

WARREN COUNTY
**SOURCE WATER ASSESSMENT
& PROTECTION PLAN**

RICHARD A. RENNEKER
WATER SYSTEM



WARREN COUNTY WATER & SEWER DEPARTMENT
WARREN COUNTY REGIONAL PLANNING COMMISSION

June 2015

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June, 2015

ENDORSE AND SUPPORT THE SOURCE WATER ASSESSMENT AND PROTECTION PLAN FOR RICHARD A RENNEKER WATER SYSTEM AND APPROVE ITS SUBMITTAL TO THE OHIO ENVIRONMENTAL AGENCY FOR ENDORSEMENT

WHEREAS, the ample supply of high quality drinking water is a necessity for vibrant and healthy residential communities, for the growth of commercial and retail businesses, and the development of a strong and supportive economy that promotes jobs and businesses; and

WHEREAS, to help assure citizens and businesses of Warren County that their drinking water collected and treated from aquifers along the Little Miami River is safe to drink, this Board has directed the Water & Sewer Department to prepare a Source Water Assessment and Protection Plan for the customers served by the Richard Renneker Water Treatment Plant; and

WHEREAS, with assistance from the Warren County Regional Planning Commission, the Warren County Water and Sewer Department, has prepared a plan to protect the ground water quality necessary to provide adequate supplies of safe drinking water; and

WHEREAS, this Board recognizes the need to seek the Ohio Environmental Protection Agency, Division of Drinking and Ground Water review, approval, and endorsement of the prepared plan; and

NOW THEREFORE BE IT RESOLVED, that:

- 1) This Board hereby approves and the Warren County Source Water Assessment and Protection Plan for the Richard A. Renneker Water System.
- 2) This Board hereby directs the Warren County Water & Sewer Department to implement, enforce, and take actions necessary and appropriate to implement the plan.
- 3) The Warren County Sanitary Engineer is hereby authorized to submit the Warren County Source Water Assessment and Protection Plan for the Richard A. Renneker Water System to the Ohio Environmental Protection Agency for review, approval, and endorsement.

M. moved for adoption of the foregoing resolution, being seconded by M. Upon call of the roll, the following vote resulted:

M
M
M

Resolution adopted this Xnd day of June 2015.

BOARD OF COUNTY COMMISSIONERS

Tina Osborne, Clerk

cc: Water/Sewer (file)

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ACRONYMS

Bac-T:	Bacteriological Test
BUSTR:	Bureau of Underground Storage Tank Regulation
CCR:	Consumer Confidence Report
CDM:	Camp, Dresser & McKee
EPA:	Environmental Protection Agency
ERP:	Emergency Response Plan
ESI:	Expanded Site Inspection
FEBS:	Fields-Ertle Road Booster Station
GCWW:	Greater Cincinnati Water Works
gpm:	Gallons per minute
HAS:	Hydrogeologic Sensitivity Assessments
HazMat:	Greater Cincinnati Hazardous Materials Team
KMMR:	Kings Mills Military Reservation
LMR:	Little Miami River
mgd:	Million gallons per day
MSDS:	Material Safety and Data Sheets
OAC:	Ohio Administrative Code
ODNR:	Ohio Department of Natural Resources
OKI:	Ohio-Kentucky-Indiana Regional Council of Governments
ORC:	Ohio Revised Code
PPS:	Potential Pollution Sources
PPSI:	Potential Pollution Sources Inventory
RAR:	Richard A. Renneker
RCRIS:	Resource Conservation and Recovery Information System
RARWTP:	Richard A. Renneker Water Treatment Plant
RCRA:	Resource Conservation and Recovery Act
SCADA:	Supervisory Control and Data Acquisition
SFBS:	Socialville-Foster Road Booster Station
SDWA:	Safe Drinking Water Act
SOCs:	Synthetic Organic Compounds
SWAP:	Source Water Assessment and Protection
TDH:	Total Dynamic Head
TOT:	Time of Travel
TPH:	Total Petroleum Hydrocarbons
TRI:	Toxic Release Inventory
USTs:	Underground Storage Tanks
UV:	Ultraviolet
VOCs:	Volatile Organic Compounds
WHP:	Wellhead Protection
WHPA:	Wellhead Protection Area

Section 1 – Introduction

This section begins with a description of the well fields owned and operated by the County including their physical and hydrogeologic characteristics. It also includes information on the land uses within the aquifer area, an inventory of the business within the source water protection area, and a prioritized list of potential contaminant sources. The section concludes with a general discussion on the strategies to reduce the risk of pollution.

The first step in developing the Plan was the identification of the source water protection area. This area is divided into zones— the one year time of travel (TOT) zone (where pollution takes a year to enter the wells); the five year TOT zone (pollution takes five years to enter the wells). Delineation of the TOT zones was completed in August 2012 the assistance from the Ohio Environmental Protection Agency using GFLOW groundwater modeling software developed by Haitjema Software, a subdivision of Haitjema Consulting, Inc. For purposes of this report, the more encompassing five year time of travel zones are shown in **Figures 1-1** and are identified as the County’s source water protection area.

GFLOW is a highly efficient stepwise groundwater flow modeling system run on a Windows program base. It models steady state flow in a single heterogeneous aquifer using the Dupuit-Forchheimer assumption. Pump rates from Warren County’s well fields were derived from the 2011 ODNR water withdrawal records with the 2011 average rate being approximately 3 MGD. USEPA used the rated plant capacity of 6 MGD for modeling purposes. The model did assume withdrawal rates for other entities including Kings Island (1.0 MGD), Vickers ESD (18,000 GPD), and South Lebanon (1.6 MGD). Since the completion of the modeling work the Village of South Lebanon has decommissioned their wells and now purchases wholesale water from Cincinnati Water Works.

1.1 Well Field Description

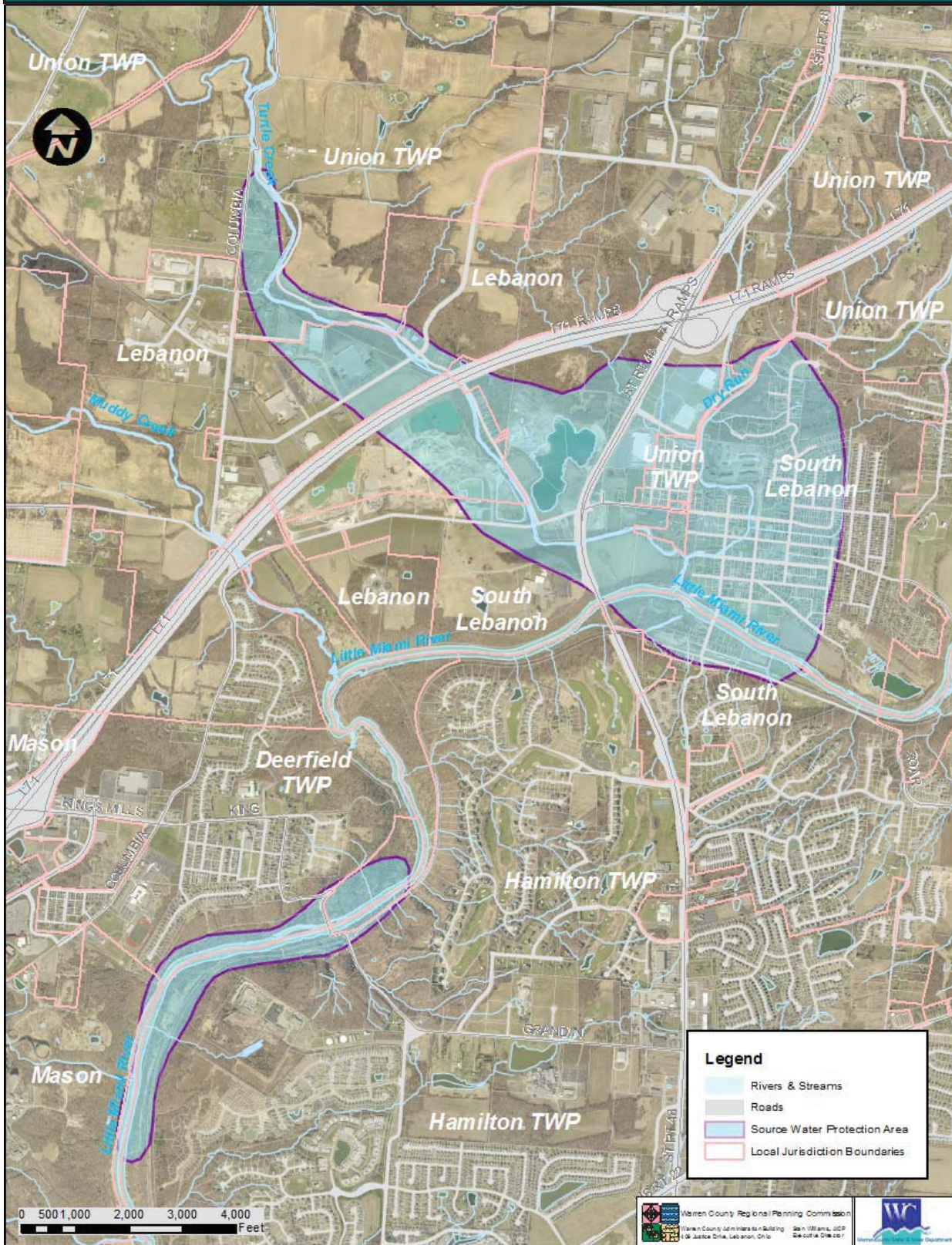
The Richard A. Renneker Water Treatment Plant (RARWTP) is a groundwater facility capable of treating 9.0 million gallon per day (mgd) for customers in the Deerfield and Hamilton Township area. The facility is served by seventeen (17) wells located in four (4) well fields along the Little Miami River (LMR) valley aquifer. The well fields have a combined capacity of approximately 11.1 million gallons per day (mgd) provided there is no hydrogeologic interference.

1.2 Aquifer Description

1.2.1 Physical and Hydrogeologic Setting

The depositional and erosional activity of glaciers and streams is responsible for the near-surface hydrogeologic features that comprise the major water supply aquifers in Warren County. All of the water supply well fields discussed in this report draw groundwater from the glacio-alluvial aquifer system that runs along the LMR and its major tributaries.

Figure 1 - 1
Source Water Protection Areas



The Buried Valley Aquifer system associated with Warren County lies entirely within the till plains of the central lowland in southwestern Ohio (OKI, 1990). This region is characterized by broad valleys, which have medium-sized to relatively small streams flowing through them. The uplands are covered with ground moraine, and the valleys are filled with glacial outwash composed primarily of sand, silt, and gravel (Dames and Moore, 1972). The valleys are the remnants of a pre-glacial drainage system. Glacial melting flooded and filled the glacially-eroded valleys with outwash consisting of vast quantities of sand, gravel, silt, and clay (OKI, 1990) on top of the pre-glacial incised river valley. Ordovician bedrock in the area is composed of interbedded limestone and shale of the Richmond and Maysville groups (Dames and Moore, 1972), and does not generally provide enough water yield to supply municipal and large industrial needs.

Outwash deposits in the Little Miami and Muddy Creek Valleys are relatively coarse, well-sorted, fairly extensive, and able to sustain yields from 100 gpm to over 500 gpm. Surface-derived recharge is crucial in supplying water to the buried valley deposits, since the impermeable bedrock cannot contribute appreciable quantities of groundwater. Areas capable of sustaining such high yields typically have permeable soils and overlying streams from which induced recharge may be drawn (CEC, 1993). Thus, induced infiltration of surface water is the most significant source of water for the well fields that have been installed in the glacio-alluvial aquifers in the area.

