ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

# KENTUCKY DIVISION OF WATER
# WELLHEAD PROTECTION PLAN
# 5-YEAR UPDATE FORM

## Update Requirements:

This form should be used for the 5-year update submittal requirements of the Kentucky Wellhead Protection Program (WHPP) in compliance with 401 KAR 4:220 and SDWA Section 1428. Once the form is complete, please sign and send to:

Kentucky Division of Water
Watershed Management Branch
Attention: Allan Shingleton
300 Sower Boulevard, 3rd Floor
Frankfort, Kentucky 40601 or allan.shingleton@ky.gov

For assistance contact Allan Shingleton at (502) 782-6907 or allan.shingleton@ky.gov

## System Information:

PWS Name:HARDIN CO. WATER DIST #1/FT. KNOX

PWS ID Number: **KY0470990** AI Number: **1642**

Contact Person/Title:**Justin Metz General Manager**

Mailing Address:**1400 Rogersville Rd. Radcliff, KY, 40160**

Telephone: **270-351-3222** Email: **Jmetz@hcwd.com**

System Type*: **Community**

*Community; Non-Transient/Non-Community; Transient/Non-Community

Source*: **Wells (13)** *Well(s) or Spring(s) and total number of each

County: **Hardin** ADD: **Lincoln Trail**

Permit #: **0471** Permitted Amount (mgd): **September-April 2.5 mgd, May-August 3.0mgd.**
Permit #: **0494** Permitted Amount (mgd)**: October-May 5.5 mgd, June-September 6.1 mgd.**

Population Served: **23600**

Overall Susceptibility Rating*: **MED** *High, Medium or Low

WHPP Changes Summary: **Update to include new planning team members, inactivation of CWTP, removal of permit #493 from use, and renovation of MWTP.**

## Update Form Instructions:

Please complete each section that applies to any system or WHPP updates and submit the supporting documentation. Please indicate if a section is not applicable to this update. **Sections 4, and 6 through 11 are required for every 5-year update**.

Please sign certification on the last page upon completion.

## Section Updates:

### Section 1: Treatment Plant

If the treatment plant location has changed then provide a new location map below. This can be a county road map or a GIS-produced map. Please use the area below to provide relevant details, or to indicate that no change has occurred.

Central Water Treatment Plant has been made inactive as of July 2020. Muldraugh Water Treatment Plant was offline for renovation from November 2020 through February 2022. The physical location of the Muldraugh Water Treatment Plant has not changed.

### Section 2: Water Withdrawal and Water Quality

If there have been changes in water withdrawal rates or water quality since the last submittal, provide a discussion of the relevant details in the space below (include new Water Withdrawal Permit Number if applicable). Include supporting documentation as an attachment.

Permit # 493 for Otter Creek/McCracken Springs not currently in use with no plans for its use. Permit #0494 daily use decreased to 1.152 MGD from November 2020 through February 2022. After MWTP renovations were completed in February 2022, withdrawal rates for permit #0494 increased to 2.319 MGD. No known changes in water quality observed since last update.

**Section 3: Change or Modification to Groundwater Source**

If the system has changed or modified the wells or springs being used, provide the following: 1) a description of changes/modifications; 2) copies of the relevant form(s) (Kentucky Water Well Record, Well Maintenance & Plugging Record, Well Inspection Form or Spring Inventory Record); and 3) any other information relating to well construction (i.e., installation logs, driller's logs, lithologic or geophysical logs), below.

There have been no changes or modifications made to the wells being used.

**Section 4 (REQUIRED): Planning Team**

Effective water supply protection requires community involvement and public awareness. Identify the planning team consisting of a leader and at least two team members, with their respective titles, below.

**Leader:**

**Austin Santoro/ Muldraugh Water Treatment Plant Supervisor/Hardin County Water District No.1**

**Team Members:**

**Justin Metz General Manager/Hardin County Water District No. 1 Daniel Linder/Water Quality Specialist/Hardin County Water District No.1**

Chris Gohman/Water Operations Manager/Hardin County Water District No. 1

**Kevin Addison/Fort Knox Department of Public Works, Contracting Officer Representative**
**Dan Musel/Fort Knox Department of Public Works, Environmental Management Division**

**Section 5: WHPA Delineation**

If the system is revising a Wellhead Protection Area (WHPA) delineation, or if a new groundwater source has been added since the last submittal, provide a site-specific description of the local geology and aquifer. Include references for published literature. Provide a summary of any aquifer tests (i.e. pumping tests, slug tests, tracer tests), including data gathering and evaluation methods. Show calculations and supporting data for each WHPA delineated or revised. Include the detailed hydrogeologic report as an attachment.

