter into partnerships with the Fulton County Soil and Water Conservation District and the Lenawee County Soil and Water Conservation District to promote the improvement of water quality of the Upper Tiffin River and Bean Creek by the establishment of permanent easements and by financially supporting those easements, and

WHEREAS, the two Soil & Water Conservation Districts will be administering projects to restore wetland areas on a permanent basis by providing payment to landholders that enter into the Wetlands Reserve or other similar program,

NOW THEREFORE BE IT RESOLVED by the Council of the Village of Archbold, Fulton County, Ohio, as follows:

Section I. The Village Administrator is hereby authorized to execute a partnership agreement with the Fulton County Soil and Water Conservation District and/or the Lenawee County Soil and Water Conservation District on the development of permanent easements along the Upper Tiffin River and Bean Creek by restoring wetlands on a permanent basis.

Section 2. The Village of Archbold agrees to contribute $75.00 per acre for acreage designated by either Soil and Water Conservation District within project perimeters. The acreage must qualify for both Federal and State of Ohio (or State of Michigan) participation in order to meet our contribution criteria.

Section 3. The Council hereby appropriates $10,000 to finance the program for a period of six (6) years.

Section 4. It is hereby found and determined that all formal actions of this Council concerning and relating to the passage of this resolution were adopted in an open meeting of the Council, and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public, in compliance with all legal requirements including Section 121.22 of the Ohio Revised Code.

Section 5. This resolution is hereby declared to be an emergency necessary for the preservation of the public peace, health, safety and welfare, and shall take effect and be in full force upon proper passage by Council.

Passed: September 6, 2011

James S. Wyse, Mayor

Attest:

Laurie J. Storrer, Clerk of Council