

Source Water Protection Efforts in Southern & Eastern Ohio



OTCO Reservoir Management Seminar

June 2019

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Division of Drinking and Ground Waters

Southeast District Office, Logan



Source Water Protection in Ohio

Re-discovering an old idea.....



Ohio's Source Water Protection Program

- 1986 & 1996: Safe Drinking Water Act and amendments supported the creation of Ohio's current Source Water Protection Program.
- **GOAL:** *To protect the sources of public drinking water (rivers, lakes, ground water) from contamination by human activities.*

Why?

Impacts to Public Water Supplies in Southeast Ohio

Industrial Solvents

- **Bellaire ***
- **Bridgeport***
- **Beverly***
- **Coal Grove***
- **Little Hocking***
- **Marietta***
- **Middleport**
- **Newport***
- **New Philadelphia***
- **West Lafayette***
- **Yorkville**
- **Zanesville***

* Requires PT

Nutrient Load / HABs

- **Barnesville**
- **Cadiz #**
- **Caldwell**
- **Ironton**
- **Maysville #**
- **New Concord**
- **Portsmouth**
- **Putnam ***
- **Somerset**
- **Wellston**
- **Woodsfield**

Triggered HABs
General Plan

Salt

- **Athens**
- **Ross County Water**





Legend

- Active Wells
- Inner Management Zones
- Source Water Protection Areas

Protection Area Data

Number of Wells = 3
 Total Well Pumping Rate = 1,080,000 GPD
 Porosity = 20%
 Aquifer Thickness = 60 feet
 Hydrogeologic Setting = Buried Valley
 Primary Land Use = Agricultural

SUSCEPTIBILITY

Ohio's Source Water Protection Program
Ground Water System

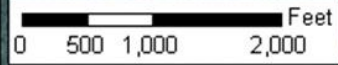
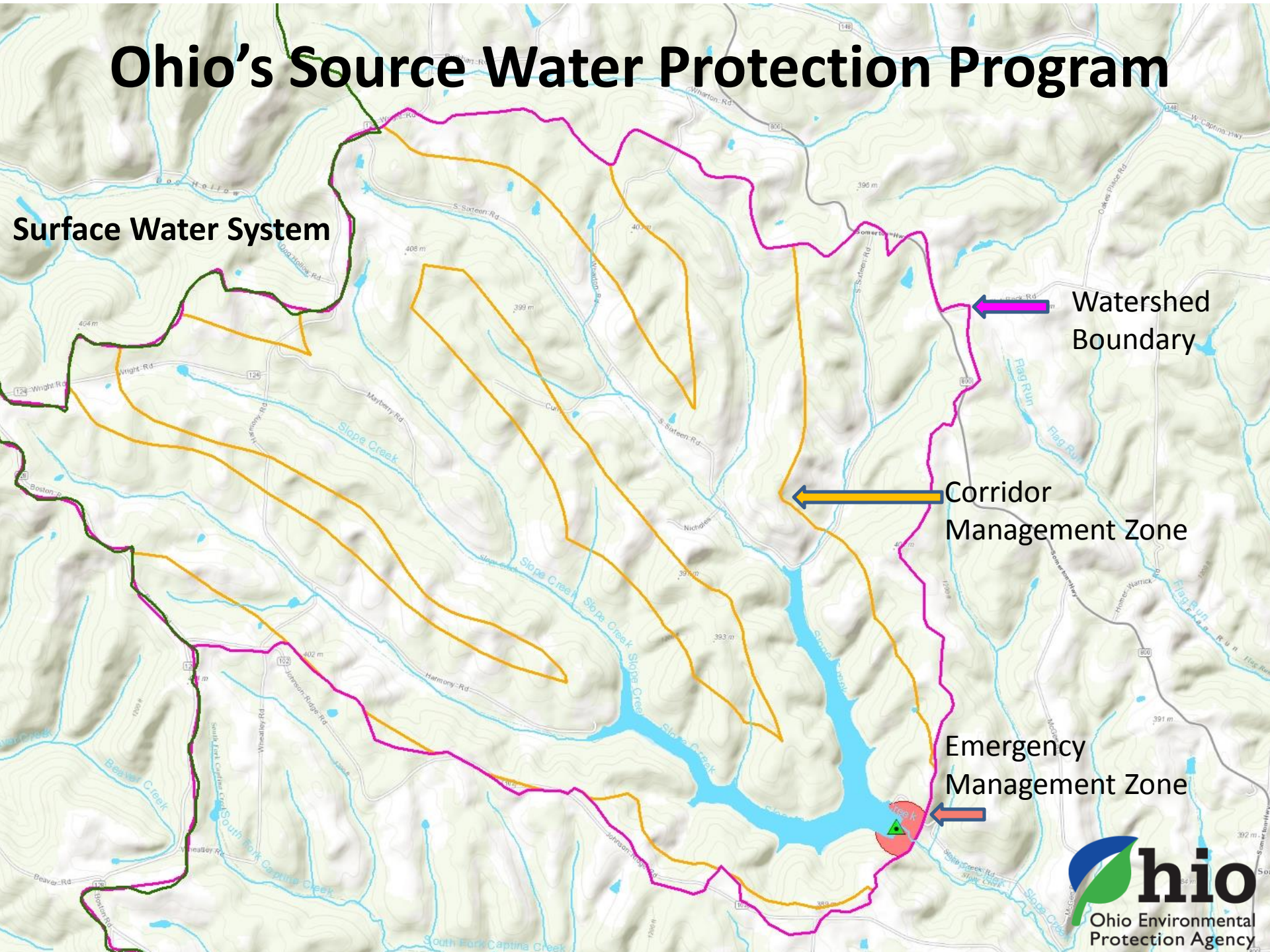


Figure 1. Drinking Water Source Protection Area for the City of Nelsonville, Identification #OH0501214

Ohio's Source Water Protection Program



Surface Water System

Watershed Boundary

Corridor Management Zone

Emergency Management Zone

Ohio's Source Water Protection Program

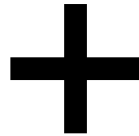
Assessment

(Technical Information,
completed by Ohio EPA)

Delineate
Protection Areas

Pollution Source
Inventory

Aquifer
Susceptibility



Protection Plan

(Developed by Local Team)

Education/
Public Participation

Contingency Plan
Update

Source Control
Strategies

Water Quality
Monitoring



Protected
Source
of
Drinking
Water

Ohio's Source Water Protection Program

Common Tools Used in Protection Plans:

1. Local Ordinances
2. Agreements with those who own/operate potential contaminant sources
3. Publicity/Education = Signs, Brochures, Fact Sheets +
4. Prioritize enforcement of existing rules/regulations
5. Water quality monitoring
6. Partnerships with state/local organizations