The well field delineation was redrawn by DOW in May 2024 to reflect abandoned and inactive wells. See map.

**Section 6 (REQUIRED): WHPA Map**

Provide a WHPA map that shows each groundwater source labeled with the appropriate AKGWA #, all protection zones identified and the Contaminant Source Inventory (CSI) point locations. If no changes have occurred since the last submittal, then a copy of the most recent WHPA/CSI map can be resubmitted. Please contact program staff for assistance.

Map below shows the WHPA for Permit #0494 and #0471. In addition, a geological survey of the well field can be found here https://pubs.usgs.gov/wri/1999/4265/report.pdf.

**Section 7 (REQUIRED): Contaminant Source Inventory**

Provide an updated CSI in table format. This can be created using the spreadsheet template provided, and copied into the space below. If no changes occurred since the last update, the table can be pulled from previous WHPP documents. Each contaminant source listed should have a Contaminant Souce ID # that corresponds to the WHPA map in Section 6. The CSI table must show the susceptibility determination ranking for each contaminant source. Include a brief discussion of the overall system susceptibility. Please contact program staff for assistance.

## Section 8 (REQUIRED): Management Strategies

Provide a discussion of the previous and newly proposed management strategies. This discussion must include the previous management strategies that were implemented as well as the goals that were met. Next, include any NEWLY proposed management strategies, associated goals, implementation plans and the party responsible for implementation.

Extensive work has been published in previous updates. The goal of this section is to provide an update on the status of the chloride plume and the effectiveness of management strategies currently being used to control chloride levels in the water supplying MWTP.

The potable water system at the Fort Knox well field is threatened by brine contamination due to improperly abandoned natural gas wells. The fort Knox well field is in the flood plain of the Ohio River. The site and regional geology consist of unconsolidated glacial outwash approximately 100 to 120 feet thick, underlain by shale and porous limestone. Brine, or salt water, is believed to flow vertically from the underlying formations to the unconsolidated aquifer through damaged or leaky wells casings under high hydraulic gradient from the porous limestone, which is utilized for natural gas storage by a regional energy company. Brine water flows from the artificially pressurized limestone formation. Once in the unconsolidated aquifer, brine is transported by the increased hydraulic gradient of the unconfined aquifer from pumping of water supply wells at the well field.

In September 2007, the U.S. Geological Survey (USGS), in cooperation with the Fort Knox Directorate of Public Works, began a systematic sampling of the groundwater resources for chloride concentrations in the wellhead protection area for the Fort Knox well field. Five piezometers (PZ 1-5) were installed in locations of interest based on previously conducted surface geophysical surveys and test drilling by the USGS. An additional piezometer (PZ 6) was installed in April 2010 to monitor groundwater levels and chloride concentrations in the area between the Fort Knox non-production wells #7 and #8. A seventh piezometer (PZ 7) was drilled in September 2014 near the location of an abandoned gas well and suspected source of the chloride contamination. These piezometers are sampled at least 6 times throughout the year to monitor the extent and migration of chlorides in the freshwater aquifer. Data collected from this network of piezometers includes depth to groundwater, water temperature and specific conductance, and chloride concentration. Wells #7 and #8 are non-production wells that discharge water into the Ohio River to control the chloride plume and prevent it from spreading. Chloride levels are monitored daily in the raw water and finished water. There has been no significant increase in chloride concentration.

## Section 9 (REQUIRED): Contingency and WHP Planning

Provide a description of Contingency and WHP Planning. Complete the Emergency Response Phone List, Procedures for Public Notification, identification of Potential Future Problems and the procedures to establish Alternative Water Supplies. This section must also address how often the WHPP will be reviewed and updated.

### Emergency Response Phone List

| Local Emergency Response | Phone Number |
|---|---|
| Plant Operator | 270-351-3222 ext.4006 |
| Fort Knox Fire Department | 502-624-6016 |
| Fort Knox Police | 911 |
| Local Emergency Dispatch<br>Fort Knox Emergency Services | 911 |

| State and Federal Assistance | Phone Number |
|---|---|
| Kentucky DOW (Frankfort) | 502-564-3410 |
| Kentucky DOW Associated Field Office<br>Louisville Regional Office | 502-429-7122 |
| Kentucky Environmental Response Team<br>24 hour response line | (502) 564-2380<br>(800) 928-2380 |
| Kentucky State Fire Marshall | (502) 573-0382 |

| Any Other Pertinent Contacts | Any Other Pertinent Numbers |
|---|---|
| **Fort Knox EMD** | **502-624-3629/502-624-1171** |
| **Justin Metz** | **270-272-2094** |
| **Austin Santoro** | **270-272-2439** |
| Chris Gohman | 270-766-7700 |

**Procedures for Public Notification:**
In the event of a water system emergency that would threaten the health or life of the public, use the following procedure. Prepare and broadcast an advisory, including directions for the public. Describe the public notification process and provide contacts for those media outlets. If the system uses methods other than traditional media please list them.

