



# **A Guide to the Pennsylvania Groundwater Information System (PaGWIS)**

An Official Source for Water-Well and Spring Data

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## What Is PaGWIS?

The Pennsylvania Groundwater Information System (PaGWIS) is the familiar name for a database maintained by the Pennsylvania Geological Survey (PaGS) that contains records for more than 800,000 water wells and 2,600 springs located in the state.

The collection of water-well data has a long and convoluted history that dates to the Water Well Drillers License Act of May 29, 1956 (amended name from Water Well Drillers License Act of 1955). The act requires that all water-well drillers be licensed by the state and specifies types of information to be recorded. The purpose of the act is stated as follows:

Section 1. Whereas, underground water in the Commonwealth of Pennsylvania is a renewable natural resource with a great potential for further development; and whereas, it is imperative that this resource be developed, in an orderly and reasonable manner, without waste, in order to assure sufficient supplies for continued population growth and industrial development of the Commonwealth.

Therefore, it is the policy of the General Assembly of the Commonwealth of Pennsylvania to take such steps as shall be necessary to encourage the orderly development of this resource and, to this end, it is imperative that persons engaged in water-well drilling and the Commonwealth closely cooperate to procure detailed information on the ground water resources for the use of State officials and the general public in the direction of ground water development.

The full act with compiler notes on amendments can be downloaded from the Pennsylvania Department of Conservation and Natural Resources (DCNR) eLibrary website at this address: <http://elibrary.dcnr.pa.gov/GetDocument?docId=1751965&DocName=WtrWellDrillersLicAct.pdf>

Regulations for water-well drillers in Pennsylvania are outlined in the Pennsylvania Code, Title 17, Chapter 47: <https://www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/017/chapter47/chap47toc.html&d=>.

More details about water-well drillers, including the ability to search for a licensed driller by service or county of operation, can be found on the DCNR website at <https://www.dcnr.pa.gov/Business/WaterWellDrillersLicensing/LicensedWaterWellDrillers/Pages/default.aspx>.

## Evolution of PaGWIS

Below is a summary of the history of water-well and spring data collection in Pennsylvania:

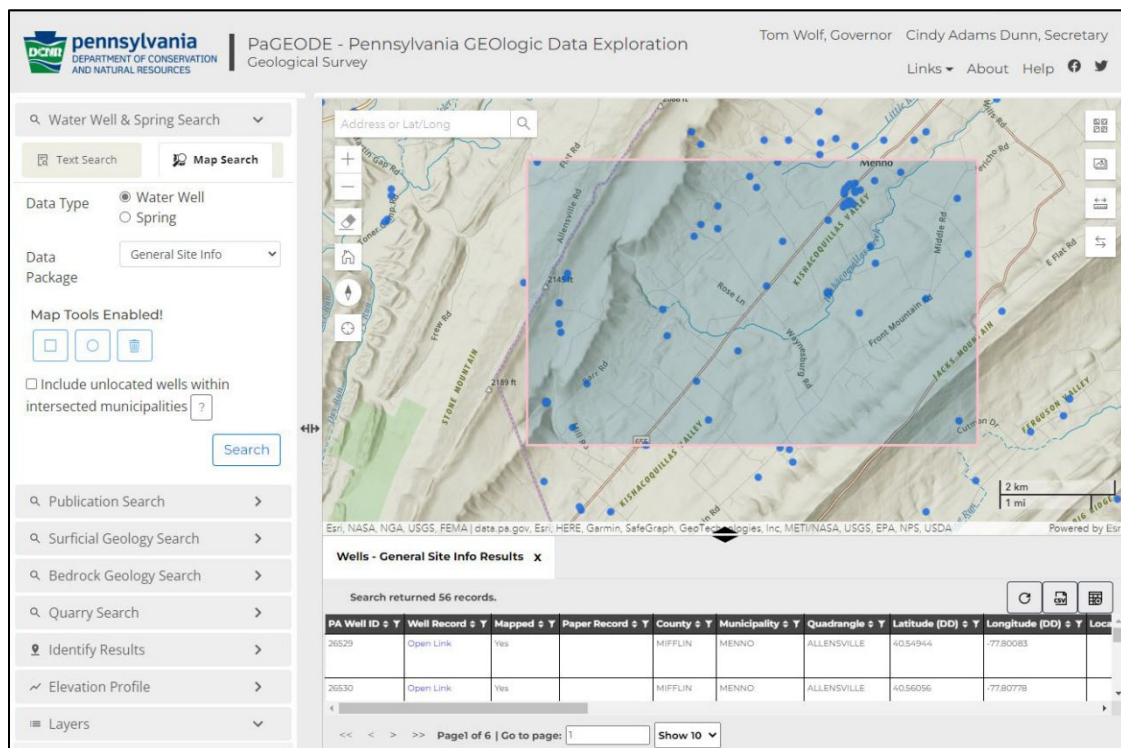
- In 1955 the Water Well Drillers License Act was passed.
- PaGS began storing paper water-well completion reports in 1965, the year that submission of these records to the organization was first required.
- In 1969, PaGS initiated the coding of water-well data from the completion reports in preparation for computer entry using punch cards.
- In 1977, PaGS staff started entering information from the paper records, both those in storage and those that were continuing to be submitted by the drillers. This early Microsoft Access database was referred to as the Water Well Inventory (WWI).
- Through the years, water-well and spring data were also imported from a multitude of government and public-organization databases or submitted by consultants. These data sources are indicated in the General Site Info data package for wells and the General Info data package for springs.
- In 1986, PaGS was working with the U.S. Geological Survey on a database of field-verified locations of wells and springs. This database was the Ground-Water Site Inventory (GWSI) database. A total of 55,283 water-well records and 1,101 springs are listed in PaGWIS as coming from the USGS – GWSI.

- Over the ensuing years, the evolution of personal computers and the internet made data entry easier. In 1998, drillers were provided an interface platform known as WebDriller to enter their records digitally.
- PaGWIS officially replaced the WWI database in the late 1990s, and new data in WebDriller was migrated weekly into the new database.
- In 2009, use of WebDriller became mandatory and submittal of paper records practically ceased.
- Also around 2009, the internal interface “PaGWIS Central” came into being. It communicated data directly into PaGWIS—PaGS staff used it to enter water-well data from the paper files and field-collected spring data.
- In 2023, the current application “PaGWISDriller” was established. It allows for active external data entries from drillers and active internal data entries from PaGS staff. As a result, PaGWIS data shared with the public is now updated daily.

## Where to Retrieve PaGWIS Data

### PaGEODE Search Results

Water-well and spring information can be obtained through a text or map search on the DCNR web application PaGEODE (<https://gis.dcnr.pa.gov/pageode/>) (Figure 1). Water wells and springs that are used for public water supplies are not included in the retrievals. The text search can be used to indicate a specific water well or spring by its identification number or to find data on wells or springs in a particular municipality. The map search has drawing tools that allows one to look for wells or springs within a selected rectangular or circular region.



**Figure 1.** Example of a water-well search by area on PaGEODE.

Water-well and spring searches have several data-package options that focus on different aspects of the data collected. A search opens a table showing the data associated with the search parameters. The tabular data can be exported to a Comma-Separated Values (CSV) file. Water-well and spring data served out of PaGEODE are updated daily from the PaGWIS database.

To obtain statewide XY locational and other key data of the shared water wells and springs in the PaGWIS database, visit the PA DCNR Authoritative Geospatial Open Data website at <https://newdata-dcnr.opendata.arcgis.com/>. From there, go to the category “Geology” (Figure 2) and search for the PaGWIS Water Wells and PaGWIS Springs data entries.



**Figure 2.** The opening page of the DCNR Open-Data website.

## Water-Well Records

In the PaGEODE search-result tables, the second column for all water-well packages is “Well Record.” Clicking on “Open Link” in this column will open an information report for the associated water well. The number of fields filled in on the opened form will vary according to the amount of information that was recorded for the well (Figure 3).