Prior studies have developed an overall conceptual model of groundwater for the glacio-alluvial aquifer system in the area of interest. This conceptual understanding of regional-local hydrogeology consists of the following elements:

The bedrock formations yield unappreciable amounts of groundwater and are thus assumed to act as an impermeable formation. Although the bedrock can yield sufficient quantities of groundwater for private, residential supply wells and some larger installations, the bedrock's transmissivity and yield are considered too low to be incorporated in the model. Recharge of the glacio-alluvial, river-valley aquifer formations from the bedrock is also assumed to be negligible.

In the till/moraine areas, groundwater flow capacity is similarly very low in comparison to the transmissivity of the glacio-alluvial aquifers. As for the bedrock, the conceptual hydrogeologic model assumes that groundwater flow and discharge in the till/moraine areas is negligible. Precipitation runoff is assumed to flow into the streams and tributaries, without flowing through the groundwater system in any appreciable quantities.

The glacio-alluvial aquifers, in general, follow the LMR and its tributaries. These aquifers are typically relatively thin, laterally (i.e., perpendicular to the streams), but they extend almost uninterrupted along the longitudinal extent of the streams. At some locations, the aquifer is only along one side of the stream, with bedrock and till reaching the edge of the stream on the opposite bank. In most locations the aquifer materials are along both banks of the stream.

In the area where the Turtle Creek buried valley meets the larger buried valley of the Little Miami River, the aquifer units broaden out laterally, forming a large, productive aquifer area.

Recharge to the Buried Valley aquifers is estimated to range from about 4 to 12 inches per year (Dames and Moore, 1972, CH2MHill, 1995), with 10 to 12 inches per year the most likely long-term average (Dames and Moore, 1972, CH2MHill, 1995). This compares to average rainfall of about 40 inches per year. The remaining 28 to 30 inches per year represent losses to evapotranspiration and surface runoff.

The river and its tributaries are connected hydraulically to the glacio-alluvial aquifers that run along their valleys. Riverbed sediments and surficial clay-silt layers may impede the connection in some locations; however, in general, the hydraulic connection is very good to excellent. Also, the rivers and streams are generally not fully penetrating. That is, the bottoms of the rivers and tributaries are above the bedrock-aquifer contact. This allows groundwater to flow below the rivers and streams.

Under static, non-pumping conditions, the recharged precipitation-infiltration flows locally from point of infiltration to point of discharge. Initially, the infiltrated water flows predominantly parallel to the nearby stream, and then into the stream, through its riverbed sediment layer and also within seepage along the riverbanks. The contours of the aquifer water table run mostly perpendicular to the river, with some slight bending upstream, indicating discharge of groundwater into the river.

When pumping occurs in supply wells screened in the glacio-alluvial aquifers, locally recharged water is captured by the supply well, and more importantly, the pumping induces infiltration from the river. The percent of pumped water from induced infiltration represents a very high portion of the water pumped from the supply wells, exceeding 50%, and in some cases probably approaching 90% or more.

Under pumping conditions, groundwater from the same side of the river as the pumping wells is drawn into the wells, but in many cases, the pumping rate is high enough to draw groundwater from the other side of the river. The smaller and less penetrating the river or stream, the more likely it is that groundwater can and will flow beneath the surface water body from the opposite side.

Water table conditions predominate throughout the glacio-alluvial aquifers, however, in some cases, semi-confined to near confined conditions have been observed. This is believed to be the result of low permeability silt-clay layers that cause semi-confined to confining conditions. Therefore, storage coefficients from pumping tests have ranged as low as 0.01, or lower, but in the unconfined areas are typically 0.1 or higher.

1.2.2 East and Thompson Well Field Hydrogeology

The East and Thompson well fields are located within a high-yielding portion of the Little Miami Valley aquifer. Outwash deposits in these areas are relatively coarse, well-sorted, fairly extensive, and are able to sustain yields from 100 gpm to over 500 gpm. Surface-derived recharge from the LMR is crucial in supplying water to the Buried Valley deposit, since the impermeable bedrock cannot contribute appreciable quantities of groundwater.

Saturated aquifer thicknesses average approximately 50 feet under non-pumping conditions and aquifer permeability values are estimated to range from approximately 2,000 to 4,000 gpd/ft². Transmissivity values, estimated from production well specific capacity data, are estimated to range from 50,000 to 200,000 gpd/ft².

1.2.3 Sod Farm Well Field Hydrogeology

Groundwater at the Sod Farm well field occurs at a depth of approximately 15 feet below land surface and exists under unconfined conditions. The aquifer is comprised of approximately 40 to 50 feet of sand and gravel underlain by 40 to 50 feet of fine to course sand. Analysis of aquifer test results indicates an estimated average transmissivity of 209,000 gpd/ft and specific yield of 0.08. The average horizontal hydraulic conductivity is estimated at 257 ft/day with an average vertical hydraulic conductivity of 39 ft/day. Analysis of the well field conducted by Civil & Environmental Consultants, Inc. in January 1994 estimated the average well field yield with the installation of five vertical production wells to range from 5 to 7.5 million gallons per day.

1.2.4 Revis Well Field Hydrogeology

Groundwater at the Revis well field is observed approximately 12 feet below ground surface. The bedrock surface is variable at this site and is located at a depth of greater than 102 feet below the surface near the east-central portion of the island. The bedrock surface slopes upward to depths of 25 to 30 feet below ground surface near the western edge of the property near State Route 48. As a result of this variation, the aquifer thickness ranges from 15 feet to 75 feet (from west to east). Water-bearing hydrogeologic units at the Revis site are characterized by interbedded sand and sand and gravel layers, primarily in the central and eastern portions of the site. The saturated thickness of the aquifer, on the central and eastern portions of the site, range from 30 to 75 feet, and has an average saturated thickness of approximately 50 feet.

1.3 Land Use & Business Inventory

The area surrounding the well fields consist of a mix of land uses including residential, business, mineral extraction, industrial, and amusement park. This area is rapidly developing due to growth within Lebanon, Mason, South Lebanon, Deerfield Township and Hamilton Township. Over the past twenty years farmland within the Sod Farm and Revis well field's five year time-of-travel has developed into Lebanon's industrial business park and South Lebanon's retail business district. The zoning map in *Figure 1-2* shows approved land uses for areas within the source water protection area.

To better understand the existing land uses and to assist with the development of the potential contamination sources (PCS) inventory, the County mapped all non-residential parcels within the source water protection area and neighboring areas within the watershed. The parcel owner, address, and land use type for these non-residential properties were compiled into the business inventory list contained in *Table 1-1*. The location of these businesses and their proximity to the source water protection area is shown in *Figures 1-3 and 1-4*.

The inventory contains a variety of businesses and industries including:

- ❖ sand and gravel pits (active and closed, with extraction below water table),
- ❖ gas stations,
- ❖ car parts sales store, with used oil disposal tank,
- ❖ car repair, service, and sales,
- ❖ self-serve car wash,
- ❖ concrete batching plants,
- ❖ automobile parts fabrication and distribution,
- ❖ public sanitary sewer lines and a wastewater treatment plant,
- ❖ a public water treatment plant,
- ❖ private individual onsite sewage treatment and disposal systems,
- ❖ landscaping business equipment and materials storage,
- ❖ machine tool and metal fabrication shops,
- ❖ a self-serve laundromat,
- ❖ a township service equipment maintenance garage,
- ❖ contractor construction businesses with equipment storage & maintenance,
- ❖ large-scale regional commercial shopping center parking lots,
- ❖ a perfume manufacturer,
- ❖ a package delivery distribution center, and
- ❖ Superfund remediated contamination site.