Contracting Officer notified through phone and then formally through written communication. Written communication including Contracting Officer, MEDDAC, and housing contractor as is standard for Boil Water Advisories. Door tags also placed on doors of buildings in affected areas.

| Newspaper, Television, and Radio Stations | Phone Numbers |
|---|---|
| N/A | PHONE NUMBER |
| N/A | PHONE NUMBER |

**Potential Future Problems:**
Describe the *most likely* scenarios that could threaten the water supply.

The most likely scenario to threaten the water supply for this public water system is the expansion of the chloride plume to such severity that water quality is negatively impacted making the source water no longer viable for use in a conventional treatment plant.

**Alternative Water Supply (Short and Long Term):**
Describe the short term and long term water supply alternatives that address each of the potential future problems identified above. List all current interconnections with other water systems. Discuss the capacity of each potential alternative water supply to sustain normal operations.

In the case of emergency, Fort Knox Water can be supplied water from Hardin County Water District No. 1 from the Prichard connection where the District has a 1.25 MG ground storage tank. The District can gravity feed approximately 1300 gpm or 1.872 mgd.
The District can supply approximately 2.3 MGD from the Prichard pump station.
In the event of source water failure with no viable immediate alternative, the raw transmission line to the Muldraugh Water Treatment Plant (MWTP) can be converted into a finished water transmission line which can provide ~1800gpm (2.6MGD) of water at the MWTP connection. This method was verified as viable during the Muldraugh Water Treatment Plant Renovation. This line conversion alternative would require an emergency construction project taking 2-4 weeks to disconnect existing pipe connections and reconnect others. The Prichard connection would need to be in use during this conversion to provide water to the cantonment.

Other potential source waters are being explored including river-side infiltration, development of an on site reservoir, and or potentially pulling water from the Ohio River.

**Schedule for Update and Review:**
The Wellhead Protection Plan will be reviewed regularly and updated every five years as required by regulation.

## Section 10 (REQUIRED): Copies of Public Notices and Education and Outreach Materials

Provide copies of public notices and education and outreach materials distributed.

There is information on the Wellhead Protection placed annually in our CCR.

## Section 11 (REQUIRED): Public Meeting Documentation***

The WHPP can be viewed online at https://hcwd.com and customers can call 270-351-3222 Ext. 4016 with any questions they may have.

***Non-Community Water Systems are not required to have public meetings for 5 year updates, but must post a public notice in a conspicuous place. A public notice template is provided as a separate document. However, public input and associated documentation are encouraged. Please contact program staff if you have any questions.

**Certification Signature (TO BE COMPLETED BY PLANNING REPRESENTATIVE):**

"I certify that this document and all attachments were prepared under my direction or supervision. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete."

**Signature:** Justin Metz Digitally signed by Justin Metz DN: cn=Justin Metz, o=Hardin County Water District No.1, ou=Operations, email=jmetz@hcwd.com, c=US Date: 2024.05.09 08:27:51 -04'00' **Date:** Nov. 27, 2023

**Printed Name/Title:** Justin Metz, General Manager

**Assistance:**

For any assistance please contact Wellhead Protection Staff:

Allan Shingleton
(502) 782-6907
Allan.Shingleton@ky.gov

Ben Currens
(502)782-5227
Benjamin.Currens@ky.gov

**Please sign and return completed form to:**

Kentucky Division of Water
Watershed Management Branch
Attention: Allan Shingleton
300 Sower Boulevard, 3rd Floor
Frankfort, Kentucky 40601
or allan.shingleton@ky.gov