There are four main sections in the displayed water-well record:

- **Water Well Record** shows identifiers used for the well
- **Location Information** has data associated with the well location
- **Well Construction Information** provides construction details
- **Groundwater and Geological Information** contains data related to water zones and geologic materials encountered in the well

Pennsylvania Department of Conservation and Natural Resources  
Bureau of Geological Survey  
Water Well Program  
3240 Schoolhouse Road  
Middletown, PA 17057  
717-702-2017

### WATER WELL RECORD

PA Well ID: 486785 Local Well ID: Local Permit#:

### LOCATION INFORMATION

Owner: PA-DEP Original Paper Record Image Available: No  
Address of Well: 37 Western Avenue County: ALLEGHENY  
Municipality: ASPINWALL Latitude: 40.491306  
Longitude: -79.907533 Coordinate Method: GPS - Global Positioning System  
Data Reliability: Description of Well Location and Other Notes:

### WELL CONSTRUCTION INFORMATION

Well Driller: FRONTZ DRILLING INC. License: 2406 Driller Well ID:  
Type of Activity: New Well Date Drilled: 07/20/2011 Drilling Method: OTHER  
Well Depth (ft): 65 Well Finish: SCREEN

### WELL SIZE

Top (ft): 0 Bottom (ft): 65 Diameter (in): 6.5

### CASING

Top (ft): 0 Bottom (ft): 15 Diameter (in): 2 Casing Material: PVC OR OTHER PLASTIC  
Seal Top: 0 Seal Bottom: 13 Seal Type: BENTONITE CHIPS/PELLETS

### GROUNDWATER AND GEOLOGICAL INFORMATION

Well Yield (GPM - gal per min): Yield Measurement Method:  
Water Level when not pumped: (ft below land surface): 26 Water Level after yield test: (ft below land surface):  
Length of Yield Test (minutes): Saltwater Zone (ft):  
Use of Well: MONITORING Use of Water: OTHER  
Depth to Bedrock (ft): 63 Was Well Drilled Into Bedrock? Yes

### MATERIALS WELL PENETRATES

Top (ft)	Bottom (ft)	Description
0	1	Soil
1	10	Sand
10	35	Sand; gravel
35	63	Coarse Sand and gravel
63	65	Weathered Shale

### LEVELS WHERE WATER ENTERS WELL

Top (ft)	Bottom (ft)	Yield (GPM)
23	63	

Date Printed:

04/27/2022

**Figure 3.** A water-well record that was displayed after clicking “Open Link” in the “Well Record” column on a PaGEODE search-result table. The column appears in the search-result tables of all water-well data packages.



## Spring Reports

In the PaGEODE search-result tables for all spring data packages, the second column is “Spring Report.” Clicking on “Open Link” in this column will open an information report for the associated spring. The number of fields filled in on the opened form will vary according to the amount of information that was collected for the spring (Figure 4).

There are three main sections in the displayed spring report:

- **Spring Information Report** shows identifiers used for the spring and includes extra information on data reliability and spring improvements
- **Location Information** has data associated with the spring location
- **Hydrogeological Information** provides data related to the hydrogeology of the spring—this includes the geologic formation, rock type, discharge environment, spring type, discharge average and number of measurements, permanence of spring, spring use of site, and spring water use

Pennsylvania Department of Conservation and Natural Resources Bureau of Geological Survey Water Well Program 3240 Schoolhouse Road Middletown, PA 17057 717-702-2017			
<b>SPRING INFORMATION REPORT</b>			
PA Spring ID:	1187	Data Reliability:	NOT FLD CHECKED, RPRTING AGENCY CONSIDERS IT OK (DEP WSM, WWI web)
Spring Name:		Improvements:	
Description of spring and other notes:	Filippo, (1974)		
<b>LOCATION INFORMATION</b>			
County:	BERKS	Quadrangle:	BIRDSBORO
Municipality:	EXETER	Topography:	VALLEY FLAT
Latitude:	40.29972	Longitude:	-75.84917
Elevation (feet above sea level):	208		
<b>HYDROGEOLOGICAL INFORMATION</b>			
Geologic Formation:	BRUNSWICK FORMATION	Discharge Environment:	FLOWING
Rock Type:	SILTSTONE	Average flow in gallons/minute:	150
Spring Type:	SPRING	Number of measurements:	2
Permanence of Spring:		Spring Use of Site:	WITHDRAWAL
Spring Water Use:	IRRIGATION		
Detailed flow data, as well as both lab and field water quality data, can be obtained by downloading the Hydrogeologic, Lab Water Quality, and Field Water Quality data packages, respectively.			Date Printed: 11/02/2022

**Figure 4.** A spring report that was displayed after clicking “Open Link” in the “Spring Report” column on a PaGEODE search-result table. The column appears in the search-result tables of all spring data packages.

## Locational Accuracy

Although some locations may have been field checked or located with GPS, all well locations in PaGWIS should be considered questionable. In fact, the original goal of the Water Well Inventory database was to place a well within a mile of its actual occurrence! All springs were likely field checked, but the accuracies of their locations vary with the locational methods used and the technology available at the time of data collection.

The latitude and longitude of PaGWIS water wells and springs are reported in decimal degrees and served out of PaGEODE to five decimal places. In Pennsylvania, the horizontal difference of the fifth decimal point for latitude and longitude is roughly 3.6 feet—most assigned coordinates are not accurate to the fifth decimal place.

## Manner of Data Collection—Water Wells

In the first decades of data collection, drillers would write a description for the location of a water well on a paper form known as the well completion report. Some of these submittals included a sketch of road intersections or other landmarks to help locate the well (Figure 5). The earlier forms were in the years before hand-held GPS units and did not have spaces for latitude-longitude entries.

**Figure 5.** Driller's well completion report from 1986 showing a sketch map of a water-well location. Many images of old paper records are included in PaGWIS, but not all scanned records were assigned to a water-well entry and updates continue to be made. In PaGEODE, if a water well has a paper record associated with it, a link to the image will be provided under the "Paper Record" column of the General Site Info search-result table.

To calculate the location of one of these earlier wells, PaGS staff would use the information on the well completion report to plot a point representing the water well on a 1:24,000-scale, USGS topographic quadrangle map. They would then position a mylar grid with a 6-second spacing on the map and note the point location to the nearest estimated second of latitude and longitude.

### Unlocated Wells

Some completion reports did not have enough information to guess at the well locations. The data entered for these wells include county and municipality, but latitude-longitude coordinates are missing. Approximately 40 percent of the wells in PaGWIS do not have geographic coordinates assigned to them.

When performing a map search in PaGEODE for water wells, there is an option to "include unlocated wells within intersected municipalities" (Figure 1). Checking this box will allow wells that do not have geographic coordinates to appear in the search-result table. The unlocated wells are distinguished by a "No" entry in the "Mapped" column of the tables.

### Located Wells

Going into the twenty-first century, drillers started entering their water-well data online through a WebDriller interface. WebDriller had map tools that allowed for accurate placement of a well. This function continues in the updated PaGWISDriller interface used by drillers today.

The method of data entry by PaGS staff from backlogged, paper water-well completion reports has also changed. Two PaGS staff (usually interns) work independently to locate a water well using online-mapping tools. Only if the submitted locations are "reasonably close" will one of those two locations be entered. The definition of "reasonably close" is subjective and varies for different areas, but it is usually on the order of 500 to 1,000 feet.

## Manner of Data Collection—Springs

All springs list a latitude and longitude, and it is believed that all were field located. As of the date of this document, there were over 2,600 springs in PaGWIS. Most were located by PaGS staff, 1,101 came from the USGS – GWSI, and 31 came from other sources.

Even field-checked locations will vary in locational accuracy, which is dependent upon whether the visitor made use of a GPS unit, good landmarks, or some other positioning method.