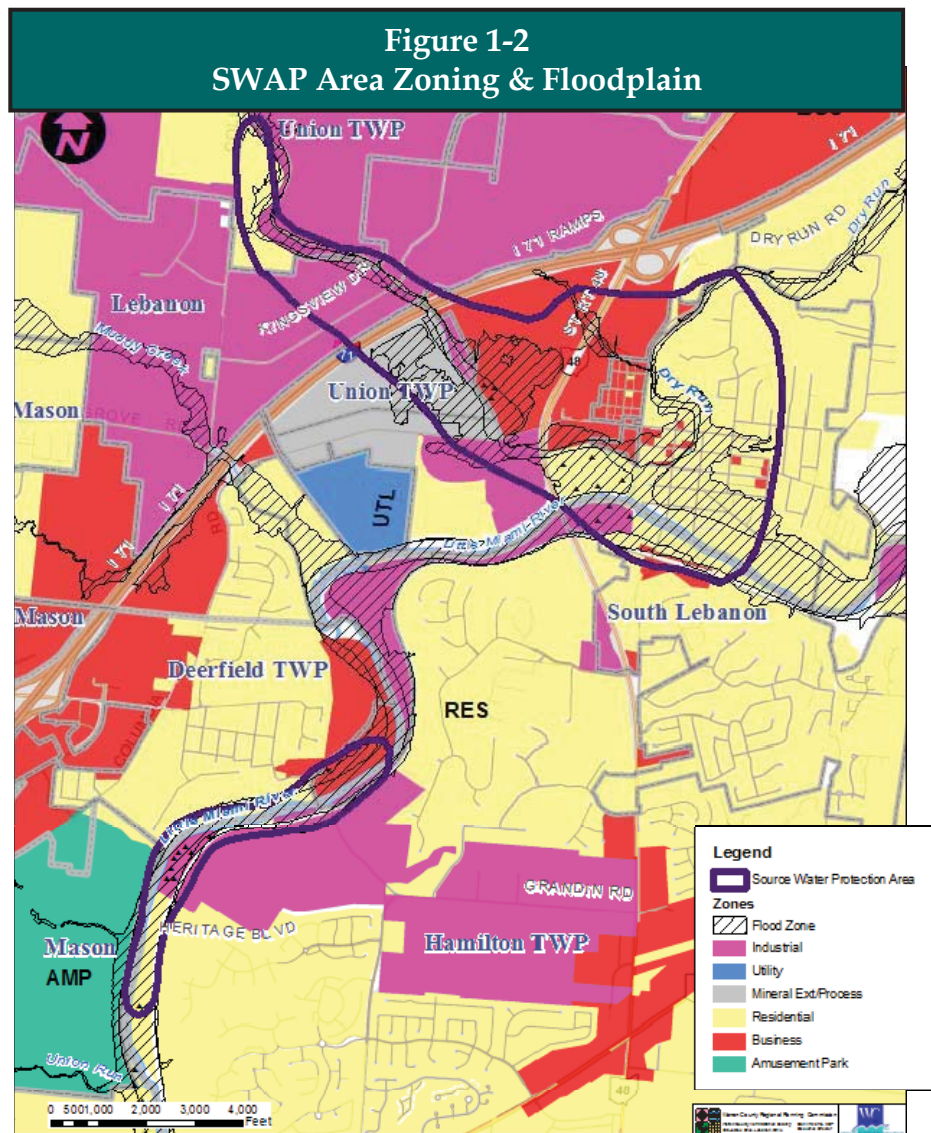


Table 1-1
Business Inventory

Inv #	Business	Location	Land Use	TOT
1	Duvall Auto Service (pka Fred's Sunoco)	4083 Lebanon Road	Commercial	1 Year
2	Barrett's Marathon	690 Mason-Morrow-Millgrove Rd.	Commercial	1 Year
3	South Lebanon Auto Parts	375 West Pike Street	Commercial	1 Year
4	Otis Bishop Excavation Site	Mason-Morrow-Millgrove Rd.	Excavation	1 Year
5	Oeder & Sons Garage, Inc	3980 Turtlecreek Road	Gravel Pits	1 Year
6	Finn & Son Machine Shop	213 South Main Street	Industrial	1 Year
7	John's Service Station	2015 Mary Ellen Street	Commercial	5 Year
8	Lowes Home Improvement Supplies	575 S.R. 48 South	Commercial	5 Year
9	Target Department Store	400 Corwin Nixon Blvd.	Commercial	5 Year
10	Kohls Department Store	500 Corwin Nixon Blvd.	Commercial	5 Year
11	Newman Backhoe Service Residence	3873 Lebanon Road	Commercial	5 Year
12	Harlow Auto Service Business	4033 Lebanon Road	Commercial	5 Year
13	Self-Serve Car Wash	205 North High St.	Commercial	5 Year
14	Barrett Concrete Plant 18	4000 Turtlecreek Road	Industrial	5 Year
15	Lens Crafters	1413 Grandin Road	Industrial	5 Year
16	Peters Cartridge Factory	1415 Grandin Road	Industrial	5 Year
17	Siemens Energy (now EPIC Technology)	1151 Mason-Morrow-Millgrove Rd.	Industrial	5 Year
18	R & I Industries (Vacant)	3650 Turtlecreek Road	Industrial	5 Year
19	Amtex	1500 Kingsview Drive	Industrial	5 Year
20	JIT Packaging	1550 Kingsview Drive	Industrial	5 Year
21	Brickman Products	1600 Kingsview Drive	Industrial	5 Year
22	Advics Manufacturing - Ohio	1650 Kingsview Drive	Industrial	5 Year
23	Former Lucas-Sumitomo Brakes	1650 Kingsview Drive	Industrial	Out
24	Mag Tech Magnet Technology	1599 Kingsview Drive	Industrial	5 Year
25	Addison - McKee	1637 Kingsview Drive	Industrial	Out
26	Union Twp Maintenance Garage	10 North High Street	Public	5 Year
27	Speedway 1224	2423 Kings Mills Road	Commercial	Out
28	Charles H. Hamilton Excavating	5875 S.R. 48 South	Commercial	Out
29	Otis Bishop Oil Distributor	6049 S.R. 48 South	Commercial	Out
30	GRCD LLC	558 Grandin Road	Commercial	Out
31	Ghent Manufacturing	2999 Henkle Drive	Industrial	Out
32	Cyrus One (pka Fujitech)	401 Fujitech Drive	Industrial	Out
33	World Color (pka Johnson & Hardin)	760 Fujitech Drive	Industrial	Out
34	Ernst Concrete Plant	4344 Columbia Road	Industrial	Out
35	OTC -Sumitomo Silix Silicon	537 Grandin Road	Industrial	Out

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Inv #	Business	Location	Land Use	TOT
36	Fabacraft Co. Inc.	201 Grandin Road	Industrial	Out
37	Diversified Products, Inc.	6451 Striker Road	Industrial	Out
38	Tipton Deburring & Mass Finishing	1967 Kingsview Drive	Industrial	Out
39	JBM Envelope Company	2850 Henkle Drive	Industrial	Out
40	NIBCO	2800 Henkle Drive	Industrial	Out
41	E-Beam Services, Inc.	2775 Henkle Drive	Industrial	Out
42	OPW Engineering Systems	2726 Henkle Drive	Industrial	Out
43	Plasti-Fab EPS Product Solutions	2725 Henkle Drive	Industrial	Out
44	Flint Group	2675 Henkle Drive	Industrial	Out
45	J & N Distribution Design	2700 Henkle Drive	Industrial	Out
46	Collins Ink (Vacant)	2650 Henkle Drive	Industrial	Out
47	Tomak Precision	2600 Henkle Drive	Industrial	Out
48	Ryan & Vis-Tech	1087 Mane Way	Industrial	Out
49	VMF Mane	1093 Mane Way	Industrial	Out
50	Equipment Manufacturing	1000 Kingsview Drive	Industrial	Out
51	PAX Corrugated Products	1899 Kingsview Drive	Industrial	Out
52	CT Chemicals Inc	4110 Columbia Road	Industrial	Out
53	Ernst Ready-Mix	4250 Columbia Road	Industrial	Out
54	Star Pack	3625 Columbia Road	Industrial	Out
55	(A&B)JC Contracting(C)Conoco Cabinets	2020 (A-F)McKinley	Industrial	Out
56	Doran Enterprises - Racing	2050 McKinley Blvd	Industrial	Out
57	Franklin Brazing	2025 McKinley Blvd	Industrial	Out
58	Gad-Jets, Inc	3800 Taft Drive	Industrial	Out
59	Quantum Metals-Innovative Scrap Use	3675 Taft Drive	Industrial	Out
60	Vista Grant Industrial Park	3525 (A-E) Grant Drive	Industrial	Out
61	Fecon - QC	3460 Grant Drive	Industrial	Out
62	Kings Mills U.S. Army Reserve	6195 Striker Road	Institutional	Out
63	Henkle-Schueler/Bunnell Hill Dev	3000 Henkle Drive	Office/WH	Out
64	Fed-Ex Distribution Center	2187 Homan Road	Office/WH	Out
65	Mane Perfume Manufacturing Office	Henkle Drive	Office/WH	Out
66	Siemens Industrial Warehouse	4170 Columbia Road	Office/WH	Out
67	Unknown Industry	2034 McKinley Blvd	Industrial	Out
68	Unknown Industry	2550 Henkle Drive	Industrial	Out
69	Unknown Industry	3425 Grant Drive	Industrial	Out
70	Unknown	3550 Grant Drive	Industrial	Out
71	Unknown	3465 Columbia Road	Industrial	Out

Figure 1 -3
North Area Business Uses

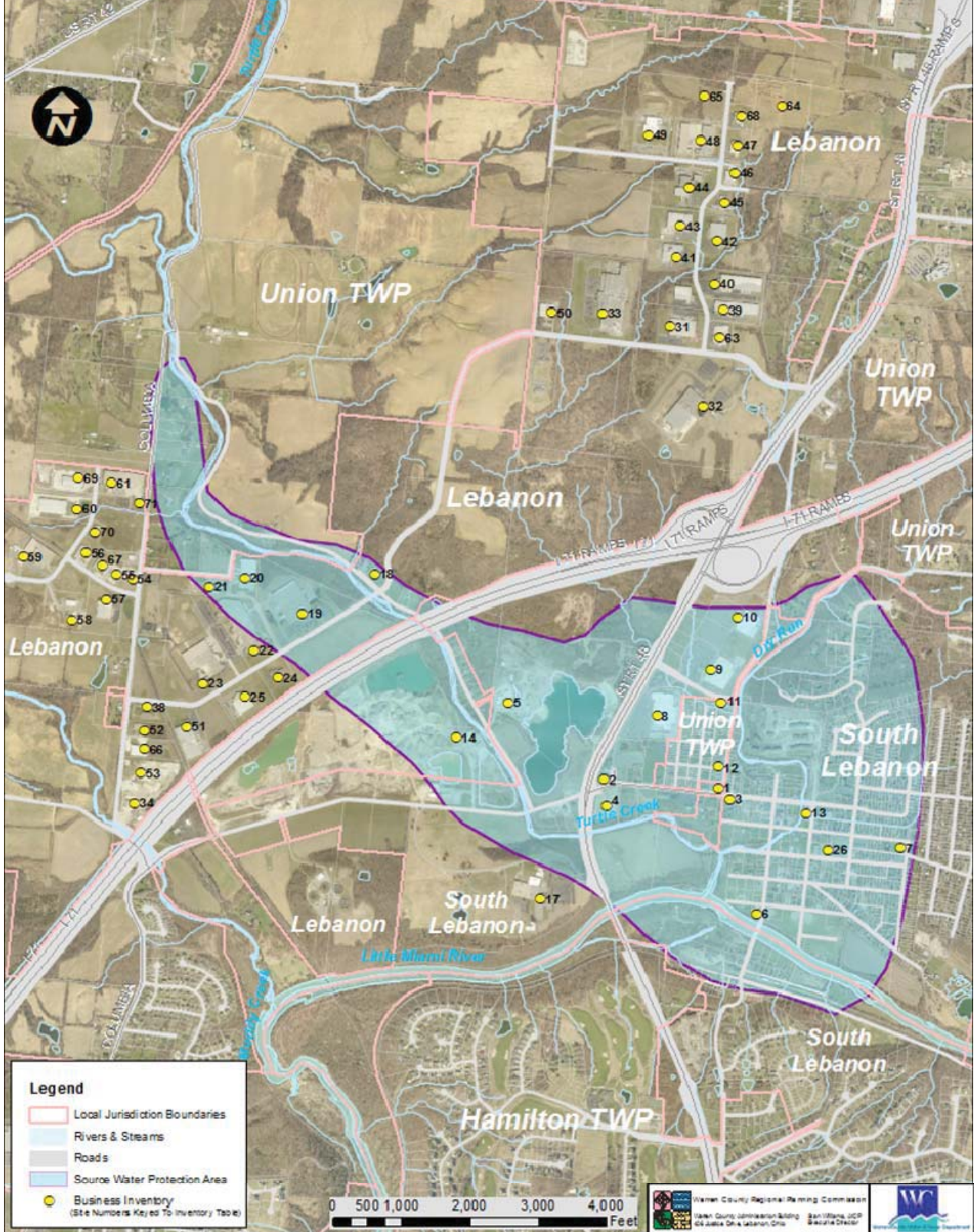
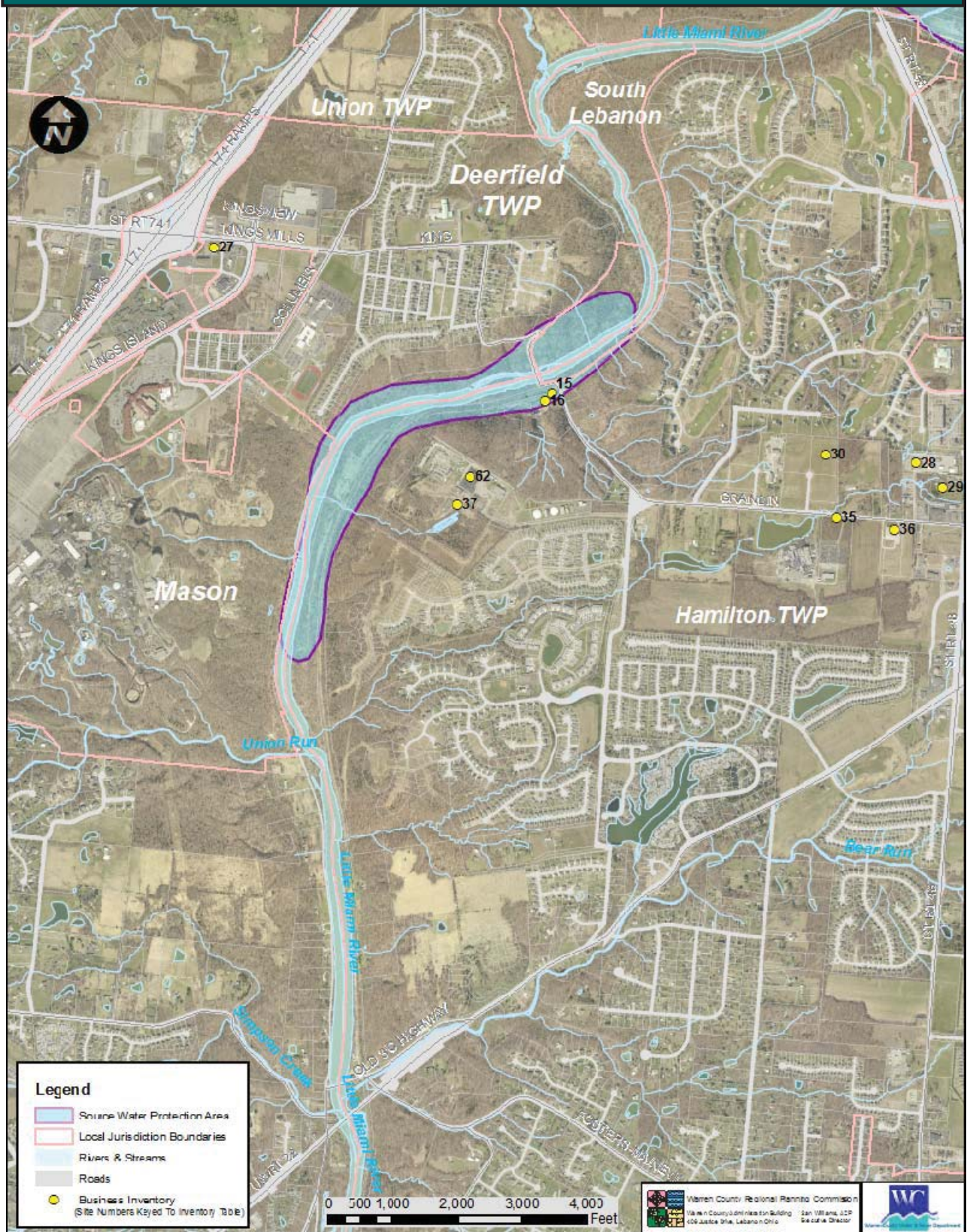