# Contaminant Source Inventory and Susceptibility Analysis for

*[Hardin County Water District #1/Fort Knox Housing and Engineering/ KY0470990]*

| CSI Map ID # | Site ID | Contaminant Source Type | CS CODE | Name | Address | Lat | Lon | Quantity | Zone | Proximity Value | Contaminant Value | Hydrologic Sensitivity | Numeric Rating | Susceptibility Ranking | Contaminant Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | Major Roadways | M-7 | US Hwy 31W/60 | | 37.99683 | -85.946203 | 1 | 3 | 1 | 3 | 4 | 15 | MED | |
| 2 | | Railroad Lines | C-32 | Railroad | | 37.99668 | -85.948959 | 1 | 3 | 1 | 3 | 4 | 15 | MED | |
| 3 | | Major Roadways | M-7 | Highway 835 | Main Street | 37.99877 | -85.949112 | 1 | 3 | 1 | 3 | 4 | 15 | MED | |
| 4 | | Other Industrial Sources | I-16 | Brickyard - Superfund Site | | 37.99042 | -85.951453 | 1 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 5 | | Gas stations (existing & abandoned/ historic) | C-16 | Citgo Gas Station | 101 Main Street, West Point, KY 40117 | 37.99927 | -85.944326 | 1 | 3 | 1 | 3 | 4 | 15 | MED | |
| 6 | | Gas stations (existing & abandoned/ historic) | C-16 | BP Gas Station | 204 South 4th Street, West Point, KY 40177 | 37.99728 | -85.946122 | 1 | 3 | 1 | 3 | 4 | 15 | MED | |
| 7 | | Oil and Natural Gas Wells | I-15 | Open Abandoned Gas Well | LG&E, 119 North 3rd Street, Louisville, KY 40202 | 37.99883 | -85.95062 | 1 | 3 | 1 | 2 | 4 | 12 | MED | |
| 8 | | Oil and Natural Gas Wells | I-15 | Abandoned Gas Well | LG&E, 119 North 3rd Street, Louisville, KY 40202 | 37.9997 | -85.949162 | 1 | 3 | 1 | 2 | 4 | 12 | MED | |