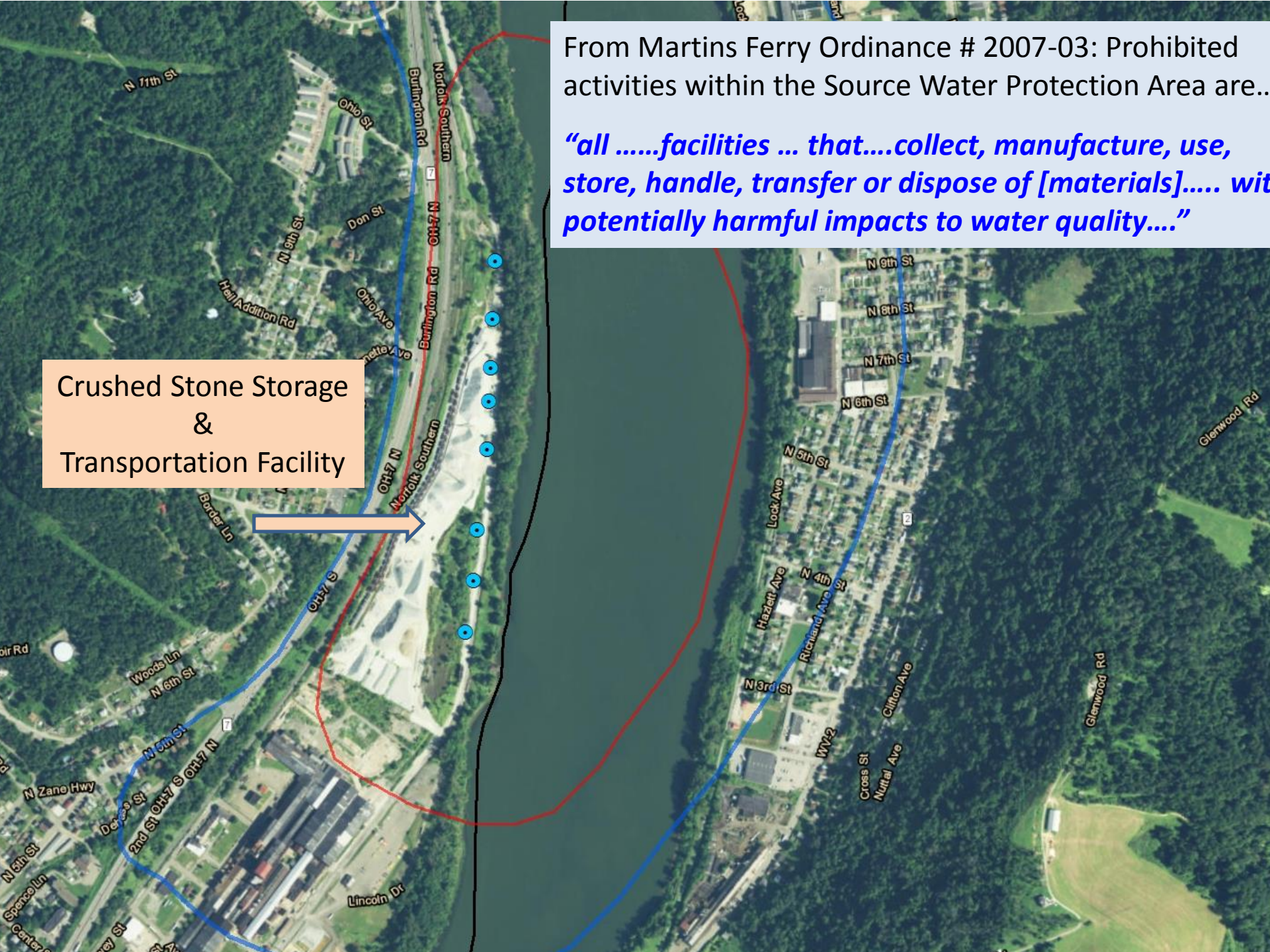
City of Martins Ferry –
Source Water Protection Area
Proposed Land Uses, Circa 2010

Barge Transfer Facility?

Salt Storage Piles?

Petroleum Tank Farm?





From Martins Ferry Ordinance # 2007-03: Prohibited activities within the Source Water Protection Area are..

“allfacilities ... that....collect, manufacture, use, store, handle, transfer or dispose of [materials]..... with potentially harmful impacts to water quality....”