Figure 1 -4
South Area Business Uses



1.4 Potential Contaminant Sources

The following sections describe how the County used the business inventory to develop the list of potential contaminate sources and their respective threat level. It also contains the list of prioritized PCS sites and information on various PCS groups.

1.4.1 Identifying Potential Contaminant Sources

Using information collected and gathered from windshield surveys, zoning and land use maps, internet searches, regulatory reports, and hydrogeological/topographic maps, the County evaluated the parcels listed in the business inventory to determine if they are a potential contaminate source. This evaluation resulted in the following:

- Parcels located along Grandin Road and State Route 48 (Site No. 28-30, 35, &36) were not included in the PCS list since they are located in the upland area above the aquifer and their watershed flows to the aquifer downstream of the well fields.
- Parcels located in the Kings Mills Area (including Site No. 27) were not included in the PCS list since they are located in an upland area above the aquifer and that the majority of their watershed flows to the aquifer downstream of the East Well Field.
- Parcels located in Lebanon's Fujitech & Henkel Drive Industrial Park were not included in the PCS list since they are located in an area significantly far from the 5-year TOT zone and at an upland location above the Sod and Revis Well Field aquifers.
- Remediation work was completed at Site No. 15 (Lens Crafters) and therefore not included in the PCS list.
- The undeveloped vacant parcel at Site No. 29 (Otis Bishop Property) was not included in the PCS list.
- All parcels in Lebanon's Kingsview Industrial Business Park are included in the PCS inventory due to the predominate nature of the businesses (automotive & light manufacturing) and their location in or near the Revis and Sod Farm Well Field 5-year TOT zone.

1.4.2 Ranking Potential Contaminant Sources

Several factors were taken into account when assessing the relative risks posed by the potential contaminant sources. The County specifically considered the location within the aquifer, land use, type of business, known or anticipated quantities of stored chemicals, previous unpermitted discharges or spills, distance to the well fields, and groundwater flow direction. In the absence of site visits and inspections the information gathered for each PCS was not complete for all factors. Nevertheless, the approach utilized allowed for an initial ranking of potential contamination sources on the basis of relative risk. The PCS ranking is contained in *Table 1-2* and located on maps contained in *Figures 1-5 and 1-6*.

The County recognizes that this preliminary ranking serves as a starting point for the collection of additional data that will help refine the risk assessment of each PCS. In the

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short-term, this approach is considered adequate; nevertheless, there is value for a more detailed and site specific risk assessment. Developing a comprehensive understanding—further data gathering and interview efforts—for all potential contamination sources is identified as an objective in Chapter 6 Plan Implementation.

In the long-term, each PCS impact will be updated; reprioritized; and risk levels reassigned. The WCWSD will also arrange site visits to the initial high and medium-risk PCS sites together with representatives from Warren County’s Emergency Management Agency. The intent is to initially focus on high and medium risk facilities and develop a more comprehensive understanding of these sites allowing the County to more accurately quantify the level of threat that a given source poses (high, medium, or low).

**Table 1-2
Prioritized Potential Contaminant Sources**

Site Number	Name and Location	Risk Level	Miles to Well Field	T.O.T. Zone	Zoning
High Risk Level					
1	Duvall’s Auto Service (pka Gonzo’sAuto Service) 4083 Lebanon Rd.	1-6,000 gal LUST (closed) 3-3,000 gal LUST (closed)	0.24	1 year	Business
2	Barrett’s Marathon - 690 W. Mason Rd.	3-8,000 gal UST (gas) 1-500 gal UST (used oil)	0.23	1 year	Business
17	EPIC Technologies (previously Siemens Energy)- 1151 W. Mason Morrow Rd	(TRIS/RCRIS site) Large Potential Generator - Unknown Compliance Status	0.35	Outside 5 year	Industrial
37	Diversified Products (AKA Thames River Ltd) - 6451 Striker Road	(RCRIS-TSD, FINDS & SHWS site) Vacant Industrial Site	0.35	Outside 5 year	Industrial
Medium Risk Level					
18-25, 34,38, 51-61, 66 67,69-71	Columbia Road & Kingsview Drive Industrial Area - City of Lebanon	Small, Moderate & Large Potential Generators	0.99 to 1.77	In & Outside 5 year	Industrial
7	Johns Service-201 S. Mary Ellen St.	1-3,000 gal UST (gas) 1-2,000 gal UST (gas) 2-560 gal AST (used oil, kerosene) 4-Removed LUSTs	0.59	5 year	Business
5	Oeder & Sons-4000 & 3980 Turtle Creek Rd	1-60-70 foot deep gravel pit (closed) 1-30 foot deep gravel pit (closed) 1-25 foot deep gravel pit (no activity) 1-40-50 foot deep gravel pit (active)	0.56	1 to 5 year	Industrial
14	Barrett Paving Materials - 4000 Turtle Creek Rd.	Possible AST (used oil)	0.56	1 year	Industrial

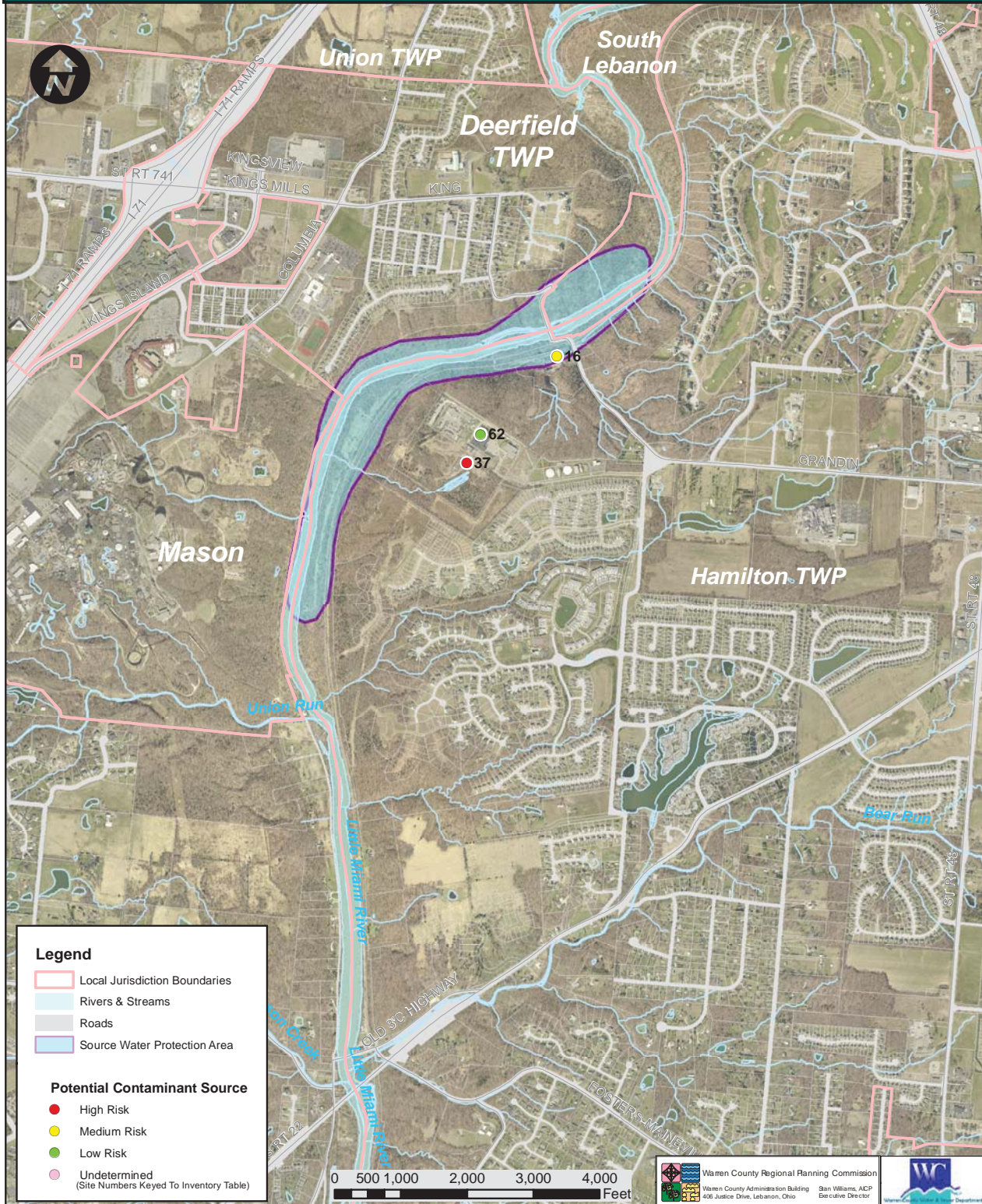
Warren County Source Water Assessment & Protection Plan