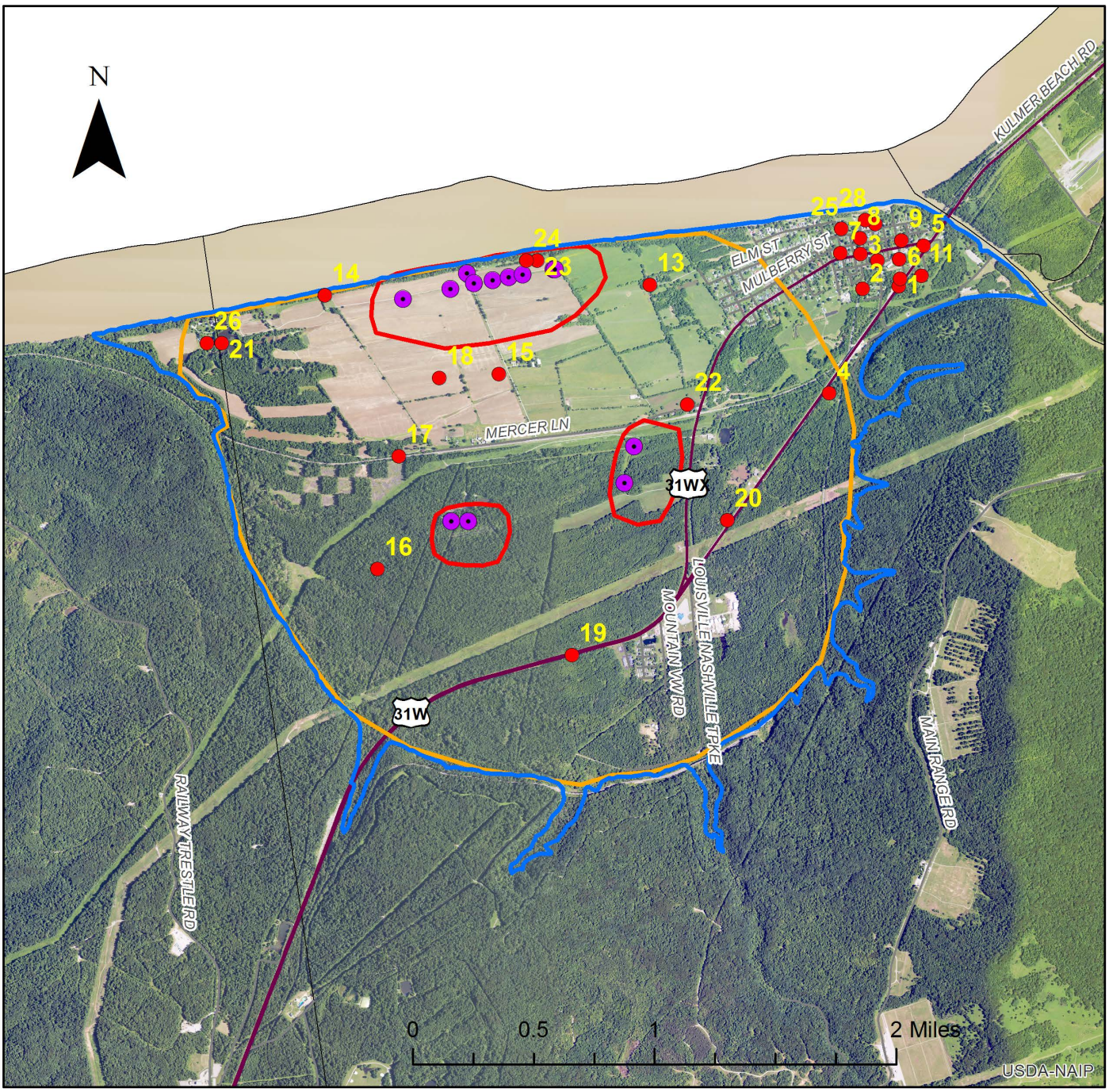
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | | Oil and Natural Gas Wells | I-15 | Concrete Buried Gas Well | LG&E, 119 North 3rd Street, Louisville, KY 40202 | 37.9996 | -85.94602 | 1 | 3 | 1 | 2 | 4 | 12 | MED | |
| 10 | | Oil and Natural Gas Wells | I-15 | Concrete Buried Gas Well | LG&E, 119 North 3rd Street, Louisville, KY 40202 | 37.99845 | -85.946177 | 1 | 3 | 1 | 2 | 4 | 12 | MED | |
| 11 | | Residential Septic | R-4 | Septic in WHPA - 3 | | 37.99748 | -85.944492 | 1 | 3 | 1 | 2 | 4 | 12 | MED | |
| 12 | | Municipal Sewer Lines | M-8 | Municipal Sewer Lines | | 37.99838 | -85.947833 | 1 | 3 | 1 | 3 | 4 | 15 | MED | |
| 13 | AI 1696; KY0022152 | Wastewater Treatment Plant* | M-15 | KPDES permit West Point STP | WHPA 3 | 37.99689 | -85.965059 | 1 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 14 | AI 1642; KY0002917 | Other Municipal Sources | M-10 | KPDES permitted outfall | WHPA 3 | 37.99623 | -85.98971 | 1 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 15 | | Other Wells | G-10 | Domestic and Monitoring Wells in WHPA | | 37.99152 | -85.97648 | 76 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 16 | | Oil and Natural Gas Wells | I-15 | Oil and Gas Wells | WHPA 3 | 37.97982 | -85.985641 | 40 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 17 | | Railroad Lines | C-32 | CSX Railroad | WHPA 3 | 37.98657 | -85.98407 | 1 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 18 | | Crops : Corn, Soybean, Wheat | A-5 | Cultivated Crops | WHPA 3 | 37.99127 | -85.980998 | 4 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 19 | | Major Roadways | M-7 | U.S. 31 | WHPA 3 | 37.97469 | -85.970909 | 1 | 2 | 2 | 3 | 4 | 17 | HIGH | |
| 20 | AKGWA #00006791 | Domestic Wells | G-7 | Residence - Bill Priddy | | 37.98278 | -85.959167 | 1 | 2 | 2 | 2 | 4 | 14 | MED | |
| 21 | AKGWA #00006792 | Domestic Wells | G-7 | Residence - Lee Mattingly | | 37.99333 | -85.9975 | 1 | 2 | 2 | 2 | 4 | 14 | MED | |
| 22 | AKGWA #00020154 | Domestic Wells | G-7 | Residence - E D Furrie | | 37.98972 | -85.962222 | 1 | 2 | 2 | 2 | 4 | 14 | MED | |
| 23 | AKGWA #00030321 | Domestic Wells | G-7 | Residence - Jack Glass | | 37.99833 | -85.973611 | 1 | 1 | 3 | 2 | 4 | 16 | HIGH | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | AKGWA #00030322 | Domestic Wells | G-7 | Residence - Doug Gregory | | 37.99833 | -85.974444 | 1 | 1 | 3 | 2 | 4 | 16 | HIGH | |
| 25 | AKGWA #00031896 | Domestic Wells | G-7 | Residence - James A Higdon | | 38.00028 | -85.950556 | 1 | 3 | 1 | 2 | 4 | 12 | MED | |
| 26 | AKGWA #00033583 | Domestic Wells | G-7 | Residence - Dale Smith | | 37.99333 | -85.998611 | 1 | 2 | 2 | 2 | 4 | 14 | MED | |
| 27 | AKQWA #00049097 | Municipal Wells (PWS) | G-9 | West Point Water Department | | 38.00058 | -85.948 | 1 | 3 | 1 | 1 | 4 | 9 | LOW | |
| 28 | AKQWA #00049098 | Municipal Wells (PWS) | G-9 | West Point Water Department | | 38.00082 | -85.948752 | 1 | 3 | 1 | 1 | 4 | 9 | LOW | |