Crushed Stone Storage
&
Transportation Facility



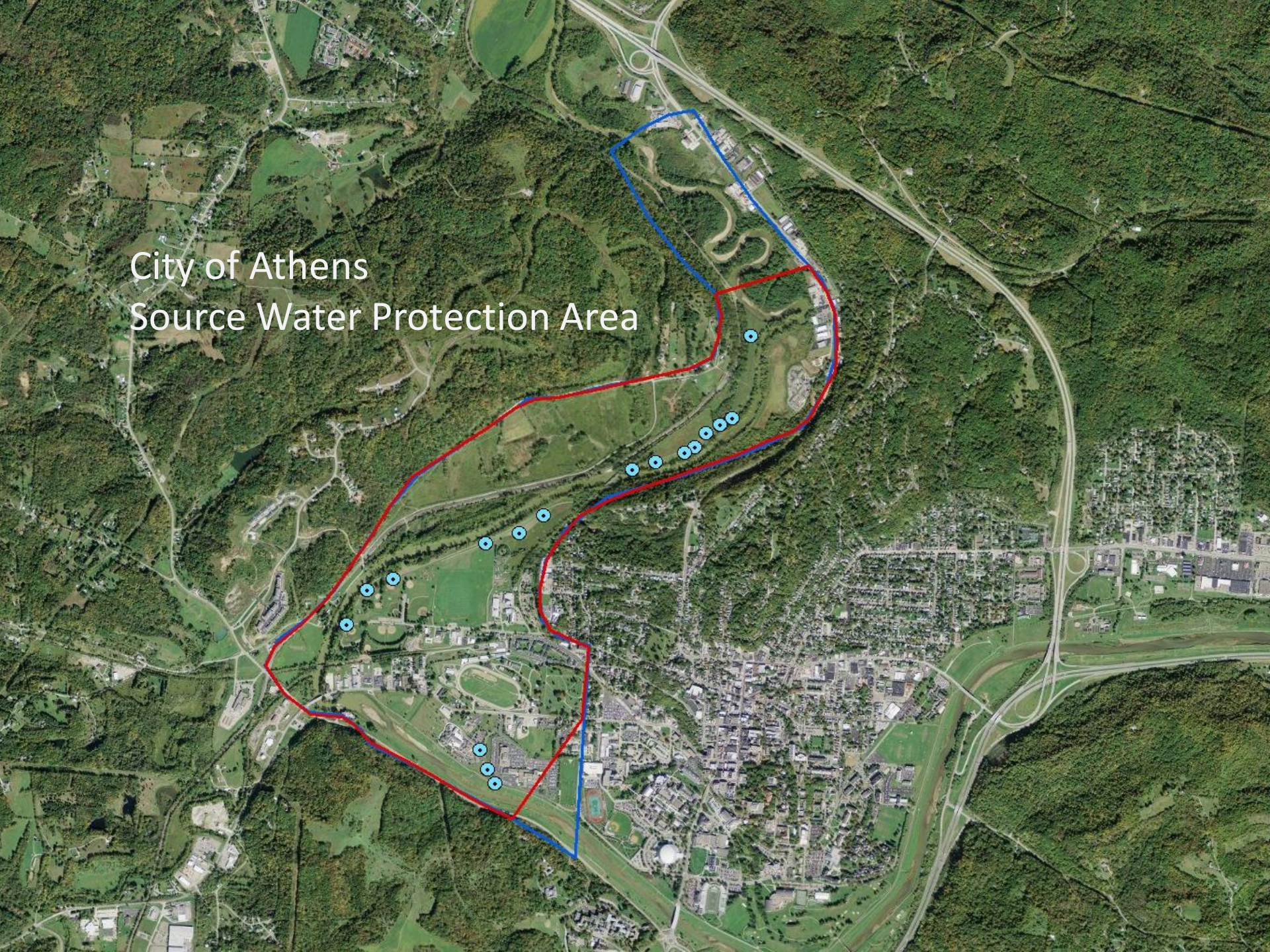
Ohio's Source Water Protection Program

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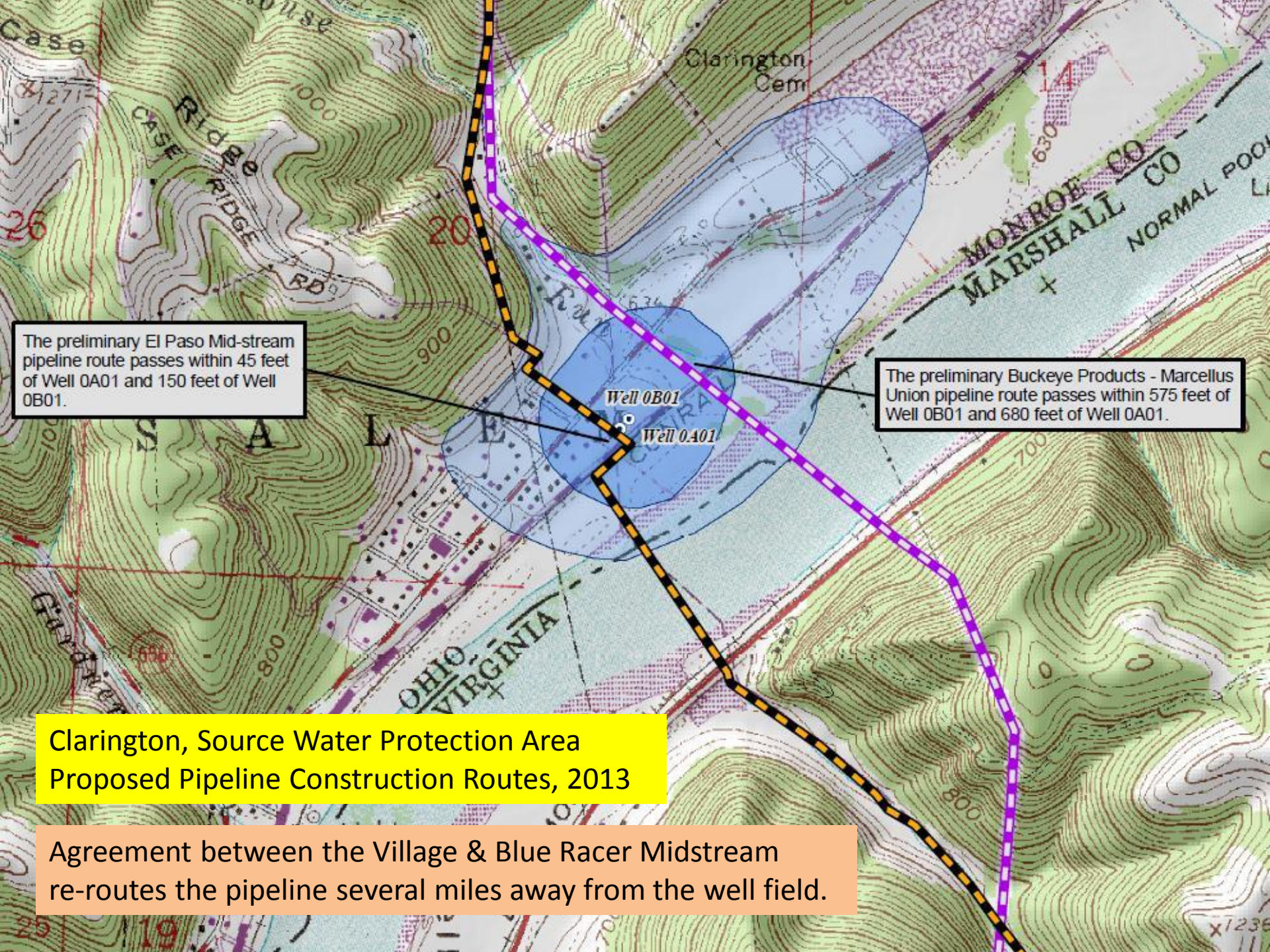


City of Athens
Source Water Protection Area



City of Athens
New Salt Storage Facility





The preliminary El Paso Mid-stream pipeline route passes within 45 feet of Well 0A01 and 150 feet of Well 0B01.

The preliminary Buckeye Products - Marcellus Union pipeline route passes within 575 feet of Well 0B01 and 680 feet of Well 0A01.

Clarington, Source Water Protection Area
Proposed Pipeline Construction Routes, 2013

Agreement between the Village & Blue Racer Midstream re-routes the pipeline several miles away from the well field.

Ohio's Source Water Protection Program

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2. Agreements with those who own/operate potential contaminant sources
3. **Publicity/Education = Signs, Brochures, Fact Sheets +**
4. Prioritize enforcement of existing rules/regulations
5. Water quality monitoring
6. Partnerships with state/local organizations

Protecting the City of Zanesville's Source of Drinking Water

*Steps your community can take
to help limit the costs of water
treatment and ensure a safe
supply of water for the future*



Fact sheets that address the most common sources of contamination are available.



Sometimes, old-fashion teaching works too.



Ohio's Source Water Protection Program

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St. Clairsville, Source Water Protection Area
First Horizontal Well Pad Placement, 2014