## Undocumented Datums

All geographic coordinates (latitude and longitude indicating a location on a map) are with respect to a geodetic datum (an ellipsoid representing the surface of the earth). The datums used when locating the water wells and springs found in PaGWIS included the North American Datum of 1927 (NAD27), the North American Datum of 1983 (NAD83), and the World Geodetic System of 1984 (WGS84). Paper topographic quadrangle maps used for locating water wells and springs (either while out in the field or from descriptions on water-well completion reports) had an NAD27 or NAD83 datum. Points located with a map tool and by most GPS devices had a WGS84 datum.

Although accuracy of well locations varies widely, the difference in coordinates based on the datum could be an additional source of error in the well location. PaGEODE uses a WGS84 datum. The base maps you can choose in PaGEODE would have been transformed to that datum if they were not already equivalent. In Pennsylvania, a point plotted on an NAD83 base map would have to move a few feet to be at the same geographic location on a WGS84 base map. This error is considered negligible at map scales of 1:5,000 or less. The NAD27 datum was phased out after NAD83 was created. Points on an NAD27 map would have to shift anywhere from 60 to 100 feet to land on the same WGS84 location in Pennsylvania.

When PaGS staff entered water-well and spring coordinates from the paper topographic maps to PaGWIS, the datum was not noted. Because of this, no datum transformations are possible.

## Completeness of Data

Based on U.S. census data, there are more than 1 million private water wells in Pennsylvania. PaGWIS is believed to contain less than half of these wells. Two reasons for this are as follows:

1. Drillers were not required to submit water records to the Survey until 1965, so most wells drilled prior to 1965 are not in PaGWIS.
2. There has not been 100 percent compliance with the requirement to submit records. This was especially true in the late 1960s.

It is unknown how many springs are in Pennsylvania. Therefore, it is also unknown what percentage of springs have been entered into PaGWIS. Suffice it to say, there are many more to be added.

## Data Packages

PaGWIS has a plethora of data for water wells and springs. PaGEODE searches consist of several data packages for each data type (water well or spring). These packages are listed on the next page.

## Water-Well Packages

**General Info:** information on major water-well characteristics

**Site Info:** information on the location and identification of the water well and the source of the data

**Geologic:** description of geologic units penetrated by the water well

**Hydrogeologic:** information about water-bearing zones (WBZ) and well production

**Well Construction:** information related to the drilling and materials used to construct the well

## Spring Packages

**General Info:** information on the location and identification of the spring, the source of the data, and spring improvement and uses

**Hydrogeologic:** description of spring discharge and the geologic unit

**Lab Water Quality:** analytical results of water-quality tests performed in a laboratory

**Field Water Quality:** results of water-quality tests performed in the field

Because of the relational nature of the database, it is possible to have multiple returns for the same water well or the same spring in a data package. Here are two examples: (1) multiple water-bearing zones in a water well will have entries for each zone in the Hydrogeologic data package, and (2) multiple visits to a spring to test water quality will lead to separate entries for each parameter reflecting the date the spring was visited in the Field Water Quality data package.

PaGWIS data-package parameters seen in the search-result tables on PaGEODE are explained in the appendices of this guide.

## Suggested Citations

### PaGWIS User Guide

Pennsylvania Geological Survey, 2024, A guide to the Pennsylvania Groundwater Information System (PaGWIS)—An official source for water-well and spring data: Pennsylvania Geological Survey, 4th ser., report, 30 p. [Report dated March 22, 2024.]

### PaGWIS Database

Pennsylvania Geological Survey, YYYY, PaGWIS—Pennsylvania groundwater information system: Pennsylvania Geological Survey, 4th ser., database. [Data accessed from <https://gis.dcnr.pa.gov/pageode/> on Month DD, YYYY.]

### PaGEODE Web Application

Pennsylvania Geological Survey, YYYY, PaGEODE—Pennsylvania geologic data exploration: Pennsylvania Geological Survey, 4th ser., web application, <https://gis.dcnr.pa.gov/pageode/>. [Accessed on Month DD, YYYY.]

## Questions

Questions about the PaGWIS program or data should be directed to the Pennsylvania Geological Survey at 717-702-2017 or [pagwisdriller@pa.gov](mailto:pagwisdriller@pa.gov). Questions related to the use of PaGEODE or the DCNR Open-Data portal should be directed to [CEDCGIS@pa.gov](mailto:CEDCGIS@pa.gov).

## Appendix 1. Parameters Used in Water-Well Data Packages

### General Info

Field Name	Definition
PA Well ID	Unique number assigned by PaGWIS. Used to identify the water well.
Well Record	Link that opens the Water Well Record—a document of selected information related to the water-well identification, location, construction, and hydrogeology.
Paper Record	Link to an image of the water-well completion report. If there is not a scanned image of a report associated with the PaGWIS water-well entry, then this field is blank. Records submitted electronically by drillers will not have paper records.
Original Owner	Person or entity for whom the well was drilled. For a housing development where the homeowner is unknown, the developer's name is typically used.
Well Address	Street address associated with the water-well site as entered on the water-well record by the driller. If well address was not indicated by the driller, this field is blank.
Date Drilled	Date drilling was completed. In older records, if only the month and year were provided, the assigned day was the first of the month.
Latitude (DD)	Latitude of the well location in decimal degrees. This value is positive to indicate northern hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Longitude (DD)	Longitude of the well location in decimal degrees. This value is negative to indicate western hemisphere. Although the value is given to five decimal places, locations are not that accurate.
County	County in which the well is located.
Municipality	Municipality of the well site.
Quadrangle	The 7.5-minute quadrangle where the well is located. If there are no geographic coordinates given for the well, then this field is blank.
Well Zip Code	Zip code associated with the water-well site.
Activity Type	Purpose of the drilling activity, most commonly “new well.” <ul style="list-style-type: none"> <li>• clean-out</li> <li>• closed-loop geothermal</li> <li>• new well</li> <li>• open-loop geothermal</li> <li>• other</li> <li>• yield enhancement</li> </ul>
Driller	Name of drilling company (not an individual driller).

General Info *(Continued)*

Field Name	Definition
Well Use	<p>Intended use of the water well by the owner.</p> <ul style="list-style-type: none"> <li>abandoned</li> <li>anode</li> <li>closed-loop geothermal</li> <li>destroyed</li> <li>drain</li> <li>dry</li> <li>emergency supply</li> <li>geothermal</li> <li>heat reservoir</li> <li>injection</li> <li>mine</li> <li>monitoring</li> <li>observation</li> <li>oil or gas well</li> <li>open-loop geothermal</li> <li>recharge</li> <li>recreation</li> <li>repressurize</li> <li>seismic</li> <li>test</li> <li>unknown</li> <li>unused</li> <li>waste disposal</li> <li>withdrawal</li> </ul>
Water Use	<p>Intended use of the water by the owner.</p> <ul style="list-style-type: none"> <li>air conditioning</li> <li>aquaculture</li> <li>bottling</li> <li>commercial</li> <li>desalination</li> <li>dewater</li> <li>domestic</li> <li>fire</li> <li>geothermal</li> <li>industrial</li> <li>industrial cooling</li> <li>institutional</li> <li>irrigation</li> <li>medicinal</li> <li>mining</li> <li>other</li> <li>power</li> <li>recreation</li> <li>stock</li> <li>unknown</li> <li>unused</li> </ul>
Well Depth (ft)	Depth of the well, in feet below land surface.
Casing Top (ft)	Top of the casing used in the borehole, in feet below land surface. A negative number indicates a stickup above the surface.
Casing Bottom (ft)	Bottom of the casing used in the borehole, in feet below land surface.
Casing Diameter (in)	Diameter of the casing, in inches.
Bedrock Depth (ft)	Depth at which bedrock is encountered, in feet below the surface.
Bedrock Reached	Indicates if bedrock was encountered during drilling. "True" means bedrock was encountered; "False" means it was not encountered.
Well Yield (gpm)	Measurement or estimate of the yield of the well, in gallons per minute.
Static Water Level (ft)	Highest level of water in the well after being left undisturbed for at least 1 hour or for a time period sufficient enough for the water level to stabilize after drilling. Reported in feet below land surface.
Production Water Level (ft)	Lowest level of water in the well during a pumping test. Reported in feet below land surface.