Richard A. Renneker Water System

Site Number	Name and Location	Risk Level	Miles to Well Field	T.O.T. Zone	Zoning
16	Peters Cartridge Factory -- 1915 Grandin Rd.	(SHWS & CERCLIS site) (No Longer Operating & Being Remediated)	0.48	5 year	Business
<u>Low Risk Level</u>					
3	South Lebanon Auto Parts- 375 West Pike Street	Petrochemicals Sales & Waste Oil Disposal Storage, Paints, Acids	0.65	1 year	Business
8-10	River's Crossing Shopping Center- S. Lebanon	Petrochemical Products Sales Paint, Adhesives, Glues, Acids	0.31 to 0.66	5 year	Business
11	Newman Backhoe Service Residence -3873 Lebanon Road	Petrochemicals Use & Waste Oil Disposal Storage, Antifreeze	0.49	5 year	Business
12	Harlow Auto Service Business - 4033 Lebanon Road	Petrochemicals Use & Waste Oils Disposal Storage	0.36	5 year	Business
13	Self-Serve Car Wash - 205 North High St.	Car Cleaning & Finishing Products and Washing Wastewater	0.54	5 year	Business
26	Union Twp Maintenance Garage-10 North High Street	Petrochemicals Use & Disposal Storage, Acids, Antifreeze	0.63	5 year	Residential
62	Kings Mills Military Reserve - 6195 Striker Rd.	(RCRIS site) Detectable TCE Concentrations 1-6,000 gal UST (gas) 1-6,000 gal UST (diesel) 1-1,200 gal UST (heating oil)	0.35	Outside 5 year	Industrial
<u>Undetermined Risk Level</u>					
6	Finn & Son Machine Shop-213 South Main Street	Metal Cutting Oil & Cleaning Solvents	0.22	1 year	Residential

- UST Underground Storage Tank File
- LUST Leaking Underground Storage Tank Incident Report
- SHWS State Hazardous Waste Sites Master List
- RCRIS Resource Conservation and Recovery Information System
- TSD Technical Support Document for Water Quality-based Toxics Control
- TCE Trichloroethylene
- TRIS Toxic Chemicals Release Inventory System
- CERCLIS Comprehensive Environmental Response Compensation
and Liability Information System
- FINDS Facility Index System
- AST Aboveground Storage Tank

Figure 1 - 6
South Area Potential Contaminate Sources



1.4.3 Potential Contaminant Source Description

The following section contains information on the high and medium risk PCS sites and the rationale for their ranking.

HIGH RISK SITES

Site #1 Duvall's Auto Service (pka Gonzo's Auto Service)

Duvall's Auto Service is located in the Village of South Lebanon, at the northern edge of the 1 year TOT of the Sod Farm and Revis Well Fields. It is currently an active business that was formerly Gonzo's Auto Service and before that Fred's Sunoco. The site is no longer a gas station and no gas pumps or islands are present. However, the site was listed as having four (4) closed Leaking Underground Storage Tanks (LUSTs), one 6,000 gallon tank and three 3,000 gallon tanks. Therefore, the site is considered a high risk until it can be confirmed whether the tanks have been removed.

Site #2 Barrett's Marathon

The site is a fuel service and auto repair station located at the northeastern corner of the S.R. 48 and Mason-Morrow-Millgrove Road intersection, which is 0.23 miles from the Sod Farm well field and in the 1 year TOT of the well field. The station's four underground storage tanks currently in use are not listed as having any leaks, but the closeness of such use to the well field warrants maintaining observation of the site as a high risk.

Site #17 EPIC Technologies (previously Seimens Energy)

The site is located outside of the 5 year TOT of the Sod Farm and Revis wells. EPIC Technologies is no longer in operation at the site. Prior to their occupancy, the site was used for the Seimens Energy and Automation and earlier by Cincinnati Milacron Manufacturing. The site has been listed in the TRIS and RCRIS inventories and has been used by industries that were categorized as large potential generators of possible contaminants. As such, the site is labeled a high risk due to the unknown compliance status and the closeness of the site to the well fields.

Site #37 Diversified Products (Thames River Ltd.)

This location is a vacant 40 acre industrial site that was initially developed in the 1940s. This site poses minimal health risks due to the bedrock and clay layers in the upland terrace that prevent contaminate migration into the valley aquifer. This location is ranked as a high risk due to the long industrial use, history of chemical contamination, and location up-gradient and in close proximity of the East Well Field. The following is a brief history of the site.

The Diversified Products site was initially developed as part of the Kings Mills Military Reserve (KMMR). KMMR was established in 1942, on a 110-acre reservation, and was used for the production of small caliber ammunition. In 1959 the Department of the Army began to sell portions of the reservation to private individuals. The United States Army retained a portion of the site for storage, vehicle maintenance, and the establishment of a United States Army Reserve Center.

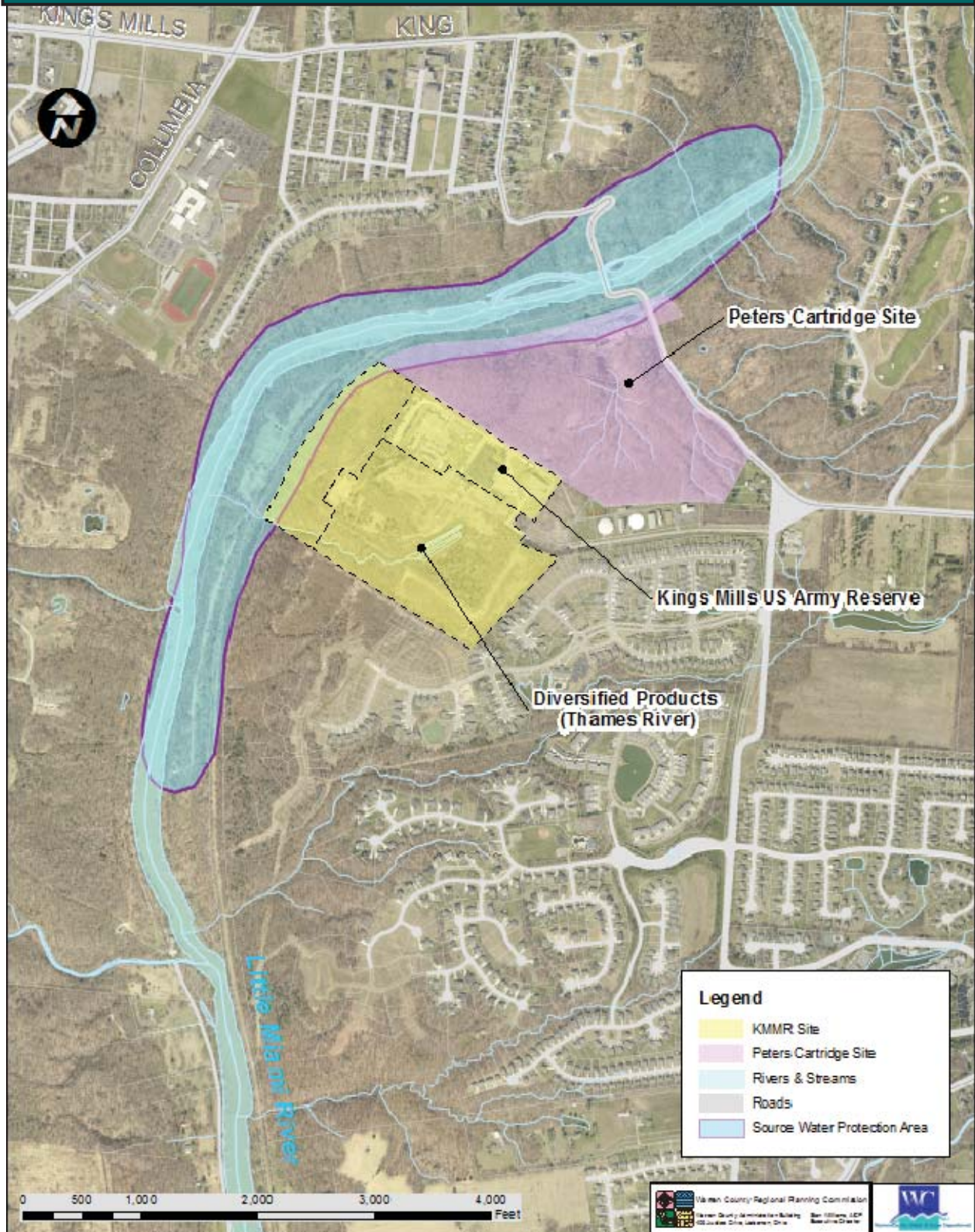
Diversified Products, Inc. owned 40 acres of the former ordinance plant and operated a steel fabricating and painting business at the location starting in 1974. The Company filed for bankruptcy in 1997 and the property was sold to the current owner, Thames River, LTD. Thames River, LTD currently leases buildings on the property for storage space.

In 1981, the Ohio EPA discovered soil contamination on the Diversified Products, Inc property during a routine field inspection. The company admitted burying several hundred drums of paint waste at the site. During subsequent OEPA investigations, a drum burial area was identified. The drum burial area was located approximately 800 feet from the County's East well field, at a location on the edge of an upland terrace 300 feet above the river valley. The site is located outside of the 5-year time of travel delineation. Samples collected from the KMMR monitoring wells installed by the County in 1988 tested positive for volatile organic compounds, total organic halogens, and metals.

In June 2006, USEPA conducted a site investigation at the drum burial site. Partially buried drums were identified at numerous locations in and around a 3-acre area directly upgrade to the County's KMMR monitoring wells. Drums were noted to be in varying stages of deterioration, some with waste contents. USEPA conducted test trenching and sampling during which they encountered approximately 80 subsurface and partially buried drums, several of which had spilled contents. Wastes encountered included paint waste and solvents. Test sampling verified the presence of elevated levels of chromium, lead, toluene, xylene, trichloroethylene (TCE) and ignitable (low flash point) paint waste.

USEPA performed removal actions from October 2006 through February 2007. A total of 1,405 subsurface drums containing waste paint and solvents were removed for off-site disposal. The drums and contaminated soils were loaded into 114 roll-off boxes and transported to an off-site hazardous waste landfill for disposal. Drum removal activities were completed on February 9, 2007.

Figure 1 - 7
KMMR, Diversified Product, & Peters Cartridge Sites



MEDIUM RISK SITES

Sites 18, 25,34,38,51-58,60,61-66,67,&69-71 Columbia Road & Kingsview Drive Industrial Area

This area is partly within the 5 year TOT of the Sod Farm and Revis well fields, though most are outside of it to the west. The sites listed are for a variety of commercial and light industrial uses, and other sites in the area have yet to be occupied for undetermined uses. Existing uses include: auto parts manufacturing and assembly; auto specialty fabrication; scrap metals reuse research; machine tool shops; and construction contractor shops. They use various types of petroleum based solvents, chemicals, and paints, and lubricants and are categorized as small, medium, and large potential generators of contaminants. Therefore, they are listed as a medium risk, even though there no reports of contaminant spills or dumping.

Site #7 John's Service

The site is an auto repair and gas station located at 201 South Mary Ellen Street in South Lebanon that is at the eastern edge of the 5 year TOT of the Sod Farm and Revis well fields. Four LUSTs were removed from the site. Two new gasoline USTs (1- 2,000 gallons and 1-3,000 gallons) have been installed in compliance with monitoring requirements. There are also two 560 gallon above-ground storage tanks (ATS), with one for kerosene and the other for diesel fuel. As such, the site is considered a medium risk.

Site #5 Oeder & Sons (Gravel Pits)

The site is located between Turtlecreek Road, Mason-Morrow-Millgrove Road, I-71 and S.R. 48 in the 1 to 5 year TOT of the Sod Farm and Revis well fields. In 1993, the site had four (4) gravel pits, which were all excavated to depths below the water table. At that time, two of the pits had been closed and filled; one was inactive, but may be reactivated; and the one that was active was anticipated to reach a final depth of 70 to 80 feet. As of 2015, there are four gravel pit lakes of unknown status on the site. There are no reports of any contaminant spills or dumping having occurred at the pits, but the closeness of such use being open to the aquifer water that supplies the well fields warrants maintaining observation of the site as a medium risk and implementing precautionary measures to prevent any contamination from occurring.