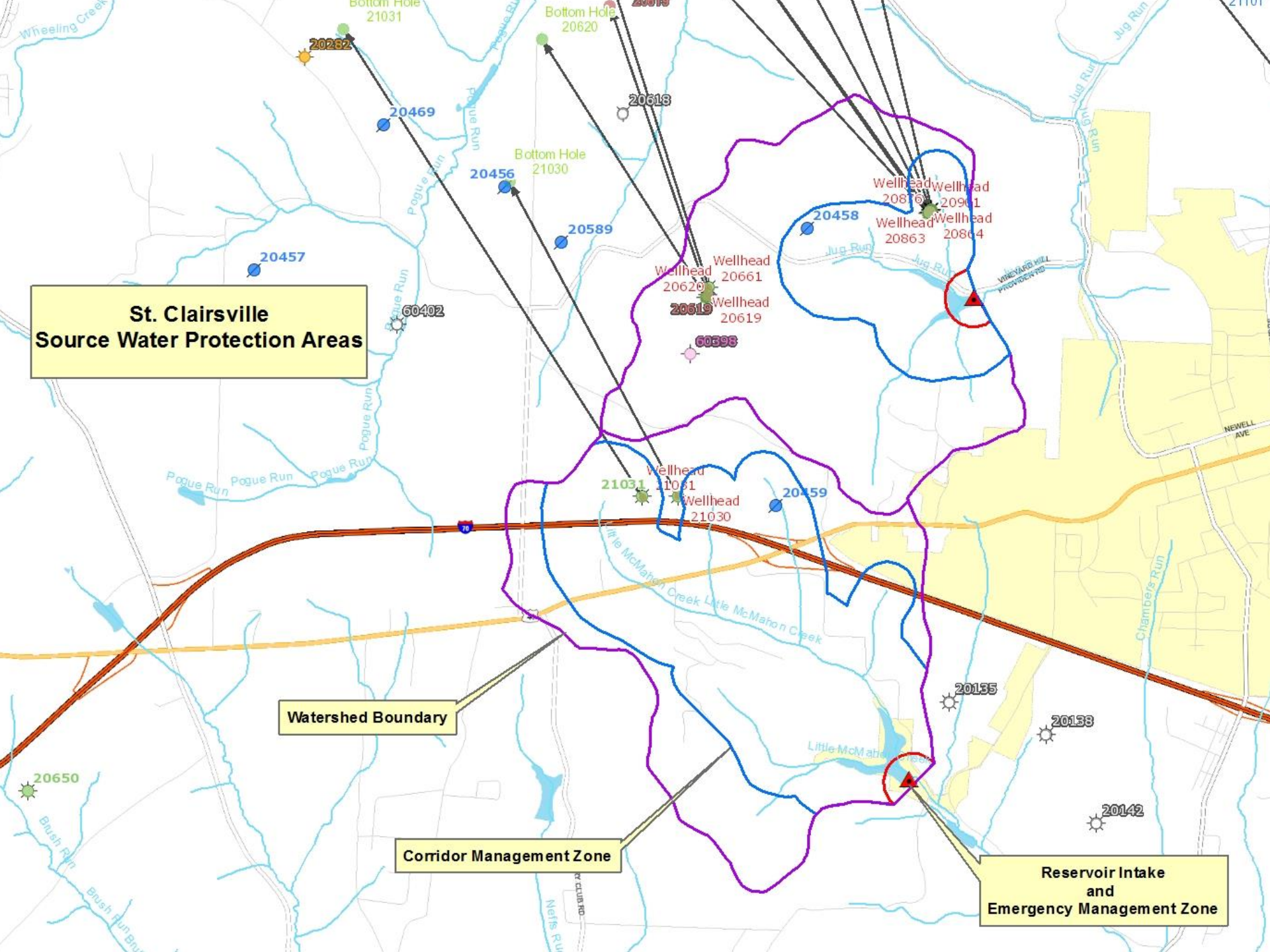
2014/12/19

**St. Clairsville
Source Water Protection Areas**

Watershed Boundary

Corridor Management Zone

**Reservoir Intake
and
Emergency Management Zone**



Downtown Barnesville, Belmont County



Local Opposition to Oil and Gas Development
+
Promotion of Source Water Protection
=
Premier Drinking Water Protection Plan

Activity	Responsible Party	When Implemented	Comments
SOURCE MANAGEMENT ACTIVITIES			
<i>Manage risk associated with oil and gas exploration - Current</i>			
Maintain up to date inventory of well permits issued within the village drinking water reservoir watersheds, through ODNR. Maintain up to date maps of existing and proposed oil & gas pipelines in Barnesville area. Update contact information with Emergency Responders.	Fire Department Staff (or delegate from the Village Administrator).	ODNR contact or website checked at least quarterly, beginning in January 2017.	See page 22 for details
Request the ODNR Dam Safety Program increase the frequency of dam inspections for the village's reservoirs based on density of shale-gas development and/or seismic activity in near reservoir watersheds.	Village Administrator +/or PWS Operator (via letter or email from the village of Barnesville to ODNR).	By the first Quarter of 2017. Annual check.	May require communication +/or coordination with ODNR.
Request the ODNR Oil and Gas Division increase frequency of above ground oil and gas storage tank inspections within reservoir watershed areas.	Village Administrator (via letter or email from the village of Barnesville to ODNR).	By the first Quarter of 2017. Annual check.	May require communication +/or coordination with ODNR.
<i>Manage risk associated with oil and gas exploration - Future</i>			
Request that ODNR: 1) post or inform communities (Barnesville) when oil and gas infrastructure projects are submitted for permitting within water supply reservoir watersheds (before ODNR approval/initial). This will give Barnesville a chance to study +/or comment on proposed projects. 2) deny permits for well pads within the Emergency Management Zone for the reservoirs. 3) deny permits within 500' of the reservoirs at normal water elevations. 4) for distances greater than 500' from the reservoirs, if/when pads/infrastructure are	Village Administrator or delegate (via letter or email from the village of Barnesville to ODNR).	Once SWPP Plan is finalized & endorsed by OEPA.	Barnesville is requesting the use of federal BLM rules - https://www.gpo.gov/fdsys/pkg/FR-2015-03-20/pdf/2015-06658.pdf . This may require internal discussion in ODNR & Ohio EPA because the rules are different than state of Ohio rules.

Activity	Responsible Party	When Implemented	Comments
permitted, request ground water monitoring of these facilities and additional safeguards as specified in the 2016 Bureau of Land Management rules and/or equivalent ODNR permit restrictions or BMP engineering safe-guards to well pads; 5) require operators to notify the village 90 days prior to well pad construction, for pads in the reservoir watersheds.			
If midstream pipeline(s) for liquid petroleum product and/or brine are proposed within the watershed of the PWS reservoirs, request additional engineering safe-guards for the pipeline. Modify Source Water Protection Plan.	Village Administrator +/or PWS Operator +/or delegate (via letter or email from the village of Barnesville to pipeline company).	When proposal becomes known.	May require participation by ODNR, PUCO +/or FERC.
Upon siting of oil/gas well pads within the reservoir's watershed, request oil/gas company and ODNR meeting. Request well pad design & communication modifications equivalent to or superior to AEP-Utica St. Clairsville well pad design.	Village Administrator, PWS Operator and source water protection team members (via letter or email from the village of Barnesville to ODNR and oil and gas company)	As soon as possible after permit request is published.	Will require ODNR & oil and gas company participation. See Appendix D for AEP-Utica well pad design specifications & permit restrictions.
Upon siting of oil/gas well pad within the reservoir's watershed, evaluate ground water monitoring potential for these installations.	Village Administrator, PWS Operator and source water protection team members.	As soon as possible after permit request is published.	May require ODNR +/or oil & gas company participation. Can also use network of private water well monitoring stations.
Upon siting of oil/gas well pad within the reservoir's watershed, confirm and request copies of MSDS sheets for materials used/stored @ oil/gas facility.	Barnesville Fire Dept. and/or Village Administrator (via letter or email from the village of Barnesville)	As soon as possible after construction of the well pad is completed.	May require ODNR +/or oil & gas company notification.

Activity	Responsible Party	When Implemented	Comments
<i>Reduce impacts to Barnesville Reservoirs from agricultural activities</i>			
Request agriculture specialists to visit agricultural producers within the village's reservoir watersheds to discuss / encourage the use of BMPs (via letter or email).	Village Administrator & SWCD, OSU Extension +/or USDA Cons. Service staff (via letter or email).	Repeat annually, starting in 2017.	See page 23
Review / oversee herbicide spraying practices along utility right of ways within watershed boundaries and/or pesticide spraying on farms.	Village Administrator & PWS Operator -> SWCD, OSU Extension +/or USDA Cons. Service staff (via letter or email).	Routinely, when notified by utilities of cleaning / spraying activities or by farmers within reservoir watersheds.	May request advice from Ohio Department of Agriculture.
<i>Reduce impacts to Reservoirs from septic system discharges</i>			
Request Belmont County Health Department prioritization of septic system inspections within the reservoir watersheds.	Village Administrator to Belmont County Health Department, via letter or email.	Request in 2017. Set up inspection schedule every 3 years.	Schedule can be modified based on village judgement.
EDUCATION AND OUTREACH			
Road Signs: Post Source Water Protection signs on public roads within reservoir watershed areas.	Village Council Member Scott Gallagher +/or county DOT official, township trustees.	Complete by the end of 2017.	2 free signs can be obtained from ODOT. Additional signs may be required for more coverage @ the village's expense.
Consumer Confidence Report: Include info on Source Water Protection Plan in CCR.	Village Administrator +/or 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 Operator/staff	Ongoing - as requested.	
Web Page: Post information about source water protection strategies on the Village's web page.	Village Administrator (or family member)	By 2017, and ongoing as needed thereafter.	
School Outreach: Bring project VET activities into public school classrooms. Include SW Protection information with activities for Science Day, Earth Day, Environmental Awareness Programs in local schools.	Belmont Co. SWCD	Annually.	Belmont Co. SWCD already doing this. Ohio EPA participates in these outreach activities (by request) in communities with endorsed SWP Plans.