| | | |
|---|---|---|
| CSI Totals | Low | |
| | Med | 16 |
| | High | 10 |

| | |
|---|---|
| Overall Susceptibility Ranking | MED |

# Contaminant Source Inventory

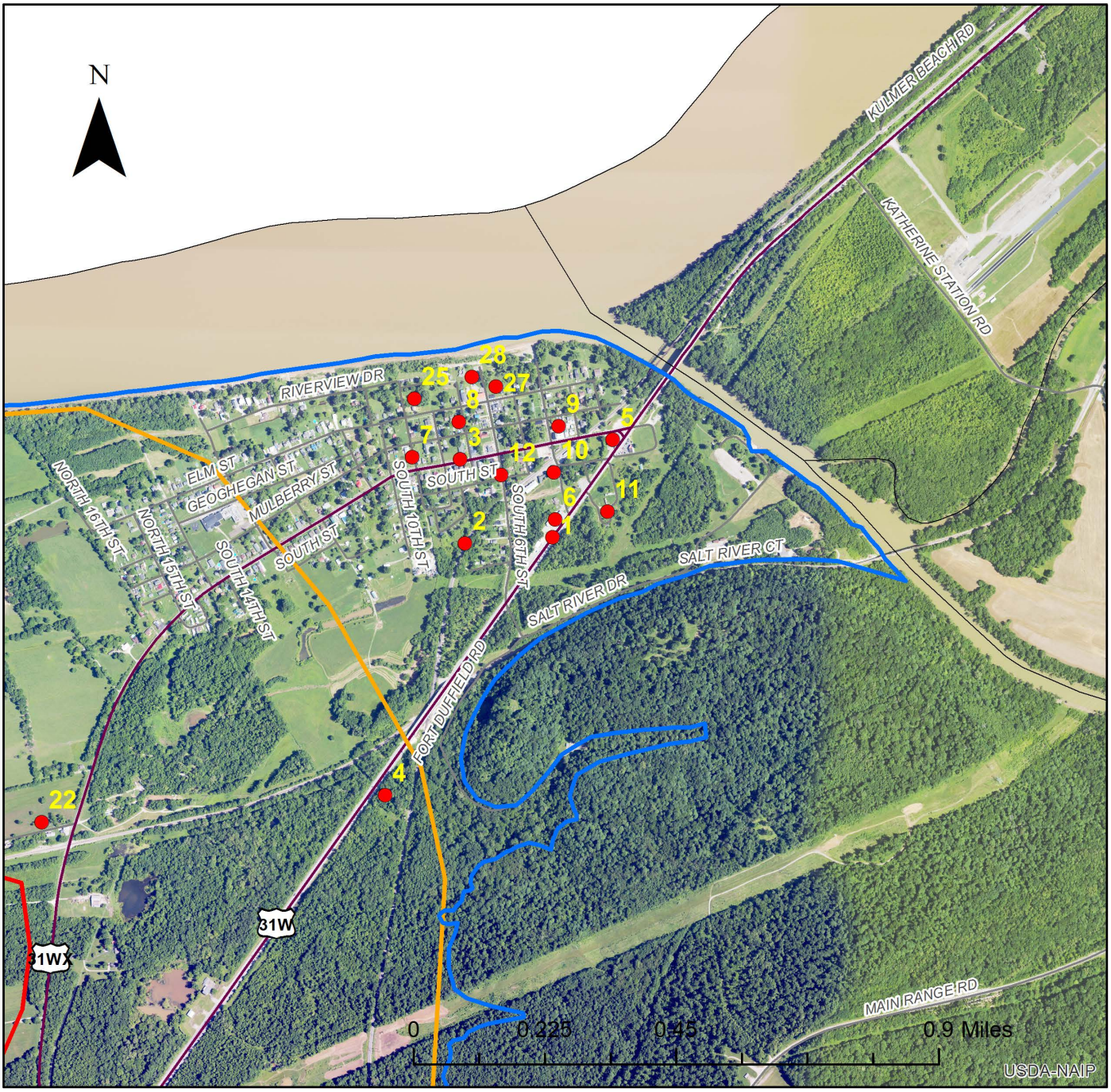



- Potential Contaminants
- Water Wells (PWS)

**WHPA**

- Zone 1: 180 Day time of travel
- Zone 2: 10 Year time of travel
- Zone 3: Hydrologic Boundary