### General Info *(Continued)*

Field Name	Definition
Test Duration (mins)	Length of time that the well was tested. Reported in minutes.
Well Yield Method	Method of well yield calculation. <ul style="list-style-type: none"> <li>• acoustic meter</li> <li>• pitot-tube meter</li> <li>• bailer</li> <li>• reported, method not known</li> <li>• current meter</li> <li>• totaling meter</li> <li>• Doppler meter</li> <li>• trajectory method</li> <li>• estimated</li> <li>• unknown</li> <li>• flume</li> <li>• venturi meter</li> <li>• orifice</li> <li>• volumetric, watch &amp; bucket</li> <li>• other</li> <li>• weir</li> </ul>
Saltwater Depth (ft)	Depth at which salt water was first encountered, in feet below land surface. Field is blank if salt water was not encountered, or such encounter was not indicated by the driller.
Formation	Reported primary aquifer of the well, using the American Association of Petroleum Geologists geologic formation names. Information should be compared with PaGS geologic mapping.
Remarks	Comments made about the well by the driller or by PaGS staff.

### Site Info

Field Name	Definition
PA Well ID	Unique number assigned by PaGWIS. Used to identify the water well.
Well Record	Link that opens the Water Well Record—a document of selected information related to the water-well identification, location, construction, and hydrogeology.
Paper Record	Link to an image of the water-well completion report. If there is not a scanned image of a report associated with the PaGWIS water-well entry, then this field is blank. Records submitted electronically by drillers will not have paper records.
Original Owner	Person or entity for whom the well was drilled. For a housing development where the homeowner is unknown, the developer's name is typically used.
Well Address	Street address associated with the water-well site as entered on the water-well record by the driller. If well address was not indicated by the driller, this field is blank.
Date Drilled	Date drilling was completed. In older records, if only the month and year were provided, the assigned day was the first of the month.



Site Info *(Continued)*

Field Name	Definition
Latitude (DD)	Latitude of the well location in decimal degrees. This value is positive to indicate northern hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Longitude (DD)	Longitude of the well location in decimal degrees. This value is negative to indicate western hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Mapped	“Yes” indicates the approximate water-well location is shown on the map. “No” indicates the location is not shown but the water well occurs within a selected municipality.
County	County in which the well is located.
Municipality	Municipality of the well site.
Quadrangle	The 7.5-minute quadrangle where the well is located. If there are no geographic coordinates given for the well, then this field is blank.
Location Method	Method used by the driller or PaGS staff to determine geographic coordinates or municipality. If field is blank, the method used to locate the water well was not indicated. <ul style="list-style-type: none"> <li>• Commercial Street Atlas Program</li> <li>• Digital Quadrangle Map</li> <li>• GPS - Global Positioning System</li> <li>• Paper Quadrangle Map</li> </ul>
Well Zip Code	Zip code associated with the water-well site.
Site Type	Type of site (typically “Well”). <ul style="list-style-type: none"> <li>• Collector or Rainey Type Well</li> <li>• Drain</li> <li>• Excavation</li> <li>• Interconnected</li> <li>• Interconnected Wells</li> <li>• Multiple Wells</li> <li>• Outcrop</li> <li>• Pond</li> <li>• Sinkhole</li> <li>• Test Hole - Not Completed as Well</li> <li>• Tunnel, Shaft, or Mine</li> <li>• Well</li> </ul>
Topography	Reported topography at the well site. Categories came from the USGS - GWSI database and entries only occur in wells from that dataset. <ul style="list-style-type: none"> <li>• Alluvial Plain</li> <li>• Dunes</li> <li>• Flat Surface</li> <li>• Floodplain</li> <li>• Hillside</li> <li>• Lake</li> <li>• Local Depression</li> <li>• Mangrove Swamp</li> <li>• Marsh</li> <li>• Offshore</li> <li>• Pediment</li> <li>• Playa</li> <li>• Sinkhole</li> <li>• Stream Channel</li> </ul>



Site Info *(Continued)*

Field Name	Definition
Topography (Continued)	<ul style="list-style-type: none"> <li>• Swamp</li> <li>• Terrace</li> <li>• Undulating</li> <li>• Upland Draw</li> <li>• Unknown</li> <li>• Valley Flat</li> </ul>
Elevation (ft)	Elevation of the earth's surface at the well site, in feet.
Elevation Method	Method used to determine the elevation at the well site. <ul style="list-style-type: none"> <li>• Altimeter</li> <li>• Interpolated from Topographic Map</li> <li>• Level or Other Surveying Method</li> <li>• PAMAP Digital Elevation Model</li> <li>• Unknown</li> </ul>
Elevation Accuracy (ft)	Approximate accuracy of the elevation, in feet.
Water Use	Intended use of the water by the owner. <ul style="list-style-type: none"> <li>• air conditioning</li> <li>• aquaculture</li> <li>• bottling</li> <li>• commercial</li> <li>• desalination</li> <li>• dewater</li> <li>• domestic</li> <li>• fire</li> <li>• geothermal</li> <li>• industrial</li> <li>• industrial cooling</li> <li>• institutional</li> <li>• irrigation</li> <li>• medicinal</li> <li>• mining</li> <li>• other</li> <li>• power</li> <li>• recreation</li> <li>• stock</li> <li>• unknown</li> <li>• unused</li> </ul>
Well Use	Intended use of the water well by the owner. <ul style="list-style-type: none"> <li>• abandoned</li> <li>• anode</li> <li>• closed-loop geothermal</li> <li>• destroyed</li> <li>• drain</li> <li>• dry</li> <li>• emergency supply</li> <li>• geothermal</li> <li>• heat reservoir</li> <li>• injection</li> <li>• mine</li> <li>• monitoring</li> <li>• observation</li> <li>• oil or gas well</li> <li>• open-loop geothermal</li> <li>• recharge</li> <li>• recreation</li> <li>• repressurize</li> <li>• seismic</li> <li>• test</li> <li>• unknown</li> <li>• unused</li> <li>• waste disposal</li> <li>• withdrawal</li> </ul>

Site Info *(Continued)*

Field Name	Definition
Data Source	<p>Collection from where the water-well data were retrieved. Options and explanations are as follows:</p> <ul style="list-style-type: none"> <li>• Delaware River Basin Comm (data are from a Delaware River Basin Commission database)</li> <li>• EPA (data are from an EPA source other than STORET)</li> <li>• EPA STORET (data are from EPA STOage and RETrieval database and do not occur in one of the other identified sources in this field)</li> <li>• Ohio River Basin Comm (data are from an Ohio River Basin Commission database)</li> <li>• Other/Unknown/Unspecified (source of site data is unknown or unidentified)</li> <li>• PA Dept Of Agriculture Pesticide Survey (field-verified site from the Pennsylvania Department of Agriculture pesticide survey)</li> <li>• PA DEP Water Supply Mgt (data were obtained from former Bureau of Water Supply Management, in the former Division of Drinking Water Management, in the Pennsylvania Department of Environmental Protection)</li> <li>• PaGS (data were collected by PaGS staff and are not associated with a water-well completion report)</li> <li>• PaGS Other Than WWI (site located by PaGS staff for which no water-well completion report was available)</li> <li>• PaGS WWI Electronic (site submitted by the driller using the WebDriller or PaGWISDRILLER internet application)</li> <li>• PaGS WWI PAPER (site located by PaGS staff from the description on a paper water-well completion report supplied by the driller)</li> <li>• Potomac River Basin Comm (data are from a Potomac River Basin Commission database)</li> <li>• Private/Univ Geologist (Consultant) (data were collected by a consultant or academia; often found in a thesis or technical report, such as a site assessment)</li> <li>• Susquehanna River Basin Comm (data are from a Susquehanna River Basin Commission database)</li> <li>• USGS – GWSI (field-verified site from the USGS National Ground Water Site Inventory database)</li> <li>• USGS - Other Than GWSI (data are from a USGS database other than GWSI)</li> <li>• Water Company (data are from a licensed water purveyor)</li> </ul>
Data Reliability	<p>Assessment of the reliability of the data.</p> <ul style="list-style-type: none"> <li>• Field Checked by Reporting Agency (PaDAg pest. Survey)</li> <li>• Location May Not Be Accurate (WWI paper)</li> <li>• Minimal Data</li> </ul>

### Site Info *(Continued)*

Field Name	Definition
Data Reliability <i>(Continued)</i>	<ul style="list-style-type: none"> <li>• Not FLD (Field) Checked</li> <li>• Reporting Agency Considered It Ok</li> <li>• Unknown</li> </ul>
Permit Number	Permit number obtained from a local municipality.
Local Well ID	A well identification number used by a local agency that differs from the PA Well ID.
Remarks	Comments made about the well by the driller or by PaGS staff.