Activity	Responsible Party	When Implemented	Comments
Agronomy Day: Include SW Protection topics.	OSU Ext. Service.	Annually.	As above.
Brochure: OEPA created a draft brochure.	Village Administrator +/or PWS operator and staff.	Following completion and endorsement of SWP Plan.	Distribute @ discretion of village. Make available via website - distribution by other local entities.
Festivals: Barnesville Pumpkin Festival & Captina Creek Celebration.	Belmont Co. SWCD, Olney School & Captina Conservancy.	Annually, in September.	May use Enticospaga and GW Sand Tank-Flow Model.
Newspaper: Submit info on the SWP Plan & its implementation to the public can be kept informed of progress / work.	Village Administrator or delegate in consultation with the Barnesville Enterprise +/or other media outlets.	When plan goes draft-final. After plan is endorsed. When key development projects occur in the reservoir watersheds.	At the discretion of the Village.
Information Outreach: Communicate with Somerset and Warren Twp. residents to inform & recruit as "monitoring eyes & ears."	Village Administrator in consultation with participants. Face to Face, email, telephone calls or letters.	After each major project installation. Annual contact at a minimum.	At the discretion of the Village.
CONTINGENCY PLANNING			
Institute table-top spill exercises within reservoir watershed to test emergency response capability. Include SR 800 spill catchment basin location in these exercises.	Village Administrator, fire chief and county EMA coordinator.	Test by the end of 2017. Repeat every 3 years.	See Appendix C for SR 800 Spill Response Plan.
PWS staff will notify EMA, LEPC and Fire Dept. of changes in contact staff on at least an annual basis.	PWS operator	As part of annual contingency plan review/update.	
Maintain road guard rails along public roads near the PWS reservoirs. Pursue alternate route designation with the township to reduce reservoir traffic.	Mayor, Village Administrator or delegate.	Include inspection criteria within road maintenance plans by end of 2017.	
Review Spill Response and Short/Long Term Water Shortage Plans.	PWS operator & Village Administrator.	Documented in plan's contingency plan, which is reviewed and updated annually.	See pages 23-24

Activity	Responsible Party	When Implemented	Comments
SOURCE WATER MONITORING			
Implement tier 1, 2 and 3 Background Sampling Program for oil and gas indicator parameters in each reservoir. Maintain analytical records with former Ohio EPA analysis of reservoirs in 2009.	Village Administrator Barnesville PWS Operator / staff.	Ongoing. Reduction in frequency of sampling included in the Sampling Plan.	See Background Sampling Plan on page 28.
Invite local schools to partner or assist in the gathering / storage / analysis of source water quality data.	Barnesville PWS Operator/staff, Olney Friends School. Could partner with other local schools.	ASAP	Area HS, OU Main & Belmont Campus, Zane State, KSU, Muskingum University, Marietta College, OSU.
Contact Ohio Lake Management Society's Lake Keepers to explore their participation in monitoring the Barnesville Reservoirs	Village Administrator Barnesville PWS Operator / staff or delegate.	2017	
Improve, then maintain local monitoring of Hazardous Algal Blooms (HABs) in all 3 village reservoirs.	Barnesville PWS Operator/staff.	2016	

Barnesville's SWPP Implementation Table



Barnesville Example

Protective Strategy	Who will Implement it?	When?	Comments
<p>Upon siting of oil/gas well pads within the reservoir's watershed, request oil/gas company and ODNR meeting. Request well pad design & communication modifications equivalent to or superior to AEP-Utica St. Clairsville well pad design.</p>	<p>Village administrator, PWS operator and source water protection team members (via letter or email from the village of Barnesville to ODNR and oil and gas company)</p>	<p>As soon as possible after permit request is published.</p>	<p>Will require ODNR & oil and gas company participation.</p> <p>See Appendix D for AEP-Utica well pad design specs & permit restrictions.</p>

Even when you plan for bad things.....



“S” Curve on SR 800, South of Barnesville
(Note Drinking Water Protection Area Sign)





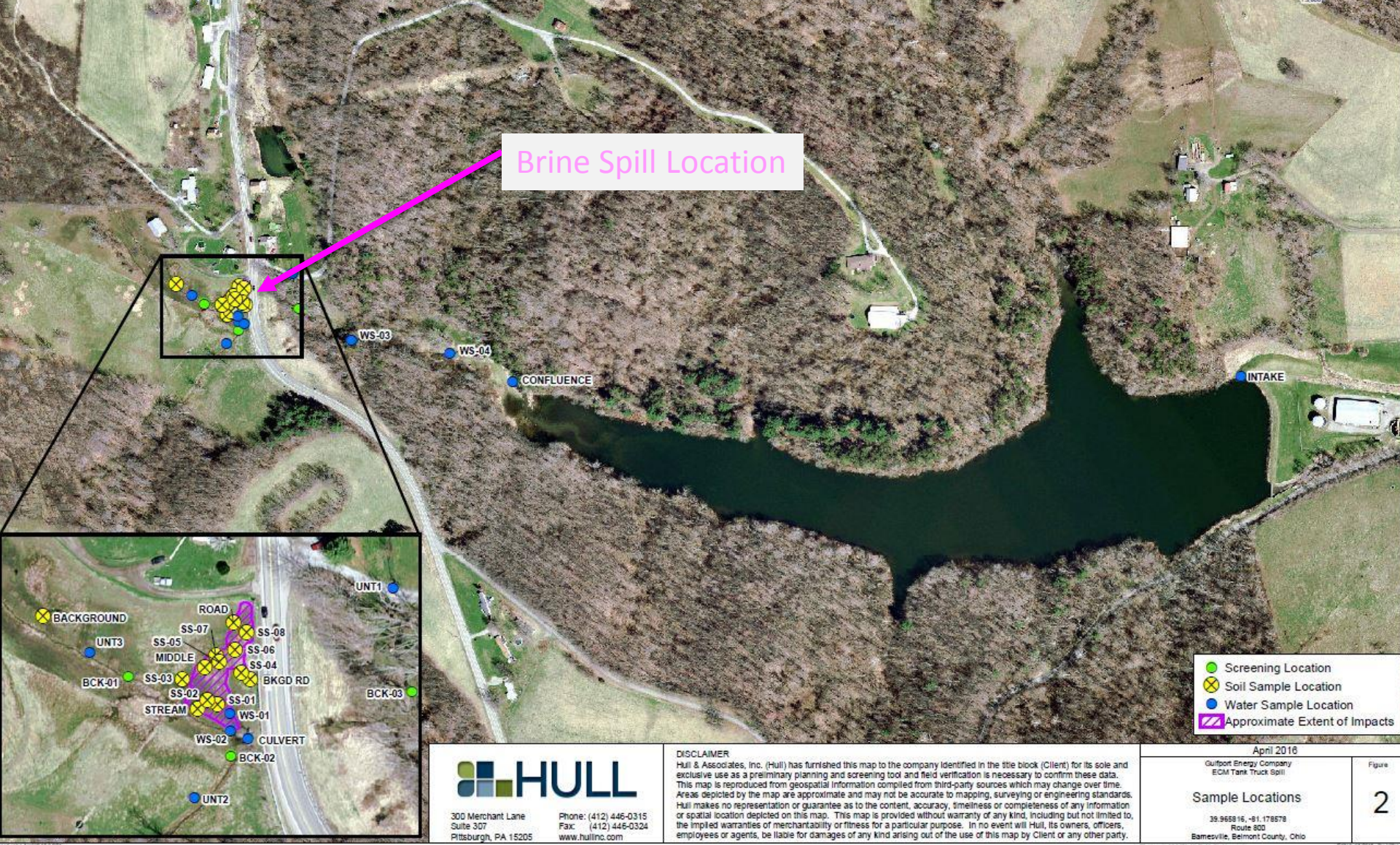
Barnesville, 2016
Spill Impoundment, east side of SR 800



Barnesville, 2016

Location of Truck Brine Spill on SR 800





HULL

300 Merchant Lane
 Suite 307
 Pittsburgh, PA 15205

Phone: (412) 446-0315
 Fax: (412) 446-0324
 www.hullinc.com

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Barnesville, 2016

First Brine Spill into a PWS Reservoir



Ohio's Source Water Protection Program

Common Tools Used in Protection Plans:

1. Local Ordinances
2. Agreements with those who own/operate potential contaminant sources
3. Publicity/Education = Signs, Brochures, Fact Sheets +
4. Prioritize enforcement of existing rules/regulations
5. Water quality monitoring
6. Partnerships with state/local organizations



Recommendations for Water Well Sampling Before Oil and Gas Drilling

Recommended Water Quality Sampling Parameters		
Tier 1 Parameters	Tier 2 Parameters	Tier 3 Parameters
Barium Chloride Magnesium Potassium Sodium Strontium Sulfate Total dissolved solids Specific Conductivity	Tier 1 sample parameters + Calcium Hardness Total Alkalinity pH Iron Manganese Total suspended solids Bromide	Tier 1 and 2 sample parameters + BTEX (benzene, toluene, xylene, ethylbenzene) Methane (dissolved)*

*Include with Tier 1 if laboratory can analyze for methane.