# Contaminant Source Inventory

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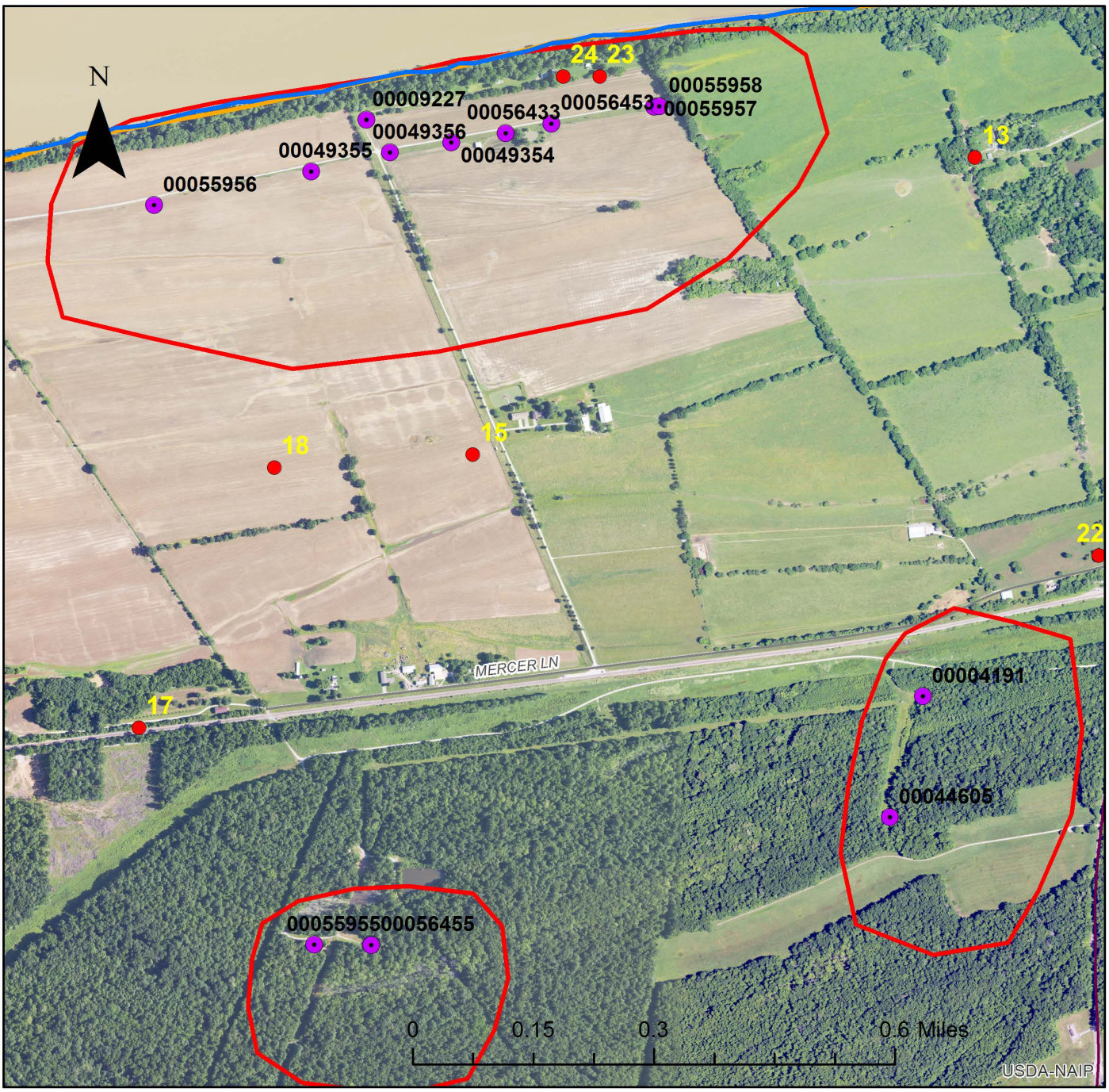