### Geologic

Field Name	Definition
PA Well ID	Unique number assigned by PaGWIS. Used to identify the water well.
Well Record	Link that opens the Water Well Record—a document of selected information related to the water-well identification, location, construction, and hydrogeology.
Original Owner	Person or entity for whom the well was drilled. For a housing development where the homeowner is unknown, the developer's name is typically used.
Well Address	Street address associated with the water-well site as entered on the water-well record by the driller. If well address was not indicated by the driller, this field is blank.
Date Drilled	Date drilling was completed. In older records, if only the month and year were provided, the assigned day was the first of the month.
Latitude (DD)	Latitude of the well location in decimal degrees. This value is positive to indicate northern hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Longitude (DD)	Longitude of the well location in decimal degrees. This value is negative to indicate western hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Mapped	“Yes” indicates the approximate water-well location is shown on the map. “No” indicates the location is not shown but the water well occurs within a selected municipality.

*Geologic (Continued)*

Field Name	Definition
Bedrock Reached	Indicates if bedrock was encountered during drilling. "True" means bedrock was encountered; "False" means it was not encountered.
Bedrock Depth (ft)	Depth at which bedrock is encountered, in feet below the surface.
Interval Top (ft)	Top of an interval described by the driller, in feet below the surface.
Interval Bottom (ft)	Bottom of an interval described by the driller, in feet below the surface.
Interval Description	Driller's description of materials penetrated in a specified interval within the water well.

*Hydrogeologic*

Field Name	Definition
PA Well ID	Unique number assigned by PaGWIS. Used to identify the water well.
Well Record	Link that opens the Water Well Record—a document of selected information related to the water-well identification, location, construction, and hydrogeology.
Original Owner	Person or entity for whom the well was drilled. For a housing development where the homeowner is unknown, the developer's name is typically used.
Well Address	Street address associated with the water-well site as entered on the water-well record by the driller. If well address was not indicated by the driller, this field is blank.
Date Drilled	Date drilling was completed. In older records, if only the month and year were provided, the assigned day was the first of the month.
Latitude (DD)	Latitude of the well location in decimal degrees. This value is positive to indicate northern hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Longitude (DD)	Longitude of the well location in decimal degrees. This value is negative to indicate western hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Mapped	"Yes" indicates the approximate water-well location is shown on the map. "No" indicates the location is not shown but the water well occurs within a selected municipality.

### Hydrogeologic (Continued)

Field Name	Definition
Hydrologic Unit	USGS catalog-level division of surface-water area, which is defined as “a geographic area representing part or all of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature.” Almost all catalog divisions are larger than 700 square miles. Refer to <a href="#">USGS Water-Supply Paper 2294</a> for details.
Saltwater Depth (ft)	Depth at which salt water was first encountered, in feet below land surface. Field is blank if salt water was not encountered, or such encounter was not indicated by the driller.
Formation	Reported primary aquifer of the well, using the American Association of Petroleum Geologists geologic formation names. Information should be compared with PaGS geologic mapping.
Lithology	<p>Rock or sediment type noted for the formation.</p> <ul style="list-style-type: none"> <li>alluvium</li> <li>anhydrite</li> <li>anorthosite</li> <li>arkose</li> <li>basalt</li> <li>bentonite</li> <li>boulders</li> <li>boulders and sand</li> <li>boulders, silt, and clay</li> <li>breccia</li> <li>calcite</li> <li>caliche (hard pan)</li> <li>carbonolith</li> <li>chalk</li> <li>chert</li> <li>clay</li> <li>clay, some sand</li> <li>claystone</li> <li>coal</li> <li>cobbles</li> <li>cobbles and sand</li> <li>cobbles, silt, and clay</li> <li>colluvium</li> <li>conglomerate</li> <li>coquina</li> <li>diabase</li> <li>diorite</li> <li>dolomite</li> <li>dolomite and shale</li> <li>drift</li> <li>gabbro</li> <li>glacial (undifferentiated)</li> <li>gneiss</li> <li>granite</li> <li>granite, gneiss</li> <li>gravel</li> <li>gravel and clay</li> <li>gravel, cemented</li> <li>gravel, sand, and silt</li> <li>gravel, silt, and clay</li> <li>graywacke</li> <li>greenstone</li> <li>gypsum</li> <li>hard pan</li> <li>igneous (undifferentiated)</li> <li>lignite</li> <li>limestone</li> <li>limestone and dolomite</li> <li>limestone and shale</li> <li>loam</li> <li>loess</li> <li>marble</li> <li>marl</li> <li>marlstone</li> <li>metamorphic (undifferentiated)</li> <li>muck</li> <li>mud</li> <li>mudstone</li> <li>other</li> <li>outwash</li> </ul>

Hydrogeologic *(Continued)*

Field Name	Definition
Lithology <i>(Continued)</i>	<ul style="list-style-type: none"> <li>• overburden</li> <li>• peat</li> <li>• quartzite</li> <li>• residuum</li> <li>• rhyolite</li> <li>• rock</li> <li>• rubble, barney</li> <li>• sand</li> <li>• sand and clay</li> <li>• sand and gravel</li> <li>• sand and silt</li> <li>• sand, gravel, and clay</li> <li>• sand, some clay</li> <li>• sandstone</li> <li>• sandstone and shale</li> <li>• saprolite</li> <li>• schist</li> <li>• sedimentary (undifferentiated)</li> <li>• serpentine</li> <li>• shale</li> <li>• silt</li> <li>• silt and clay</li> <li>• siltstone</li> <li>• slate</li> <li>• soil</li> <li>• syenite</li> <li>• till</li> <li>• topsoil</li> <li>• travertine</li> <li>• tuff</li> <li>• unknown</li> </ul>
Lithology Contribution	Assessment of the water-producing contribution of a particular lithology to the well. Options include no water, primary, secondary, and unknown.
Interval Top (ft)	Top of the interval of the contributing unit, in feet below land surface.
Interval Bottom (ft)	Bottom of the interval of the contributing unit, in feet below land surface.
Discharge Type	Type of well discharge. Options include flowing, pumped, and unknown.
Well Yield Method	<p>Method of well yield calculation.</p> <ul style="list-style-type: none"> <li>• acoustic meter</li> <li>• bailer</li> <li>• current meter</li> <li>• Doppler meter</li> <li>• estimated</li> <li>• flume</li> <li>• orifice</li> <li>• other</li> <li>• pitot-tube meter</li> <li>• reported, method not known</li> <li>• totaling meter</li> <li>• trajectory method</li> <li>• unknown</li> <li>• venturi meter</li> <li>• volumetric, watch &amp; bucket</li> <li>• weir</li> </ul>
Well Yield (gpm)	Measurement or estimate of the yield of the well, in gallons per minute.
Water Level Method	<p>Method used to measure the water level.</p> <ul style="list-style-type: none"> <li>• airline</li> <li>• calibrated airline</li> <li>• calibrated electric tape</li> <li>• calibrated pressure gage</li> <li>• electric tape</li> <li>• estimated</li> <li>• geophysical log</li> <li>• manometer</li> <li>• nonrecording gage</li> <li>• other</li> </ul>