From the ODNR/ODH/Ohio EPA fact sheet, January 2014

13 PWS in Southeast Ohio have adopted some form of Tier 1, 2 or 3 Background Monitoring in the last 6 years.



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Tappan Lake

- Created in 1936, primarily for flood control
- > 2,100 acres of open water
- ~ 47 miles of shoreline
- Heavily used for fishing, boating and swimming
- Drinking water source for the village of Cadiz





1319 3rd St. NW; P.O. Box 349
New Philadelphia, OH 44663

*Providing benefits of flood reduction,
conservation and recreation since 1933*





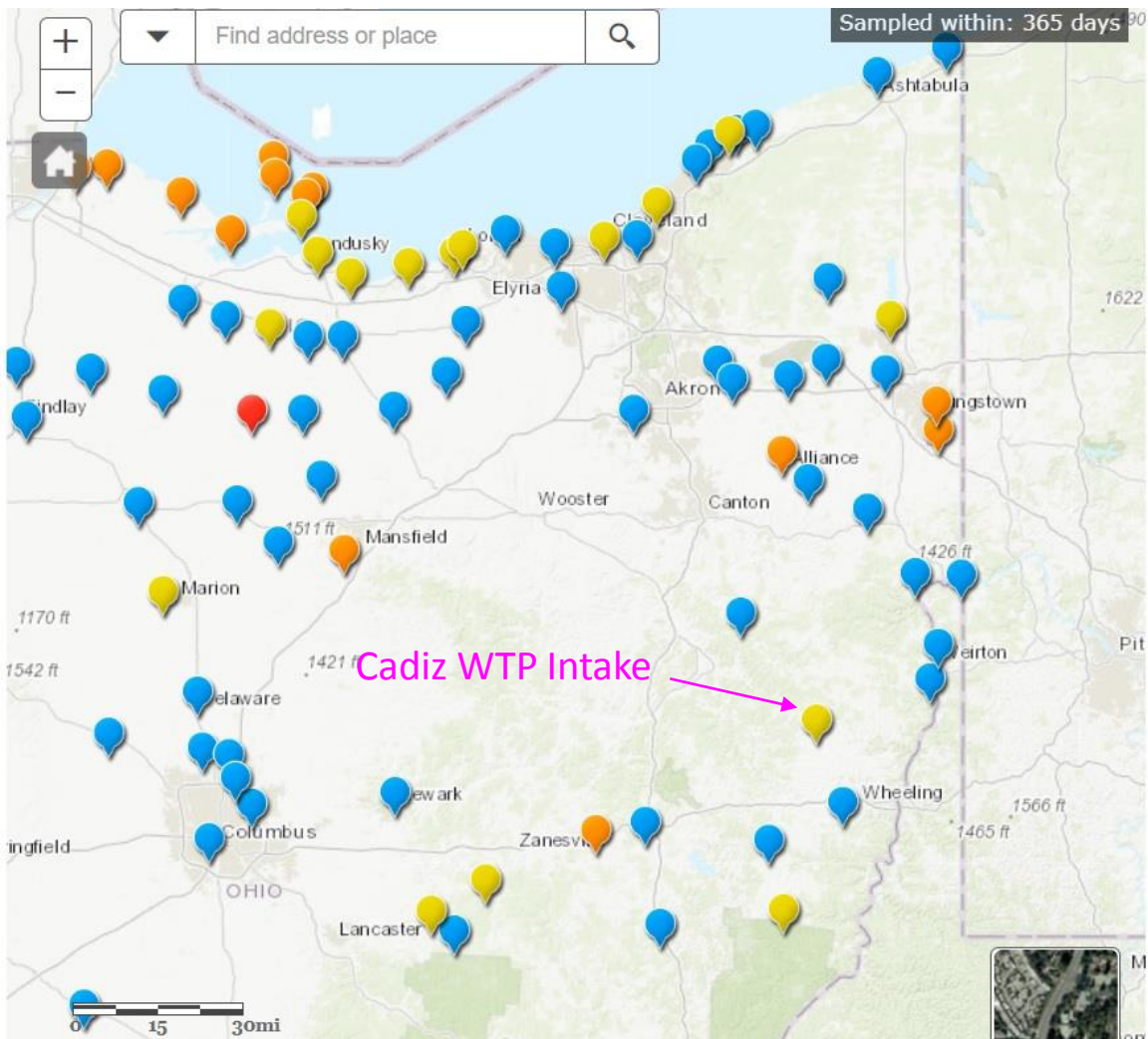
Oil and Gas Infrastructure in the Cadiz Source Water Protection Area



Harmful Algal Blooms (HABs)



- Harmful algal blooms = excessive growth of cyanobacteria.
- Many cyanobacteria produce toxins => illness (or irritation)
- The Cadiz HABs General Plan was triggered by 4 raw water detections of microcystin at the Tappan Lake intake exceeding 1.6 ug/L in June 2016.



Use the radio buttons to select a toxin or to filter by date range and site type.

Type of Toxin Sampled:

- Microcystins
- Saxitoxin
- Cylindrospermopsin
- Anatoxin-a

Time period:

- 7 days
- 14 days
- 30 days
- 90 days
- 1 year
- All

Type of Sampling Site:

- PWS Finished Drinking Water
- PWS Raw Water Intakes
- Lakes & Reservoirs
- Rivers
- All site types

Range of Toxin Concentrations

	Microcystins	Saxitoxin	Cylindrospermopsin	Anatoxin-a
	µg/l	µg/l	µg/l	µg/l
	not-detected	not-detected	not-detected	not-detected
	detect - 0.29	detect - 0.19	detect - 0.69	detect - 19.99
	0.3 - 1.59	0.2 - 0.79	0.7 - 2.99	20 - 79.99
	1.6 - 19.99	0.8 - 2.99	3.0 - 19.99	80 - 299.99
	>= 20.0	>= 3.0	>= 20.0	>= 300