Site #14 Barrett Paving Materials

The site is a producer of construction aggregates used in building roads, bridges, and foundations. It is not known if an AST for used oil is still in use on the site. As such, the site is considered a medium risk.

Site #16 Peters Cartridge Factory

The Peters Cartridge site is a partially abandoned manufacturing facility located at 1415 Grandin Road, Kings Mills, Ohio. The site has 71 acres which includes about 15 acres located along the south valley wall of the Little Miami River and 56 acres of wooded steeply sloping hills and ridges.

Peters Cartridge Co. began production in 1887. From 1887 to 1934, the facility produced ordnance and shot shell ammunition. In 1934, the Remington Arms Co. purchased Peters

Cartridge and continued production at the facility until 1944 when operations were stopped. The DuPont Co. purchased the 15 acres along the river valley from the Remington Arms Co. Portions of this property are currently in use by commercial and industrial businesses. EPA conducted investigations of the site and identified soils and sediment contaminated with lead, mercury, copper, antimony, arsenic, benzo (a) pyrene, and naphthalene. EPA considers DuPont to be legally responsible for the pollution investigations and cleanup activities at the site.

At Peter's Cartridge, the remediation plan requires elevated levels of lead to be excavated and placed in an onsite containment cell. The containment cell will be in the upland area of the site. This area was chosen because the abundance of clay, shallow bedrock (12-14ft) and lack of substantial groundwater in the area. Monitoring wells will be placed up gradient and down gradient of the containment cell. Additionally, monitoring wells are already in place along the Little Miami in the lowland area of the property. Currently, there is no indication the on-site lead contamination is migrating to groundwater and USEPA does not expect the remedial design to have an impact on groundwater at the site.

USEPA began the remedial design and remedial action (RD/RA) negotiation process with the DuPont Co. in 2010. The negotiations ended in October 2011 without a signed consent decree between EPA and the DuPont Co.

Using an order known as a Unilateral Administrative Order (UAO), EPA can require potentially responsible parties to perform cleanup work. The UAO for the remedial design and remedial action was issued on March 30, 2012. The DuPont Co., who EPA considers responsible for the cleanup activities, started the design process on April 29, 2012. Remediation of the site will be completed in 2015.

Based on URS Corporation's 2004 Remedial Investigation of the Peter's Cartridge Facility, the groundwater impacts at this site are minimal due to the nature of the contamination. Due to the low solubility of copper, lead, and mercury, groundwater impacts are unlikely. Because of the low solubility of these compounds and the distance to the County's production wells (located approximately 0.3 miles downstream), the potential for impacts to drinking water is considered low.

The County ranks this site as a Moderate Risk due to the property's long history of industrial activity and its location within the 5-year time of travel zone of the East well field. The Peters Cartridge sites pose a low health risk due to the type and concentration of contaminants at the site.

1.4.4 Other Potential Contaminant Sources

The following section contains information on additional potential pollution sources that should be considered.

Golf Course Operations

The River's Bend Tournament Player's Club 18-hole golf course is located downstream of the Revis and Sod Farm Well Fields and approximately 1-mile upstream of the East Well Field. The golf course is located in the upland area approximately 200 feet in elevation above the river channel. Storm water runoff from the course flows to the Little Miami River

through numerous unnamed tributaries. This golf course poses minimal groundwater contamination risk because of its distance and location from the well fields. Precautionary measures are recommended to minimize contamination from fertilizers, herbicides, pesticides, and fuel.

Residential Use

Residential neighborhoods exist in many of the areas surrounding the well fields. Stormwater runoff from these residential areas may contain household chemicals, lawn fertilizers, and herbicides. Control strategies for residential developments should include public education and public participation on pollution prevention.

Road and Rail Vehicles

There are 19.1 miles of roadways in the SWAP area, of which nearly all are in the TOT zones of the northern wells. Pollutants from large parking and loading areas of the shopping centers, gravel pit operations, commercial/industrial uses, as well as snow and ice removal chemicals could contaminate the groundwater or stormwater.

Interstate 71, State Route 48, and numerous other roads traverse the SWAP area. There is also an active spur line of the Penn Central Railroad that is up-gradient at the western edge of the northern 5 year groundwater TOT zone.

Septic Systems

Most residential developments within the aquifer area are served by public sewer. The following is a list of developments (governmental and residential) that have individual onsite septic systems that could be a source of groundwater contamination .

1. **Highland Park Subdivision** is an older, densely developed area of mostly single-family residential uses on septic systems that is in the TOT zones of the Sod Farm and Revis wells. No failures or violations have been reported to the Health Department.
2. **Properties along Lebanon Road and Dry Run Road** located in the 5 year TOT zone of the Sod Farm and Revis wells are a potential groundwater contamination concern due to the adequacy of septic systems, of particular concern is the Countryside Motel that has intensified its use.
3. **Grandin Ridge Subdivision** is a single-family residential community served by septic systems. The development is located approximately one-half mile up-gradient and outside of the TOT zones of the East and Thompson well fields. This subdivision is not considered a major threat to groundwater quality because of its low density (lots greater than one acre) and distance from the well fields. However, this depends on proper use and maintenance of the septic systems.
4. **Kings Mills U.S. Army Reserve** is of concern because of its location, up-gradient of the southern well fields. There are no reports or evidence of septic system failure at this location; however, it would be best served by connecting to the sanitary sewer system.

Sewage Waste Water Treatment Plant

The sewage waste water treatment plant (WWTP) for the City of Lebanon and Village of South Lebanon is located south of Mason-Morrow-Millgrove Road and north of the Little Miami River. The discharge point is approximately 4,250 feet downstream of the Sod Farm and Revis well fields; 10,000 feet upstream of the nearest well in the East Well field and; approximately 8,635 feet upstream from the 1 year TOT zone. Thus, discharge is only a concern to the southern well fields.

The effluent discharged from the Lebanon/South Lebanon WWTP is maintained in compliance with OEPA operating requirements. The WWTP average daily flow ranges between 3 to 6 mgd and has a 12 mgd peak flow capacity. This permitted discharge is considered a low contamination risk.

1.5 Protection Strategies for PCS Risk Reduction

The strategies for protecting the SWAP area groundwater supply are to reduce the risk of contamination from potential pollution sources. The protection strategies include:

- ❖ **Public Education & Awareness:** Implementing a program to educate and increase public awareness on: (1) the importance of maintaining the supply source of their drinking water; (2) the protection measures that their local government and other agencies are doing to safeguard the quantity and quality of the water source; and (3) their role and responsibilities to be successful in realizing that objective. This education campaign is aimed at all owners and occupants of the different land uses on properties that drain toward the SWAP area.
- ❖ **PCS Personnel Education & Awareness:** Meeting with representatives of commercial, industrial, research-tech, and local government uses that are of groundwater quality protection concern. The objective is: (1) to make them aware of: their location in relation to the well fields; (2) the importance of them facilitating and operating their uses in a manner that will prevent or minimize the possibility of surface or ground water contamination; (3) to let them know what to do in the event of a pollutant spilling incident, and (4) for the Warren County Water Department to gain a better understanding of the facility and operations at each PCS site.
- ❖ **Contamination Site Remediation:** When contaminated properties are identified, Warren County will work with the owners and Ohio EPA to monitor and remediate the properties so that they are no longer a threat to groundwater quality.
- ❖ **Spill Emergency Response:** Strengthening emergency and contingency responses by meeting with all emergency service providers in the SWAP area to communicate the plan for responding to different potential emergency incidents and the protocol for coordinating the various emergency service providers to be successful in response specific to each different incident.
- ❖ **Zoning Protection Provisions:** Working with the local jurisdictions in the SWAP area that do not have groundwater protection overlay provisions in their zoning regulations to adopt the same or similar provisions that Warren County Zoning

provides in the Turtlecreek Township and Union Township portion of the SWAP area.

- ❖ **Planning Protection Provisions:** Working with local jurisdictions in the SWAP area to include aquifer and well field TOT protection provisions in the future land use element of their comprehensive plans, and to likewise implement in their respective zoning, subdivision, and development regulations, and stormwater drainage management plans.
- ❖ **Septic Systems Maintenance & Elimination:** Working with the Warren County Combined Health District to ensure that septic systems are properly sited and installed and properly used and maintained by those who use them. Also, working with the Village of South Lebanon to extend its central sanitary sewer system in order to eliminate onsite wastewater disposal system use on individual properties as a potential source of groundwater contamination.
- ❖ **Groundwater Monitoring:** Increasing and regularly monitoring groundwater quality at and near known or potential contamination sources located in or up gradient near the TOT zones where surface and/or ground water flows toward the well fields.

Details of these strategies are described in the subsequent sections.

1.6 Protective Strategies Evaluation

The results from groundwater monitoring will be used to evaluate the effectiveness of the groundwater protection strategies. Review of pollution incident report records, windshield inspections, and site visits of the uses identified in the PCS inventory will also continue on a regular basis.

Section 2 – Education and Outreach

The overall success of protective strategies depends upon the cooperation of Warren County residents living and working in the Little Miami River (LMR) aquifer protection area. Citizens in the aquifer area need to understand that their actions can affect the quality of their drinking water. They also need to understand how they can change their actions to prevent contamination from occurring. Public education and outreach is the key to ensuring this awareness and therefore it is a significant component of this protection plan. The County's education and outreach protective strategy includes updating and utilizing a list of local resources and contacts, maintaining an active role in the Southwest Ohio Groundwater Committee, providing educational materials and instruction to school age children, and providing educational materials to residents at major community events.

2.1 Drinking Water Source Protection Local Resources

To successfully protect its source water, Warren County must utilize local resources on a continual basis. Many of these resources will be called upon during times of emergency response while others will be utilized on a daily basis to implement sound operating procedures. **Table 2-1**, on the following page, includes a list of contact information for local and state agencies.

2.2 Local Resource Input & Collaboration

The County will submit the draft plan for review, feedback, and endorsement to local government agencies including Hamilton Township, Deerfield Township, the Village of Maineville, the Village of South Lebanon, the Warren County Board of Commissioners, and the Warren County Emergency Management Agency. Feedback from these agencies will be incorporated into the final plan.

The County will seek input from a variety of local and state resources as issues occur and the input and feedback from these resources will be periodically incorporated into this plan.

2.3 OKI Groundwater Committee

Warren County is an active member of the OKI Regional Council of Government's Groundwater Committee. The committee works to coordinate groundwater management for the southwest Ohio aquifer system that supplies two-thirds of a million people with drinking water. The committee meets quarterly and is composed of individuals from public and private water suppliers, businesses, industries, and local governments. The committee provides a forum where emerging issues relevant to water quality and quantity, such as the disposal of pharmaceutical and personal care products, can be discussed as well as state and federal regulations and legislation, and the impacts of pumping trends and drought conditions.