Hydrogeologic *(Continued)*

Field Name	Definition
Water Level Method <i>(Continued)</i>	<ul style="list-style-type: none"> <li>• pressure gage</li> <li>• recorder</li> <li>• reported, method not known</li> <li>• steel tape</li> <li>• unknown</li> </ul>
Static Water Level (ft)	Highest level of water in the well after being left undisturbed for at least 1 hour or for a time period sufficient enough for the water level to stabilize after drilling. Reported in feet below land surface.
Production Water Level (ft)	Lowest level of water in the well during a pumping test. Reported in feet below land surface.
Test Duration (mins)	Length of time that the well was tested. Reported in minutes.
Site Status WL	<p>Status of the site during the measurement of the water level.</p> <ul style="list-style-type: none"> <li>• flowing, head not measured</li> <li>• foreign substance present on water surface</li> <li>• injector site</li> <li>• injector site monitor</li> <li>• measurement discontinued</li> <li>• nearby site had been pumped recently</li> <li>• nearby site was being pumped</li> <li>• nearby site was flowing</li> <li>• nearby site was flowing recently</li> <li>• obstruction in well above WL (water level)</li> <li>• other conditions affect measured water level</li> <li>• site had been pumped recently</li> <li>• site was being pumped</li> <li>• site was dry</li> <li>• site was flowing recently</li> <li>• static water level</li> <li>• water level affected by nearby surface water site</li> <li>• well was destroyed</li> </ul>
Test Date	Date of the yield test.
Drawdown (ft)	Difference between the static water level and the production water level. Reported in feet.
Specific Capacity (gpm/ft)	Productivity of the well. Equivalent to well yield (in gallons per minute) divided by drawdown (in feet).
WBZ Top (ft)	Top of a water-bearing zone, in feet below land surface.
WBZ Bottom (ft)	Bottom of a water-bearing zone, in feet below land surface.
WBZ Yield (gpm)	Yield of a water-bearing zone, in gallons per minute.

## Well Construction

Field Name	Definition
PA Well ID	Unique number assigned by PaGWIS. Used to identify the water well.
Well Record	Link that opens the Water Well Record—a document of selected information related to the water-well identification, location, construction, and hydrogeology.
Original Owner	Person or entity for whom the well was drilled. For a housing development where the homeowner is unknown, the developer's name is typically used.
Well Address	Street address associated with the water-well site as entered on the water-well record by the driller. If well address was not indicated by the driller, this field is blank.
Date Drilled	Date drilling was completed. In older records, if only the month and year were provided, the assigned day was the first of the month.
Latitude (DD)	Latitude of the well location in decimal degrees. This value is positive to indicate northern hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Longitude (DD)	Longitude of the well location in decimal degrees. This value is negative to indicate western hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Mapped	“Yes” indicates the approximate water-well location is shown on the map. “No” indicates the location is not shown but the water well occurs within a selected municipality.
Driller	Name of drilling company (not an individual driller).
Driller Well ID	Unique identification number assigned to the driller. The number is unique only within the drilling company.
Activity Type	Purpose of the drilling activity, most commonly “new well.” <ul style="list-style-type: none"> <li>• clean-out</li> <li>• closed-loop geothermal</li> <li>• new well</li> <li>• open-loop geothermal</li> <li>• other</li> <li>• yield enhancement</li> </ul>
Drilling Method	Method of well drilling. <ul style="list-style-type: none"> <li>• air percussion</li> <li>• air rotary</li> <li>• bored or augered</li> <li>• cable tool</li> <li>• driven</li> <li>• drive wash</li> <li>• dug</li> <li>• hydraulic rotary</li> <li>• jetted</li> <li>• reverse rotary</li> <li>• trenching</li> <li>• other</li> </ul>



Well Construction *(Continued)*

Field Name	Definition		
Finish Method	<p>How the well is finished.</p> <ul style="list-style-type: none"> <li>• Closed-Loop Geothermal (Ground source heat pump borehole that contains a pipe that circulates the heat pump fluid in a closed system.)</li> <li>• Gravel Pack w/ Perforations (Perforated casing with a gravel pack either inside or outside of the casing.)</li> <li>• Gravel Pack w/ Screen (A well screen with a gravel pack in the annular space.)</li> <li>• Horizontal Gallery</li> <li>• Open End (Well cased though its entire length, allowing water to enter only through the open end.)</li> <li>• Open Hole (Well finished with an unsupported (uncased) borehole, most often in bedrock.)</li> <li>• Perforated or Slotted (Well cased through its entire length with selected section(s) either perforated or slotted.)</li> <li>• Sand Point (Hardened and pointed well screen driven into sediments.)</li> <li>• Screen (Well finished with a manufactured well screen.)</li> <li>• Other</li> <li>• Porous Concrete</li> <li>• Unknown</li> <li>• Walled (Well is lined, usually with stone or tile.)</li> </ul>		
Casing Top (ft)	Top of the casing used in the borehole, in feet below land surface. A negative number indicates a stickup above the surface.		
Casing Bottom (ft)	Bottom of the casing used in the borehole, in feet below land surface.		
Casing Diameter (in)	Diameter of the casing, in inches.		
Casing Material	<p>Type of material used for casing.</p> <table> <tr> <td> <ul style="list-style-type: none"> <li>• brick</li> <li>• coated steel</li> <li>• concrete</li> <li>• copper</li> <li>• galvanized iron</li> <li>• other</li> <li>• other metal</li> </ul> </td><td> <ul style="list-style-type: none"> <li>• PVC or other plastic</li> <li>• rock or stone</li> <li>• steel</li> <li>• tile</li> <li>• unknown</li> <li>• wood</li> <li>• wrought iron</li> </ul> </td></tr> </table>	<ul style="list-style-type: none"> <li>• brick</li> <li>• coated steel</li> <li>• concrete</li> <li>• copper</li> <li>• galvanized iron</li> <li>• other</li> <li>• other metal</li> </ul>	<ul style="list-style-type: none"> <li>• PVC or other plastic</li> <li>• rock or stone</li> <li>• steel</li> <li>• tile</li> <li>• unknown</li> <li>• wood</li> <li>• wrought iron</li> </ul>
<ul style="list-style-type: none"> <li>• brick</li> <li>• coated steel</li> <li>• concrete</li> <li>• copper</li> <li>• galvanized iron</li> <li>• other</li> <li>• other metal</li> </ul>	<ul style="list-style-type: none"> <li>• PVC or other plastic</li> <li>• rock or stone</li> <li>• steel</li> <li>• tile</li> <li>• unknown</li> <li>• wood</li> <li>• wrought iron</li> </ul>		
Sealant Top (ft)	Top of the sealant used in the borehole, in feet below land surface.		
Sealant Bottom (ft)	Bottom of the sealant used in the borehole, in feet below land surface.		

