

# SWAP MODEL

## VULNERABILITY ASSESSMENTS

### Multi-Step Approach to Source Water Protection

#### Process:

- **Phase I** - Delineation of Well-head Protection Areas/Surface Water Protection Areas.
- **Phase II** - Inventory of Potential Sources of Contamination (PSOCs).
- **SWAP Report** - Vulnerability Assessment using SWAP GIS Model.



### SWAP GIS Model

The SWAP (Source Water Assessment and Protection) Model was developed in the early 2000's to fulfill the source water assessment requirements of the Safe Drinking Water Act Amendments of 1996. The development of the model took place under the supervision of Lyle Godfrey (ADH) with the assistance from the Center for Advanced Spatial Technologies (CAST) and USGS.

The Geographic Information System (GIS) model was developed to assess a drinking water source's vulnerability to contamination. The latest version of the SWAP Model uses an Esri ArcTools toolbox using the Python programming language.

#### **Calculations:**

- **Intrinsic Sensitivity** - "natural" sensitivity of a source. Calculated using geospatial and non-geospatial data are assigned a numeric value to provide a relative indication of the likelihood that there is a barrier to contamination migration.
- **Susceptibility Analysis** - historical water quality data is assigned a numeric value of "B." The final susceptibility designation is calculated using the following formula: ("B" x Intrinsic Sensitivity value). From this formula a low, medium, or high susceptibility designation is assigned.

#### **Geospatial Data:**

- Land Use Land Cover
- Digital Elevation Model
- Soil - Depth to Bedrock
- Soil Permeability
- Geology - Rock Type
- Precipitation
- Various Vector datasets

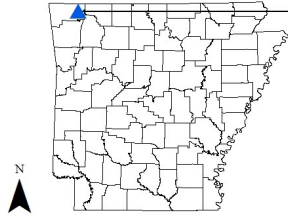
### SWAP Report

The final vulnerability assessment is detailed in the SWAP Report. The final report combines the susceptibility analysis with the PSOC inventory. The Susceptibility designation is shown and a table showing a breakdown of the number of PSOCs, their respective health risk codes (HRC), and proximity to the source of water are shown. All PSOCs are listed with their description, HRC, and distance from the public drinking water source. Also listed in the report are the factors used to determine intrinsic sensitivity and susceptibility.

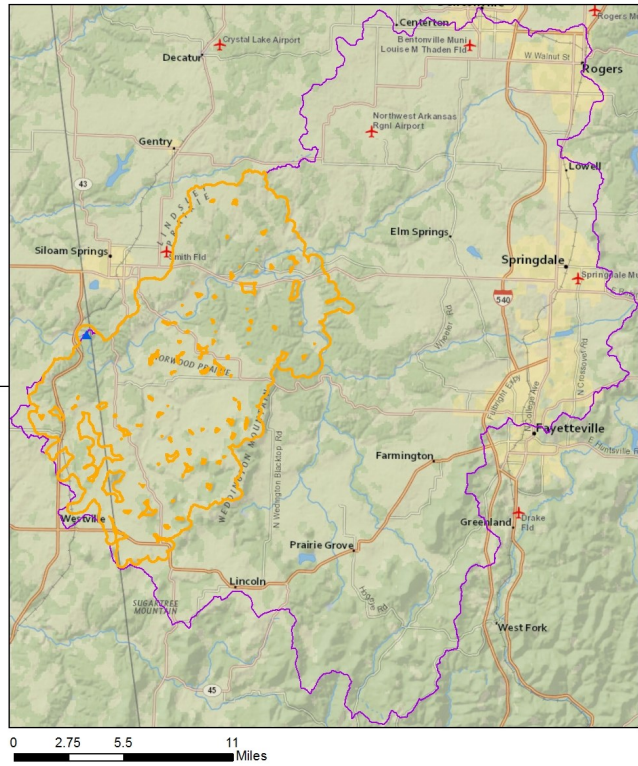
[See Back for maps generated by the report.](#)

**Explanation**

- ▲ Source Intake
- ▭ Assessment Area
- ▭ Drainage Basin

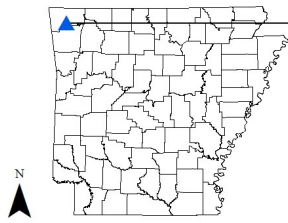


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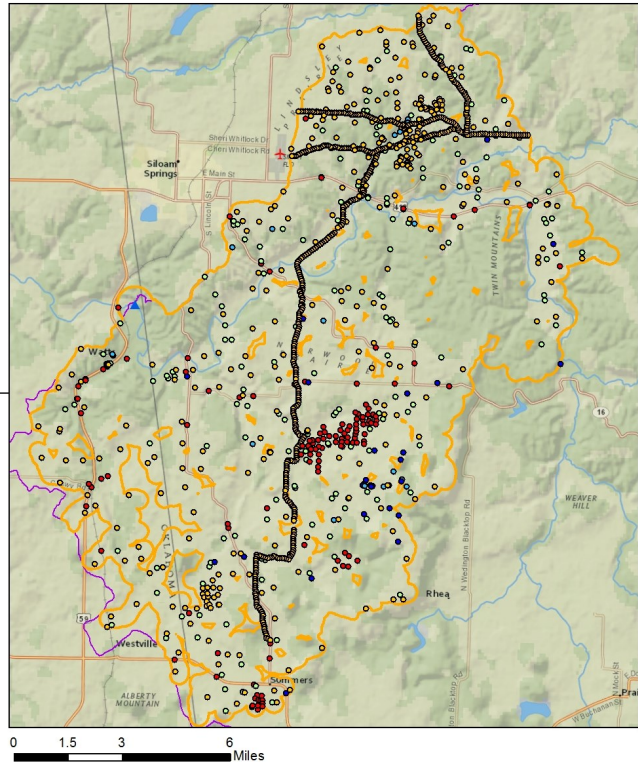


**Explanation**

- ▲ Source Intake
- PSOCs and their Health Risk Codes**
- 1 and 2 (Highest Risk)
  - 3 and 4
  - 5 and 6 (Moderate Risk)
  - 7 and 8
  - 9 and 10 (Lowest Risk)
  - ▭ Assessment Area
  - ▭ Drainage Basin



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