Agency	Contact Person	Contact Number
Richard A Renneker Water Plant	Jeff Garland, Chief Operator	(513) 683-3687
Warren County Water & Sewer	John Ware, Water Superintendent	(513) 683-3687
Warren County Water & Sewer	Chris Brausch, Sanitary Eng.	(513) 695-1193
Warren County Commissioners	Dave Gully, Administrator	(513) 695-1255
City of Lebanon	Pat Clements, City Mgr	(513) 228-3101
City of Mason	Kurt Seiler, City Engineer	(513) 229-8520 ext 2003
Combined Heath District	Duane Stansbury	(513) 695-1566
County Emergency Management	Mike Bunner	(513) 695-1313
Cox News	Main Office	1-888-802-6964
Deerfield Township	Bill Becker, Administrator	(513) 701-6973
Environmental Education Services	Suzanne Geisler	(937) 750-3430
Hamilton Township	Gary Boeres, Administrator	(513) 683-8520
Hamilton Twp Fire Department	Main Office	(614) 491-1041
Oeder and Sons	Main Office	(513) 494-1238
Ohio EPA - Groundwater	John McDaniels	(937) 285-6117
OKI Regional Council of Government	Jane Wittke	(513) 619-7693
Regional Planning Commission	Stan Williams	(513) 695-1738
Village of Maineville	William Shearer, Mayor	(513) 683-3142
Village of South Lebanon	Jerry Haddix	(513) 494-2296
Warren County Soil and Water	Jeff Thomas	(513) 695-1337
Warren County Solid Waste	Susanne Mason	(513) 695-1209

Table 2-1

Local and State Agency Contact Information

2.4 Public Education & Outreach Goals

One of the best ways to reduce the potential contamination risk to the County’s well fields is to educate the public. The County’s public education program is focused primarily on school age children and includes classroom education. The County’s educational program also provides outreach to local residents through informational booths at major community events and through the Warren County Solid Waste Department’s website that provides instructions regarding household hazardous waste disposal.

2.4.1 Classroom Education

From 2005 to 2013, Warren County has contracted with a private company, Environmental Education Services, Inc., to provide educational programs to school children in the Little Miami, Kings, and St. Susanna school districts. The service is provided free to the school systems with water quality, environmental, and natural resource lessons aligned with the Ohio Department of Education’s revised academic content standards. Lessons are offered from pre-kindergarten through 8th grade and last between 25 to 50 minutes. During the 2011 school year, the County provided 146 presentations to 3,650 students. The County tracks and records the number of classroom presentations conducted each year. A summary of the 2011 Classroom Education program is included in **Table 2-2**. The County plans on continuing to grant annual contracts with Environmental Education Services for educational services.

During the 2011 school year, the Warren County Soil and Water Conservation District also provided similar educational services to students in the Lebanon School District.

*Table 2-2
2011 Classroom
Education*

Grade	Presentations	Students
K	1	25
1	33	825
2	9	225
3	35	875
4	10	250
5	32	800
6	13	325
7	12	300
8	1	25

2.4.2 Information Booths at Community Events

The County will provide informational displays at community festivals and events to the extent that their annual budget allows. At these events, the County provides materials that inform residents and visitors of the importance of protecting the County’s drinking water supply. Display materials typically include information on best management practices, proper disposal of household hazardous wastes, and coloring books and activity sheets that focus on water quality. The County, to the maximum extent possible, will continue to provide display booths and materials at significant community events such as the Warren County Fair, annual festivals at Warren County Parks, and the Water Festival at Caesar’s Creek State Park.

2.4.3 Household Hazardous Waste Disposal

The Warren County Solid Waste District provides residents with information on the proper disposal of a wide variety of household wastes including automotive fluids (oils, antifreeze, transmission, & hydraulic fluids), pesticides, paints, tires, and other residential generated wastes. Residents access this information through the County’s Solid Waste website or by calling the Solid Waste Department.

2.4.4 Informational Mailings

Outreach to Warren County residents will be accomplished by coordinating with the City of Lebanon, City of Mason, Deerfield Township, and Hamilton Township to allow the County to include informational articles in periodic publications provided to their residents. Articles will provide residents with aquifer protection related information such as home sewage treatment system maintenance, lawn fertilizer application, and the proper disposal of household hazardous wastes.

The Warren County Water and Sewer Department will also provide their water customers with aquifer protection information through its website.

2.4.5 Roadway Signage

The County will purchase and install roadway signage with the purpose of informing motorists that they are entering an aquifer protection area and instructing them to call 911 to report a spill. These signs will be installed along roadways near the 5-year time of travel aquifer boundary and will be legible as travelers enter the aquifer protection area. .

2.5 Additional Goals and Strategies

The strategies in this subsection are for the purpose of raising awareness with PCS owners and operators of the importance to protect groundwater quality. These recommendations are in addition to the education and outreach programs and activities intended to broadly inform the public about the importance of their groundwater supply and their role and responsibility in protecting it. The information education and outreach strategies for controlling groundwater PCS risks and impacts are as follows:

1. Perform site visits at each PCS location for the following purpose and goals:
 - ❖ update the County's PCS inventory including new risks, removing sites that are no longer risks, and classifying each site's risk level;
 - ❖ provide owners, operators, and employees with SWAP information including the relationship and importance between their site, the well heads, time of travel zones, and groundwater quality;
 - ❖ emphasis the use of best-management practices; and
 - ❖ emphasis proper spill and emergency response procedures.
2. Meet with farmers and golf course operators to encourage the use of best management practices for groundwater quality protection.
3. Install SWAP area identification and response signs along roads and railways.
4. Coordinate with County and Township road maintenance departments to encourage the use of good housekeeping activities for the storage and application of roadway salt.

The first control strategy applies to inventoried PCS site facilities, operations, and activities where harmful substances are used. The specific intention of

implementing the control strategies at these PCS sites is to help ensure owners, operators, and employees understand the groundwater protection importance of:

- ❖ their site location and operation relative to the vulnerability of potentially contaminating the groundwater supply; and
- ❖ their responsibility in preventing contamination of the groundwater by the potentially harmful substances they handle.

The second strategy focuses on farming and golf course operations. The WCWSD in cooperation with the Warren County Soil and Water Conservation District (SWCD), seeks to implement this strategy by encouraging farmers and the golf course operators to use best management practices (BMPs) in the application of fertilizers, herbicides, and pesticides.

The purpose for implementing the third control strategy is to raise the general awareness of the public and more specifically, informing travelers within the SWAP area that they are in a groundwater protection area and providing instructions on how to report spills or the dumping of substances harmful to the groundwater.

The final control strategy is intended to remind and encourage local roadway departments to implement sound road salt and bulk chemical storage and housekeeping procedures that are required under their National Pollution Discharge Elimination System (NPDES) permit.

2.6 Public Education & Outreach Evaluation

The Warren County Water and Sewer Department will evaluate the effectiveness of the public education and outreach program each time the source water protection plan is updated. Section 3 – Water Shortage & Emergency Response

In the event of a severe drought, flood, natural catastrophe, or significant contamination threat of the source water, Warren County will enact the contingency plans identified in this document in addition to their Emergency Response Plan (ERP). The County has an ERP as required by the Public Health and Bioterrorism Preparedness and Response Act of 2002. This plan was prepared by TetraTech and adopted by the County in 2004.

The County's ERP meets the requirements outlined in Chapter 3745-85 of the Ohio Administrative Code (OAC) and Ohio Revised Code (ORC) Section 3750. This source water protection plan is an additional resource to be used in conjunction with the County's existing ERP. This plan identifies corrective measures in the event of potential well field contamination, identifies temporary and long-term alternate drinking water supplies, and indicates financial mechanisms for implementing such alternatives.

3.1 Drinking Water Shortage

3.1.1 Water Storage (Ground and Elevated)

In the event of a short-term emergency requiring the County to cease operation of their water plant, the County can serve its customers from both elevated and ground storage tanks. The County has a total elevated and ground storage capacity of 7.5 million gallons within the Richard A. Renneker (RAR) Water System. Assuming that the tanks are nearly full at the start of an emergency, this stored capacity provides the County roughly 24 hours of operation at a peak 2012 summer demand of 5.8 million gallons per day.

3.1.2 Alternative Drinking Water Sources

In the event of an emergency lasting longer than a day, the County may need to purchase water from neighboring utility providers. The County can purchase water under its long-term service contract with the Greater Cincinnati Water Works (GCWW) as well as an emergency service agreement with the Western Water Company.

The County has sufficient emergency service agreements and water system interconnections with neighboring entities to allow the County to provide service should its well fields become threatened. The County's source water redundancy was improved in 2014 when it completes the 24-inch water main connecting the Franklin-Clearcreek and RAR water systems.

3.1.3 Planning for Future Water Supply Needs

RAR Treatment Plant Upgrades - The County completed upgrades to the RAR Water Treatment Plant in 2008, increasing its rated design capacity to 9.0 million gallons per day. The County anticipates that an additional expansion and/or upgrades to the facility will not be necessary for an additional 5 to 10 years.

Well Field Development Options - Developing four well fields along the Little Miami River has allowed the County to diversify its source water and reduce its source water contamination risk. Should contamination of a well field occur, the County will explore the option of developing additional wells on the 24.8 acre Thompson property, purchase the City of Lebanon or Village of South Lebanon abandoned well fields, or purchase additional well field property near the Village of South Lebanon along the LMR.

Source Water Alternatives - In an effort to improve reliability and to prepare for future emergencies the County constructed a 24-inch water main that connects the Franklin-Clearcreek Water System to the RAR Water System. Construction and testing was completed in 2014. The line will allow the County to convey an estimated 2.0 to 4.0 mgd to the RAR Water System. This distribution main will

provide the County with an alternative water source should a catastrophic event occur.

3.1.4 Financial Funding for Alternative Water Sources

Revenues from the County's user fees and tap fees are sufficient to construct the planned improvements and necessary upgrades to the County's water system. The County maintains sufficient financial reserves to address current and anticipated needed improvements.

3.2 Emergency Planning

3.2.1 Drinking Water Supply Contingency Plans

A copy of the County's Drinking Water Supply Contingency Plan is located at each of the County's treatment plants, the Department's main office, and at the Warren County Emergency Operating Center. All Water and Sewer Department employees can access it. The response plan addresses a wide variety of emergencies and identifies the proper response procedures in the event of the following:

- ❖ unplanned absence of operator,
- ❖ power outage,
- ❖ main water break,
- ❖ inorganic/organic contamination,
- ❖ bacteriological contamination,
- ❖ suspected tampering,
- ❖ water system depressurization,
- ❖ distribution system storage failure,
- ❖ suspected backflow or cross connection, and
- ❖ source failure (including pumps, wells, and/or intakes).

This source water protection plan focuses on the emergency scenarios that affect the County's well fields. This plan provides additional details in the event of severe drought, well field flooding, chemical spills within the aquifer, and chemical spills within the LMR.

3.2.1.1 Severe Drought

During severe drought conditions, the County will operate the treatment facilities to their best ability to provide County produced water to their customers. This includes operating all wells, sand filters, booster pumps, and treatment equipment. The County will remove wells from service as the water table within the aquifers drop below the levels required for safe pump operation. Well pumps equipped with variable frequency drives will be operated at slower speeds to allow for aquifer recharge and to prevent pump cavitation.

Should the RAR Water System not be capable of producing sufficient water to serve its customers, the County will convey water from their Franklin-Clearcreek Water System to the RAR system through the County's 24-inch interconnection.

Should the County not be capable of providing surplus water from the Franklin-Clearcreek Water System to meet customer demands, the County will open metered interconnections with neighboring entities including the GCWW and the Western Water Company to purchase surplus water.

If the County is not capable of purchasing sufficient water from other entities, it will **as a last resort**, place water restrictions upon its users. These restrictions will be limited to irrigation restrictions and, if necessary, irrigation bans. In this event, the County will notify consumers of the severity of the water shortage, ban water use for all non-essential domestic use, and take necessary enforcement actions.