Concentration Units µg/l - micrograms per liter

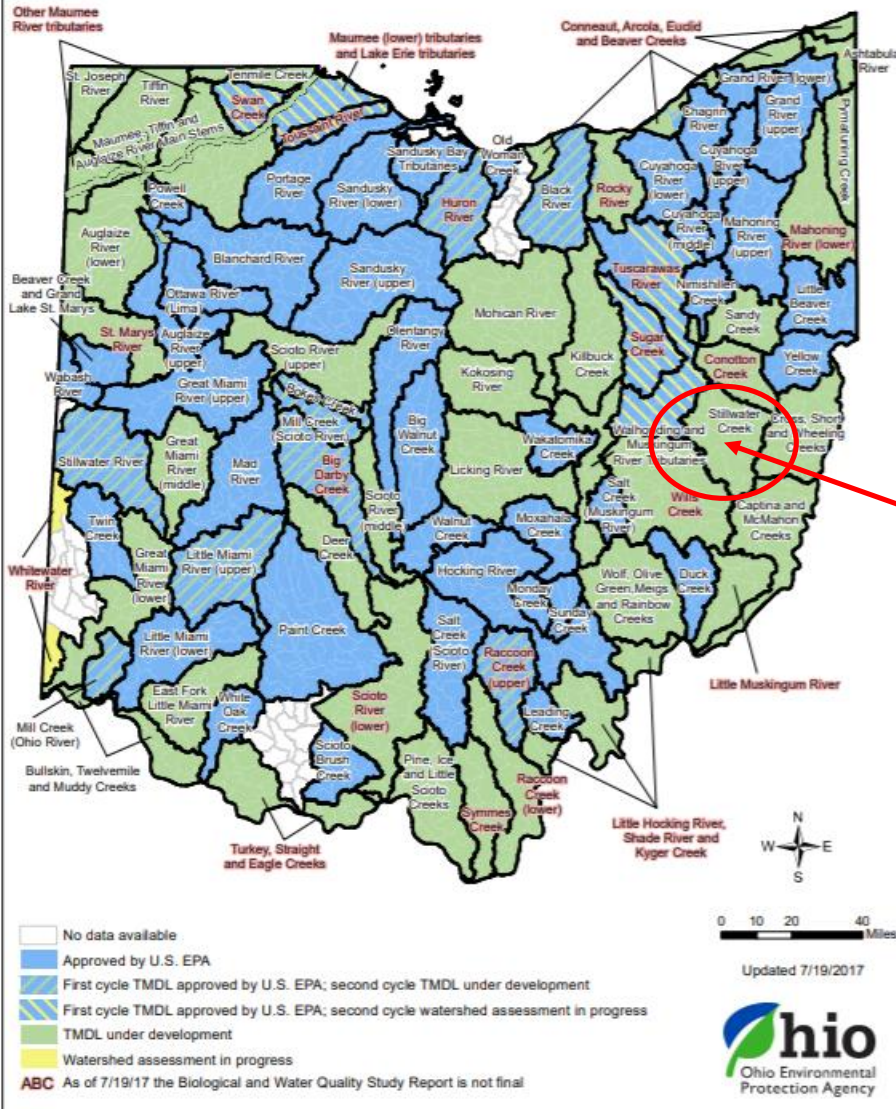
Site Type by Shape



What can we do about HABs?

1. Reduce nutrient inputs.
2. Reduce sediment inputs.
3. Deal with nutrient/sediment recycling.

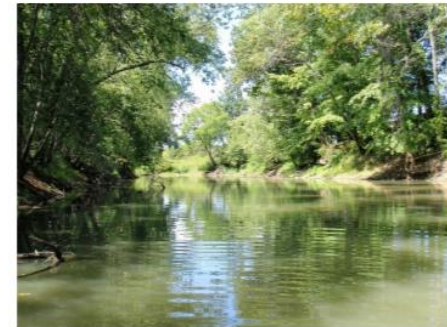
Ohio Total Maximum Daily Load Program Progress



Biological and Water Quality Study of the Stillwater Creek Basin

2012

Tuscarawas, Harrison, Guernsey, Belmont and Carroll Counties, Ohio

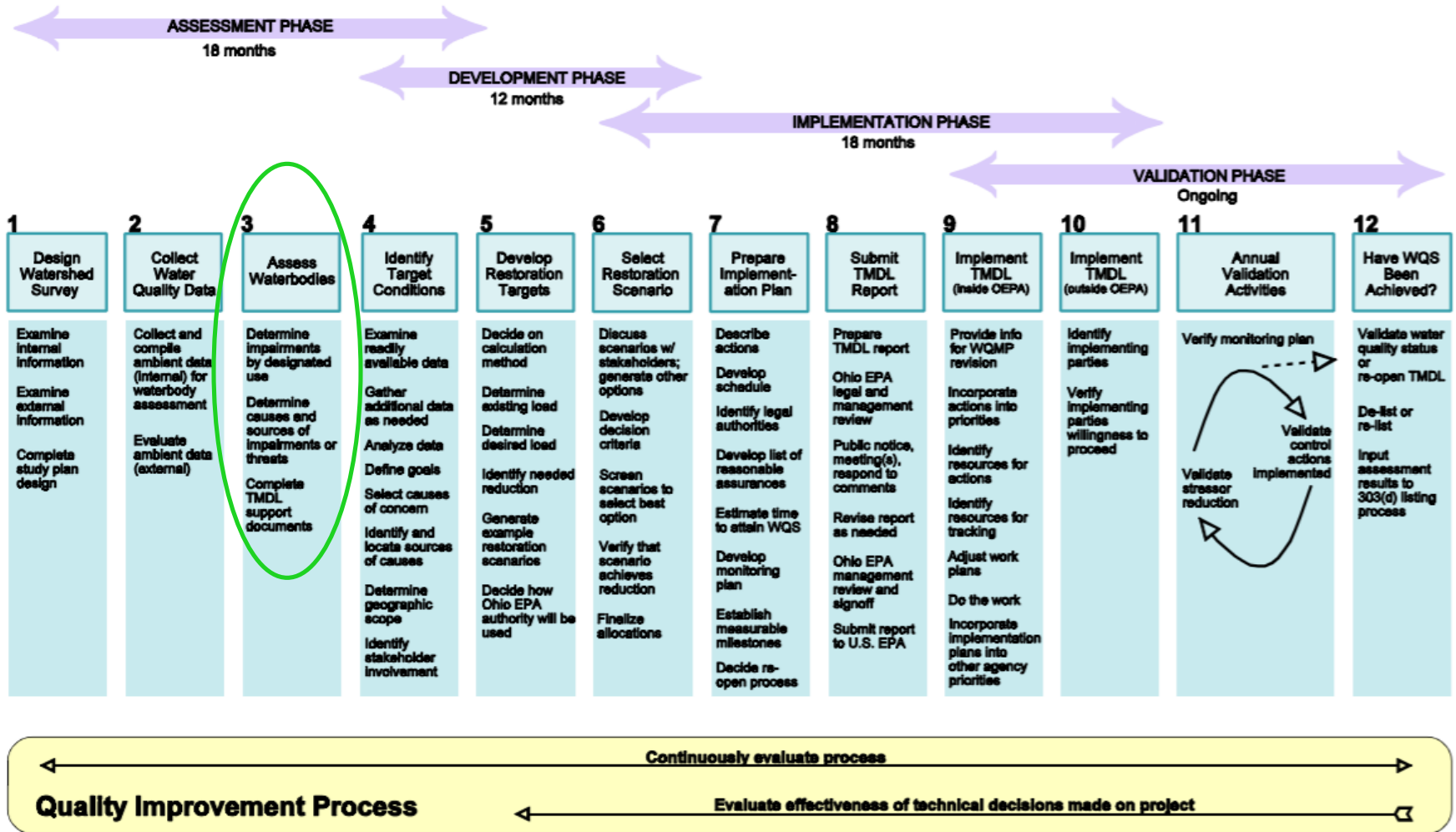


Ohio EPA Report EAS/2015-11-07

Division of Surface Water
Ecological Assessment Section
January 17, 2017



Overview of the TMDL Project Process



TMDL Alternatives - 303(d) Vision

- In December 2013, USEPA announced a new “**Vision**” for the Clean Water Act (CWA) 303(d).
- USEPA recognized “... there is not a one size fits all approach to restoring and protecting water resources.”
- Under the new “**Vision,**” states will be able to develop tailored strategies to implement the 303(d) program.