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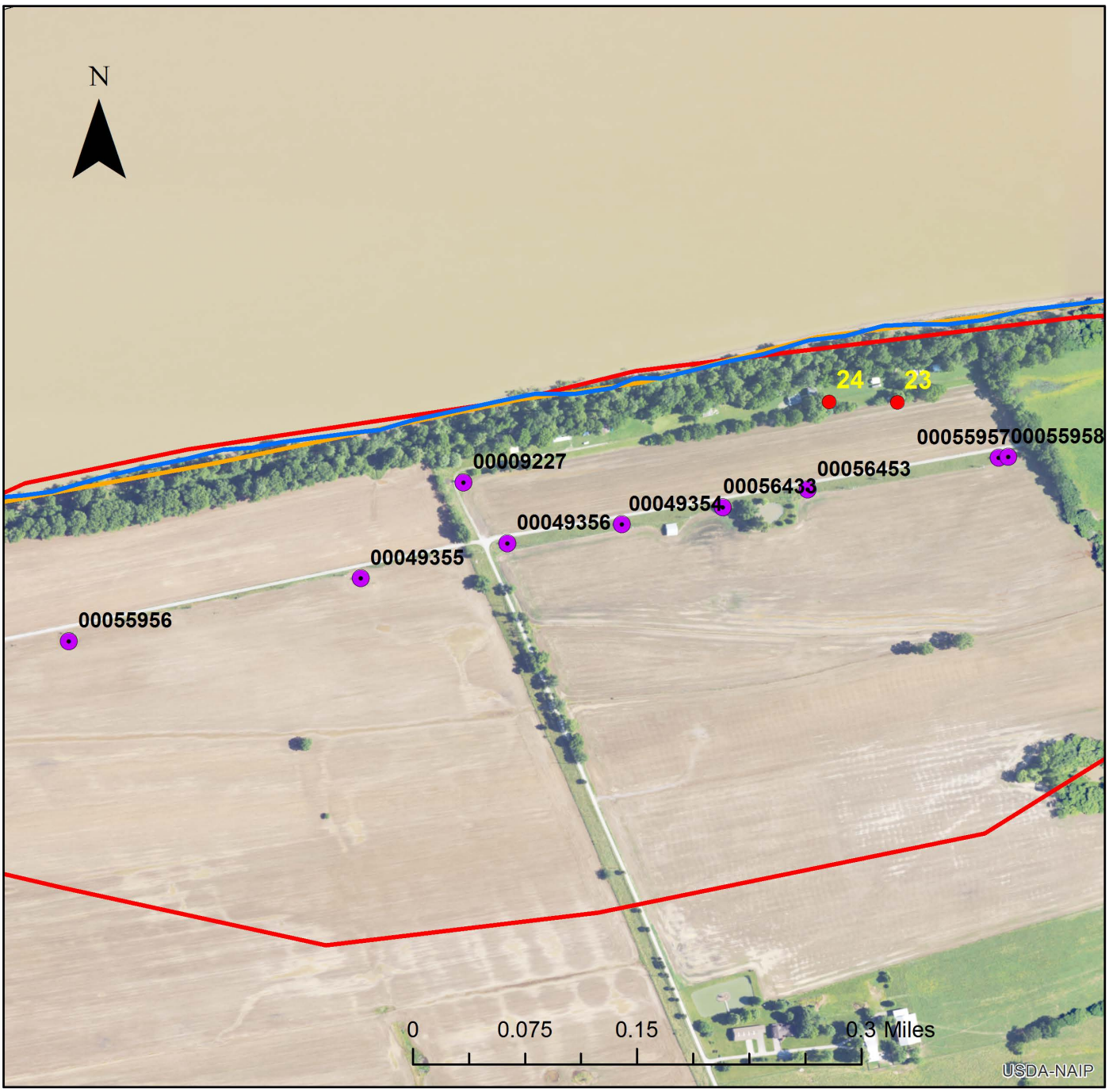


- Potential Contaminants
- Water Wells (PWS)

**WHPA**

- Zone 1: 180 Day time of travel
- Zone 2: 10 Year time of travel
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Well Inventory

| AKGWA | AltID | Latitude | Longitude |
|---|---|---|---|
| 0004-4605 | FK-01 | 37.984992 | -85.966962 |
| 0000-4191 | FK-02 | 37.987174 | -85.966217 |
| 0005-6455 | FK-05 | 37.982668 | -85.978761 |
| 0005-5955 | FK-06 | 37.982669 | -85.980057 |
| 0005-5956 | FK-07 | 37.995992 | -85.983752 |
| 0004-9355 | FK-08 | 37.996609 | -85.980175 |
| 0000-9227 | FK-09 | 37.997541 | -85.978921 |
| 0004-9356 | FK-10 | 37.996952 | -85.978379 |
| 0004-9354 | FK-11 | 37.997138 | -85.976981 |
| 0005-6433 | FK-12 | 37.997308 | -85.975744 |
| 0005-6453 | FK-13 | 37.997481 | -85.974703 |
| 0005-5957 | FK-15 | 37.997793 | -85.972366 |
| 0005-5958 | FK-16 | 37.997801 | -85.972245 |