3.2.1.2 Well Field Flooding

Because wells are located along the LMR, flooding is a common threat of contamination that the County must monitor and manage. The County removes wells from operation as the river level rises and the wells become exposed to surface water.

3.2.1.3 Chemical Spills within the Aquifer

One of the most critical threats to the operation of the treatment plant is a concentrated chemical spill or release into the aquifer near the County's well fields. The County has developed and will implement emergency procedures during a concentrated chemical release.

3.2.1.4 Chemical Spills within the Little Miami River

The aquifer is recharged from ground water, streams, and creeks as well as flow from the LMR. A significant chemical release into the LMR will be of primary concern, especially if the chemical migrates into the aquifer as it travels along the river. A few potential chemical sources include spills from stored agricultural chemicals, gas line rupture at or near a river crossing, and spills from bulk chemical storage at commercial or industrial facilities.

Should a spill occur with the LMR, the County shall coordinate with the Ohio EPA and other emergency response agencies to quantify the amount of chemical released and track its progression along the River. When the chemical reaches 0.5 miles upstream of the County's well fields, the County shall turn off all wells and cease withdrawing water from the aquifer. The County shall not place wells back into operation for a period of 6 hours after the spill has passed the Thompson well field. The County shall coordinate with the Ohio EPA prior to placing the wells back into service.

3.2.2 Chain of Command & First Response Staffing

The RARWTP Chief Operator, Water Treatment System Superintendent, Deputy Sanitary Engineer, and Sanitary Engineer shall be made aware of all emergency and

critical events that have a potential to contaminate the well field. During emergency events, decisions regarding the operation of the treatment plant shall be made by the Chief Operator and Water Treatment System Superintendent. The Sanitary Engineer and Deputy Sanitary Engineer shall be informed of the potential threat, decisions, and changes in treatment plant operation throughout the course of each event.

3.3 Emergency Response Strategies

The control strategies in this category are for the purpose of keeping the Warren County Emergency Management Agency (WCEMA) informed on the types and locations of PCS sites that are in the SWAP area. This is important because the WCEMA is the lead contact responsible for coordinating all first responders to prevent a spill or other discharge of groundwater harmful substances. They are intended to aid them in carrying out their charge of protecting the groundwater from contamination due to a spill emergency. The strategies to aid emergency response for controlling groundwater PCS risks and impacts are as follows:

1. Provide the SWAP area map to the Warren County Emergency Management Agency (WCEMA) that shows the groundwater TOT zones and GPS coordinates of the wells and PCS sites.
2. Provide WCEMA with contact information of the PCS operators and owners.
3. For other agencies and jurisdictions to notification to WCWS in the event of a spill or release in or near SWAP areas.

The WCWSD has already provided the SWAP area map to the WCEMA and will keep it updated as changes occur in the inventories of the wells and PCS sites. The WCWSD staff will provide a list of PCS site contacts to the WCEMA within one year following plan adoption.

Section 4 – Potential Contaminant Source Control Strategies

Control strategies for Potential Contaminant Sources are described and outlined in Table 4-1. The table includes a brief description of the strategy for the high and medium risk potential pollution sources, organization or agency that is primarily responsible for implementation, and a general timeframe in which the task should be fulfilled. In addition to addressing specific sources of pollution, the County has included organizational strategies for responding to source water emergencies, regulatory strategies for land use planning and zoning, and strategies for public education and outreach.

The County will continue its ongoing public education program for property owners, residents, and school children that live or work within the aquifer area. To maintain the integrity of the water supply, the County acknowledges the importance of an informed citizenry that is capable of understanding the complex issues surrounding how pollution occurs and how to take preventative action.

**Table 4.1
Implementation Strategies, Responsibility & Schedule**

Control Strategy Description	Responsibility	Schedule
1. Potential Pollution Source (Point and Non-Point)		
1.1 Active/Inactive Gas Stations & Automotive Service Shops (Duvall’s Auto Service, Barrett’s Marathon, Johns Service) <ul style="list-style-type: none"> Conduct site visit & review storage and disposal plan for automotive fluids & petroleum products Inspect containment areas for above ground storage tanks and review monitoring reports for underground storage tanks. 	Warren County Water Treatment Superintendent , RARWTP Chief Operator , & Warren County Emergency Management Agency	Within 2 years after plan adoption
1.2 Industrial Site – 1151 W. Mason Morrow Millgrove Rd <ul style="list-style-type: none"> Monitor and track future site redevelopment and review future plans for chemical storage, spill containment, and stormwater management. Encourage South Lebanon to rezone the site to a land use that with less potential for contamination. 	Warren County Sanitary Engineer	Ongoing
1.3 Diversified Products – 6451 Striker Road <ul style="list-style-type: none"> Monitor and track future site redevelopment and review future plans for chemical storage, spill containment, and stormwater management. Perform an annual site investigation along the base of the hillside looking for potential contaminated storm water and hillside seeps. 	Warren County Water Treatment Superintendent	Annual

Section 4 – PCS Control Strategies

Control Strategy Description	Responsibility	Schedule
<p>1.4 Columbia Road & Kingsview Drive Industrial Area</p> <ul style="list-style-type: none"> Obtain easements or an ODOT right-of-way permit and install a series of monitoring wells parallel to I-71 and down gradient of the Industrial Park. 	Warren County Sanitary Engineer	Within 4 years after plan adoption
<p>1.5 Peters Cartridge Factory Site</p> <ul style="list-style-type: none"> Monitor and track Dupont’s remediation of the site and annual monitoring well testing around the monofill. Work with Warren County Regional Planning Commission to redevelop this site as residential and avoid rezoning back to industrial use. 	Warren County Sanitary Engineer	Ongoing
<p>1.6 Oeder & Sons Gravel Pits & Barrett Paving</p> <ul style="list-style-type: none"> Review reclamation plans and coordinate Oeder on the transfer of the reclaimed site to a governmental entity for the public use. Conduct site visits and coordinate with owners regarding site security, drainage, chemical storage and containment, and berms 	Warren County Sanitary Engineer	Within 2 years of plan adoption
<p>1.7 Collect data on high and medium risk PCS sites and compile the information into a centralized GIS-based data management system. Information will include interviews, site visits, and research of agency reports. Reevaluate the risk levels of the PCS sites as additional information is obtained.</p>	WCWS Engineering & GIS staff & Water Treatment Superintendent	Develop the data management system within a year after plan adoption
<p>1.8 Conduct visits of high and medium-risk PCS sites to:</p> <ul style="list-style-type: none"> become familiar with the facility operation; review best management practices; and educate owners on source water. 	Warren County Water Treatment Superintendent , RARWTP Chief Operator , & Warren County Emergency Management Agency	Within 1 year after plan adoption
<p>1.9 Monitor reports such as the BUSTR (Bureau of Underground Storage Tank); EPA-Corrective Action Reports; HMIRS (Hazardous Material information Reporting System); and LUST (Leaking Underground Storage Tanks Incident Report); for information, compliance with regulations and implementation.</p>	Warren County Water Treatment Superintendent and RARWTP Chief Operator	Annually
<p>1.10 Regulate residential septic systems – new & currently permitted systems – for the location, design, installation and operation in a manner that will not contaminate groundwater.</p>	Warren County Combined Health District	Ongoing
<p>1.11 Identify concentrated areas of septic system failures and assess the need for public sewer service.</p>	Warren County Combined Health District	Ongoing

Control Strategy Description	Responsibility	Schedule
1.12 Develop an effective source water monitoring program that may include the installation and/or removal of monitoring wells and annual contaminate sampling.	Warren County Water & Sewer Director , Water Treatment Superintendent, and OhioEPA	Ongoing
2. Education & Outreach		
2.1 Submit SWAP Plan to the Warren County Emergency Management Agency, City of Lebanon, Village of South Lebanon, Warren County Combined Health District and other appropriate agencies for review, input and collaboration. Conduct a coordination meeting with each entity.	Warren County Water & Sewer Director & Water Treatment Superintendent	Within 1-year of plan adoption.
2.2 Offer Warren County public education program for school children to help them gain a better awareness of how to protect water resources.	Environmental Education Services, Inc. by contract with Warren County; by the Warren County Soil and Water Conservation District (SWCD)	Ongoing
2.3 Provide display booths at community events, festivals, parks and other gathering places to present and distribute groundwater awareness and protection information.	Environmental Education Services, Inc. by contract with Warren County; and the Warren County Soil and Water Conservation District (SWCD)	Annually
2.4 Provide groundwater protection information and a SWAP executive summary on the Water & Sewer Department’s website	Warren County Water & Sewer Director	Ongoing
2.5 Inform residents of the proper procedure for the disposal of household chemicals, automotive fluids and other pollutants.	Warren County Solid Waste Management District	Ongoing through the Solid Waste website
2.6 Visit Low Risk and Undetermined Risk PCS sites and inform site owners and operators about: <ul style="list-style-type: none"> ▪ the relationship between their site, the well heads , and TOT zones; ▪ best-management practices; ▪ spill and emergency response procedures, and ▪ collect data and information on the PCS site. 	Warren County Water Treatment Superintendent , RARWTP Chief Operator , & WCEMA	Within 2-years after plan adoption; when a new PCS is inventoried; and every 5 years thereafter.
2.7 Install SWAP area identification and response signs along the roads and railways.	Warren County Water Treatment Superintendent , RARWTP Chief Operator ,	Within 1 year after plan adoption

Section 4 – PCS Control Strategies

Control Strategy Description	Responsibility	Schedule
2.8 Evaluate education and outreach effectiveness.	Warren County Water & Sewer Director & Water Treatment Superintendent	When plan is reviewed for revision.
3. Emergency Response & Contingency Planning		
3.1 Provide SWAP area map to Warren County Emergency Management Agency that shows the groundwater TOT zones and GPS coordinates of the wells and PCS sites.	Warren County Water & Sewer	Completed and updated as needed.
3.2 Provide PCS site contact information to the Warren County Emergency Management Agency.	Warren County Water & Sewer	Within 1 year after plan adoption and when a new PCS is inventoried.
3.3 Maintain Public Water System Contingency Plans	Warren County Water & Sewer water Treatment Superintendent	Already in place and ongoing.
3.4 Establish/maintain policies and intergovernmental agreements for emergency water supply.	Warren County Water & Sewer Director	Update existing agreements as needed.
4. Land Use Regulation		
4.1 Work with local jurisdictions to adopt groundwater protection provisions in their zoning, subdivision regulations, and land use policies.	Warren County Regional Planning Commission with Warren County Water & Sewer Director	Within 2 years after plan adoption.
4.2 Identify and address regional groundwater protection issues with OKI Regional Council of Governments and participate in the OKI Groundwater Committee	Warren County Regional Planning Commission with Warren County Water & Sewer Director	Ongoing

Plan Revision

The Plan will be comprehensively reviewed for need of revision at least once every 5 years. Earlier review of the Plan may occur for the following reasons:

- ❖ New PCS are identified that not only necessitates updating the inventory, but also requires different control strategies;
- ❖ A new TOT zone is established;

- ❖ An emergency situation develops;
- ❖ Significant groundwater contamination is identified; or
- ❖ Other extenuating conditions or circumstances necessitate revisions.

Section 5 – Groundwater Monitoring

The Warren Country Water and Sewer Department and the Ohio EPA will cooperatively develop a Groundwater Monitoring Plan that describes the procedures by which Warren County monitors the quality of groundwater entering the Sod Farm, Revis, East, and Thompson well fields.