Well Construction *(Continued)*

Field Name	Definition
Sealant Name	Type of sealant used in the borehole. Could include multiple seal intervals. <ul style="list-style-type: none"> <li>• bentonite chips/pellets</li> <li>• bentonite slurry</li> <li>• cement grout</li> <li>• clay/cuttings</li> <li>• concrete</li> <li>• concrete grout</li> <li>• grout with bentonite</li> <li>• none</li> <li>• other</li> <li>• unknown</li> </ul>
Well Depth (ft)	Depth of the well, in feet below land surface.
Hole Top (ft)	Top of the borehole or borehole interval, in feet below land surface. Telescoped boreholes have multiple entries.
Hole Bottom (ft)	Bottom of the borehole or borehole interval, in feet below land surface. Telescoped boreholes have multiple entries.
Hole Diameter (in)	Diameter of the drilled borehole, in inches. Telescoped boreholes have multiple entries.
Liner Top (ft)	Top of the internal string of plastic liner used in a well, in feet below land surface.
Liner Bottom (ft)	Bottom of the internal string of plastic liner used in a well, in feet below land surface.
Liner Diameter (in)	Diameter of the internal string of plastic liner, in inches.
PVC Liner Type	Type of PVC (polyvinyl chloride) liner. Options include solid, perforated, or other PVC.
Packer Top (ft)	Top of the packer (i.e., device used to isolate part of the borehole). Reported in feet below land surface.
Packer Bottom (ft)	Bottom of the packer, in feet below land surface.
Packer Sealant	Indicates whether a sealant was used with the packer. "False" indicates no sealant was used; "True" indicates a sealant was used.
Intake Depth (ft)	Depth of the submersible pump, in feet below land surface.
Open Interval Top (ft)	Top of the interval where the well is open for water to come into the borehole. Reported in feet below land surface.
Open Interval Bottom (ft)	Bottom of the interval where the well is open for water to come into the borehole. Reported in feet below land surface.
Open Interval Diameter (in)	Diameter of the open interval, in inches.

Well Construction *(Continued)*

Field Name	Definition
Opening Type	<p>Type of opening in the borehole.</p> <ul style="list-style-type: none"> <li>• driller reported water</li> <li>• bearing zone</li> <li>• fractured rock</li> <li>• louvered screen</li> <li>• mesh screen</li> <li>• open hole</li> <li>• other</li> <li>• perforated, porous, or slotted casing</li> <li>• sand point</li> <li>• screen</li> <li>• walled</li> <li>• wire-wound screen</li> </ul>
Interval Yield (gpm)	Measurement or estimate of the yield of a specific open interval in the well. Reported in gallons per minute.
Slot Size (in)	Size of the slot holes in the opening, in inches.
Packing Type	<p>Type of packing around the open interval in the well.</p> <ul style="list-style-type: none"> <li>• Geotextile (Filter fabric wrapped around screen.)</li> <li>• Gravel – Screened (Gravel of a specific size range.)</li> <li>• Gravel – Unscreened (Run-of-quarry gravel of a general size, e.g., 2B.)</li> <li>• Natural (In-place formation material was developed as a packing.)</li> <li>• None (No known packing material.)</li> <li>• Other</li> <li>• Pre-Packed (Double walled screen with factory installed packing.)</li> <li>• Sand – Screened (Sand of a specific size range.)</li> <li>• Sand – Unscreened (Run-of-mine sand, not a specific size range.)</li> <li>• Unknown</li> </ul>
Reason Decommissioned	<p>For an abandoned (decommissioned) well, the reason why the well was decommissioned.</p> <ul style="list-style-type: none"> <li>• inadequate yield</li> <li>• other</li> <li>• poor water quality</li> <li>• well was unused</li> </ul>

## Appendix 2. Parameters Used in Spring Data Packages

### General Info

Field Name	Definition
PA Spring ID	Unique number assigned by PaGWIS. Used to identify the spring.
Spring Report	Link that opens the Spring Report—a document of selected information related to the spring identification, location, and hydrogeology.
Spring Name	General or popular name of the spring.
County	County in which the spring is located.
Municipality	Municipality in which the spring is located.
Quadrangle	The 7.5-minute quadrangle in which the spring is located.
Latitude (DD)	Latitude of the spring location in decimal degrees. This value is positive to indicate northern hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Longitude (DD)	Longitude of the spring location in decimal degrees. This value is negative to indicate western hemisphere. Although the value is given to five decimal places, locations are not that accurate.
Elevation (ft)	Elevation of the earth's surface at the spring site, in feet.
Elevation Accuracy (ft)	Approximate accuracy of the elevation, in feet.
Elevation Method	Method used to determine the elevation at the spring site. <ul style="list-style-type: none"> <li>• Altimeter</li> <li>• Interpolated from Topographic Map</li> <li>• Level or Other Surveying Method</li> <li>• PAMAP Digital Elevation Model</li> <li>• Unknown</li> </ul>
Topography	Reported topography at the spring site. Categories came from the USGS - GWSI database and entries only occur in springs from that dataset. <ul style="list-style-type: none"> <li>• Alluvial Plain</li> <li>• Dunes</li> <li>• Flat Surface</li> <li>• Floodplain</li> <li>• Hillside</li> <li>• Hilltop</li> <li>• Lake</li> <li>• Local Depression</li> <li>• Mangrove Swamp</li> <li>• Marsh</li> <li>• Offshore</li> <li>• Pediment</li> <li>• Playa</li> <li>• Sinkhole</li> <li>• Stream Channel</li> <li>• Swamp</li> <li>• Terrace</li> <li>• Undulating</li> <li>• Upland Draw</li> <li>• Unknown</li> <li>• Valley Flat</li> </ul>

General Info *(Continued)*

Field Name	Definition
Landowner	Indicates if the spring is on privately owned land or on public property (e.g., a state or national forest or a state or local park).
Data Source	<p>Collection from where the spring data were retrieved.</p> <ul style="list-style-type: none"> <li>• Delaware River Basin Comm (data are from a Delaware River Basin Commission database)</li> <li>• EPA (data are from an EPA source other than STORET)</li> <li>• EPA STORET (data are from EPA STOage and RETrieval database and do not occur in one of the other identified sources in this field)</li> <li>• Ohio River Basin Comm (data are from an Ohio River Basin Commission database)</li> <li>• Other/Unknown/Unspecified (source of site data is unknown or unidentified)</li> <li>• PA Dept Of Agriculture Pesticide Survey (field-verified site from the Pennsylvania Department of Agriculture pesticide survey)</li> <li>• PaGS (data were collected by PaGS staff and are not associated with a water-well completion report)</li> <li>• PaGS Other Than WWI (Watersite located by PaGS staff for which no water-well completion report was available)</li> <li>• PaGS WWI Electronic (site submitted by the driller using the WebDriller or PaGWISDRILLER internet application)</li> <li>• PaGS WWI PAPER (site located by PaGS staff from the description on a paper water-well completion report supplied by the driller)</li> <li>• Potomac River Basin Comm (data are from a Potomac River Basin Commission database)</li> <li>• Private/Univ Geologist (Consultant) (data were collected by a consultant or academia; often found in a thesis or technical report, such as a site assessment)</li> <li>• Susquehanna River Basin Comm (data are from a Susquehanna River Basin Commission database)</li> <li>• USGS – GWSI (field-verified site from the USGS National Ground Water Site Inventory database)</li> <li>• USGS - Other Than GWSI (data are from a USGS database other than GWSI)</li> <li>• Water Company (data are from a licensed water purveyor)</li> </ul>
Agency Use	<p>Agency's use of the spring.</p> <ul style="list-style-type: none"> <li>• active data collection site</li> <li>• inactive or discontinued data collection site</li> <li>• inventory data site only</li> <li>• unknown</li> </ul>

General Info *(Continued)*

Field Name	Definition
Site Use	<p>Intended use of the spring by the owner.</p> <ul style="list-style-type: none"> <li>abandoned</li> <li>anode</li> <li>closed-loop geothermal</li> <li>destroyed</li> <li>drain</li> <li>dry</li> <li>emergency supply</li> <li>geothermal</li> <li>heat reservoir</li> <li>injection</li> <li>mine</li> <li>monitoring</li> <li>observation</li> <li>oil or gas well</li> <li>open-loop geothermal</li> <li>recharge</li> <li>recreation</li> <li>repressurize</li> <li>seismic</li> <li>test</li> <li>unknown</li> <li>unused</li> <li>waste disposal</li> <li>withdrawal</li> </ul>
Water Use	<p>Intended use of the water by the owner.</p> <ul style="list-style-type: none"> <li>air conditioning</li> <li>aquaculture</li> <li>bottling</li> <li>commercial</li> <li>desalination</li> <li>dewater</li> <li>domestic</li> <li>fire</li> <li>geothermal</li> <li>industrial</li> <li>industrial cooling</li> <li>institutional</li> <li>irrigation</li> <li>medicinal</li> <li>mining</li> <li>other</li> <li>power</li> <li>recreation</li> <li>stock</li> <li>unknown</li> <li>unused</li> </ul>
Improvement	<p>Type of improvement made at the spring.</p> <ul style="list-style-type: none"> <li>boxed or small covered basin</li> <li>concrete basin</li> <li>gallery</li> <li>lined</li> <li>none</li> <li>other</li> <li>pipe (not for conduction of water from spring)</li> <li>pond</li> <li>spring house</li> <li>trough</li> </ul>
Data Reliability	<p>Assessment of the reliability of the data. A blank field indicates that no assessment was made.</p> <ul style="list-style-type: none"> <li>Field Checked by Reporting Agency (PaDAg pest. survey)</li> <li>Location May Not Be Accurate(WWI paper)</li> <li>Minimal Data</li> <li>Not FLD (Field) Checked</li> <li>Reporting Agency Considered It Ok</li> <li>Unknown</li> </ul>