The Tappan Lake Nutrient Reduction Initiative (TLNRI) is born!

- MWCD, Cadiz and Ohio EPA (DSW & DDAGW) led this effort (starting in late 2017).
- The TLNRI borrowed some structure and philosophy from nutrient reduction efforts underway in the western basin of Lake Erie.
- The overall TLNRI goal: Eliminate the presence of harmful algal toxins in Tappan Lake water within the next decade.

Common Local Partnerships in Source Water Protection



- ODA-SWCDs
- Health Departments
- OSU Extension Offices
- USDA-NRCS
- Schools/Colleges/Universities
- Businesses & Farms
- Industry Trade Groups
- EMAs/FDs
- Engineer/Highway Departments

TLNRI Members



**HARRISON
SOIL
AND
WATER**

CONSERVATION DISTRICT



**US Army Corps
of Engineers.**

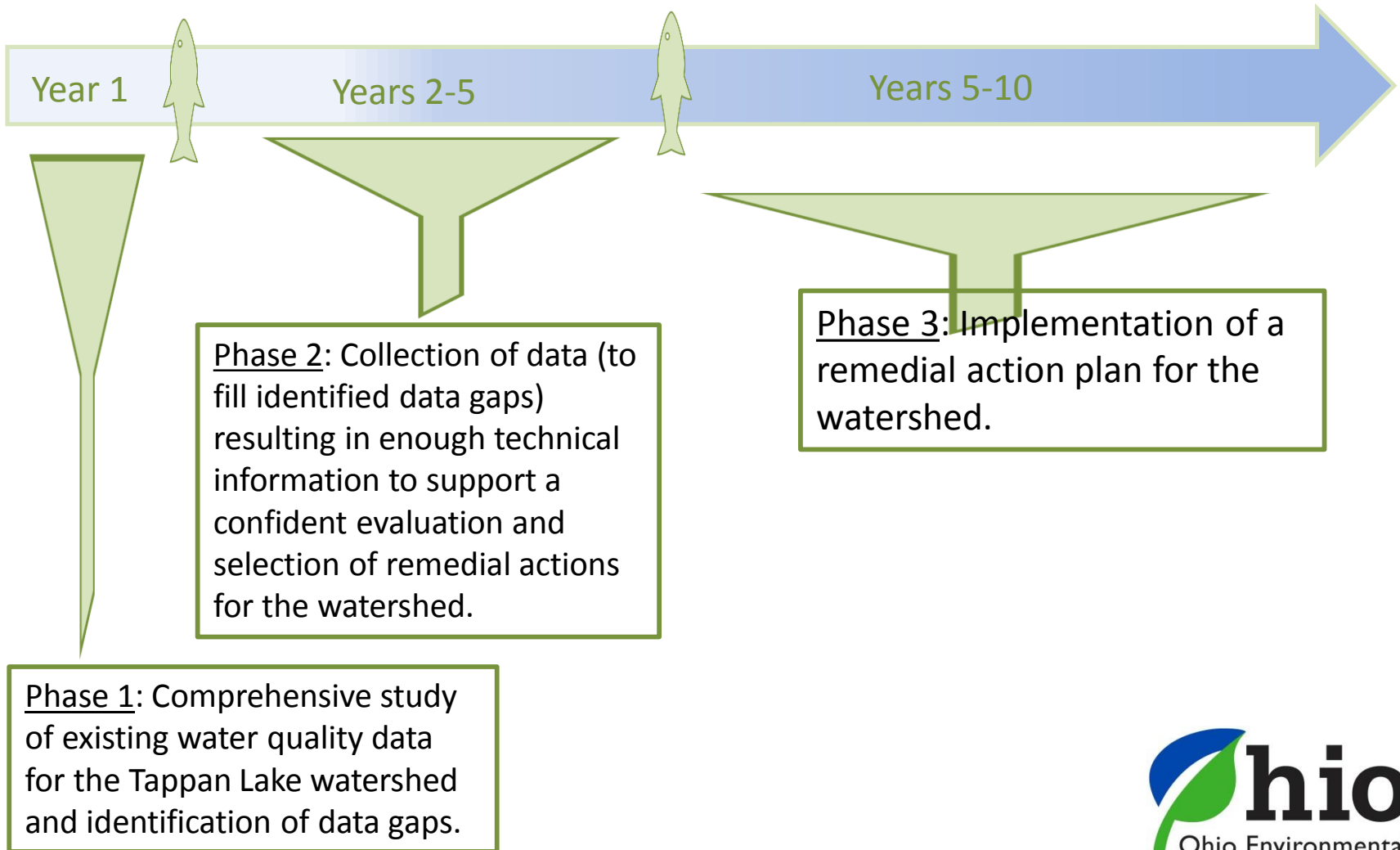


**THE OHIO STATE
UNIVERSITY**

***Village of
Cadiz***



TLNRI Phases



TLNRI – Next Steps (Phase 2)

Water Quality subgroup met in early April to begin discussions regarding:

- Data collected;
- Data Holes - Data Needed; and
- How to obtain data.
 - Who – will collected the data, do the sampling?
 - What – what parameters are needed?
 - Where – where should the samples be collected?

Ohio's Source Water Protection Program

For more information:

www.epa.ohio.gov/ddagw/swap.aspx



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Source Water Assessment and Protection Program



Also known as "Wellhead Protection" and "Drinking Water Source Protection," Ohio's Source Water Assessment and Protection (SWAP) program assists communities with protecting their sources of drinking water (streams, lakes and aquifers) from contamination. The SWAP program addresses over 4,500 public water systems in Ohio and does not address private residential water systems.

Although Ohio's public water systems treat their drinking water to meet health-based standards, treatment is expensive and may not address every kind of contaminant. By taking steps to avoid chemical spills in the areas surrounding a well field or upstream from a surface water intake, a community can help reduce the costs of their water and better ensure a safe and high-quality supply of drinking water.

Endorsed Drinking Water Source Protection Plans

For municipal systems, this involves developing a written plan that addresses the concerns to the source water. Non-municipal systems complete a checklist that is tailored to the types of potential contaminant sources identified in the system's protection area.

- Municipal Systems with Endorsed Protection Plans (as of June 30, 2017)
- Non-Municipal Systems with Endorsed Protection Plans (as of June 30, 2017)

WHAT'S NEW

- ▶ [2016 Drinking Water Source Protection Update](#)

QUICK LINKS

- ▶ [Source Water Protection Areas](#)
Interactive map showing source water protection areas, sole source aquifers and assessment reports.
- ▶ [Developing a Protection Plan](#)
Examples, Templates, Guidances and Strategies
- ▶ [Outreach and Education](#)
Materials for Informing the Public about Protecting their Source of Drinking Water
- ▶ [Public Drinking Water Beneficial Use](#)
For Surface Waters Near Public Water Intakes

Program Manager: [Jeff Patzke](#)

(614) 644-3029

Central District Office: [Michael Bondoc](#)

(614) 728-3875

Northeast District Office: [K. Metropulos](#)

(330) 963-1149

Northwest District Office: [Rich Kroeger](#)

(419) 373-4101

Southeast District Office: [Steven Saines](#)

(740) 380-5445

Southwest District Office: [Allison Reed](#)

(937) 285-6447



Ohio's Source Water Protection Program

In Summary, the Characteristics of Effective Protection Plans are:

1. It fits the PWS's capabilities (*time, \$, expertise*).
2. It emphasizes *communication* with those who own/operate local potential contaminant sources.
3. It is compatible with the community's *culture & values*.