## Hydrogeologic

Field Name	Definition
PA Spring ID	Unique number assigned by PaGWIS. Used to identify the spring.
Spring Report	Link that opens the Spring Report—a document of selected information related to the spring identification, location, and hydrogeology.
Hydrologic Unit	USGS catalog-level division of surface-water area, which is defined as “a geographic area representing part or all of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature.” Almost all catalog divisions are larger than 700 square miles. Refer to <a href="#">USGS Water-Supply Paper 2294</a> for details.
Spring Type	Type of spring. <ul style="list-style-type: none"> <li>• artesian</li> <li>• artesian and depression</li> <li>• artesian and seepage or depression</li> <li>• contact</li> <li>• depression</li> <li>• fracture</li> <li>• fracture and depression</li> <li>• geyser</li> <li>• other</li> <li>• perched</li> <li>• perched and depression</li> <li>• perched and fracture</li> <li>• perched and seepage or filtration</li> <li>• perched and tubular</li> <li>• perched or contact</li> <li>• seepage or filtration</li> <li>• tubular - cave other</li> </ul>
Flow Character	General flow characteristic of the spring. <ul style="list-style-type: none"> <li>• geyser</li> <li>• intermittent</li> <li>• other</li> <li>• perennial</li> <li>• periodic - ebb and flow</li> <li>• response to precipitation</li> <li>• seasonal</li> </ul>
Discharge Environment	Sphere or environment of discharge of the spring. Choices are (1) discharges on the land (subaerial) or (2) discharges under water (subaqueous).
Number Openings	Number of openings from which the spring discharges.
Geologic Unit	Reported primary aquifer of the spring, using the American Association of Petroleum Geologists geologic formation names. Information should be compared with PaGS geologic mapping.
Lithology	Rock or sediment type noted for the formation. <ul style="list-style-type: none"> <li>• alluvium</li> <li>• anhydrite</li> <li>• anorthosite</li> <li>• arkose</li> <li>• basalt</li> <li>• bentonite</li> <li>• boulders</li> <li>• boulders and sand</li> <li>• boulders, silt, and clay</li> <li>• breccia</li> <li>• calcite</li> <li>• caliche (hard pan)</li> <li>• carbonolith</li> <li>• chalk</li> </ul>

Hydrogeologic *(Continued)*

Field Name	Definition
Lithology <i>(Continued)</i>	<ul style="list-style-type: none"> <li>• chert</li> <li>• clay</li> <li>• clay, some sand</li> <li>• claystone</li> <li>• coal</li> <li>• cobbles</li> <li>• cobbles and sand</li> <li>• cobbles, silt, and clay</li> <li>• colluvium</li> <li>• conglomerate</li> <li>• coquina</li> <li>• diabase</li> <li>• diorite</li> <li>• dolomite</li> <li>• dolomite and shale</li> <li>• drift</li> <li>• gabbro</li> <li>• glacial (undifferentiated)</li> <li>• gneiss</li> <li>• granite</li> <li>• granite, gneiss</li> <li>• gravel</li> <li>• gravel and clay</li> <li>• gravel, cemented</li> <li>• gravel, sand, and silt</li> <li>• gravel, silt, and clay</li> <li>• graywacke</li> <li>• greenstone</li> <li>• gypsum</li> <li>• hard pan</li> <li>• igneous (undifferentiated)</li> <li>• lignite</li> <li>• limestone</li> <li>• limestone and dolomite</li> <li>• limestone and shale</li> <li>• loam</li> <li>• loess</li> <li>• marble</li> <li>• marl</li> <li>• marlstone</li> <li>• metamorphic (undifferentiated)</li> <li>• muck</li> <li>• mud</li> <li>• mudstone</li> <li>• other</li> <li>• outwash</li> <li>• overburden</li> <li>• peat</li> <li>• quartzite</li> <li>• residuum</li> <li>• rhyolite</li> <li>• rock</li> <li>• rubble, barney</li> <li>• sand</li> <li>• sand and clay</li> <li>• sand and gravel</li> <li>• sand and silt</li> <li>• sand, gravel, and clay</li> <li>• sand, some clay</li> <li>• sandstone</li> <li>• sandstone and shale</li> <li>• saprolite</li> <li>• schist</li> <li>• sedimentary (undifferentiated)</li> <li>• serpentine</li> <li>• shale</li> <li>• silt</li> <li>• silt and clay</li> <li>• siltstone</li> <li>• slate</li> <li>• soil</li> <li>• syenite</li> <li>• till</li> <li>• topsoil</li> <li>• travertine</li> <li>• tuff</li> <li>• unknown</li> </ul>
Lithology Contribution	Assessment of the water-producing contribution of a particular lithology to the spring. Options include no water, primary, secondary, and unknown.
Discharge Type	Type of spring discharge. Options include flowing, pumped, and unknown.



### Hydrogeologic *(Continued)*

Field Name	Definition
Discharge Method	<p>Method of calculating the discharge.</p> <ul style="list-style-type: none"> <li>• acoustic meter</li> <li>• bailer</li> <li>• current meter</li> <li>• Doppler meter</li> <li>• estimated</li> <li>• flume</li> <li>• orifice</li> <li>• other</li> <li>• pitot-tube meter</li> <li>• reported, method not known</li> <li>• totaling meter</li> <li>• trajectory method</li> <li>• unknown</li> <li>• venturi meter</li> <li>• volumetric, watch &amp; bucket</li> <li>• weir</li> </ul>
Discharge (gpm)	Measurement or estimate of the flow of the spring, in gallons per minute.
Observer Name	Person who visited the spring and recorded the data.
Observation Date	Date that the person visited the spring and recorded observations.
Discharge-Data Source	<p>Source of the spring discharge data.</p> <ul style="list-style-type: none"> <li>• Agency other than USGS or PAGS</li> <li>• Delaware River Basin Comm</li> <li>• Driller's Record</li> <li>• EPA</li> <li>• Interpreted From Logs</li> <li>• Memory</li> <li>• Ohio River Basin Comm</li> <li>• Other/Unknown/Unspecified</li> <li>• Pa DEP</li> <li>• PA Dept Of Agriculture</li> <li>• Potomac River Basin Comm</li> <li>• Private/Univ Geologist (Consultant)</li> <li>• Reported</li> <li>• Susquehanna River Basin Comm</li> <li>• Unknown</li> <li>• USGS or PaGS</li> <li>• Water Company</li> <li>• Well Owner</li> </ul>

### Lab Water Quality

Field Name	Definition
PA Spring ID	Unique number assigned by PaGWIS. Used to identify the spring.
Spring Report	Link that opens the Spring Report—a document of selected information related to the spring identification, location, and hydrogeology.

### Lab Water Quality *(Continued)*

Field Name	Definition
Date Analyzed	Date the sample of spring water was analyzed in the laboratory.
Parameter (units)	Full name of the analyzed parameter. Units of measurement are given after the name.
Significant Digits	Number of significant digits in the analytical result.
Value	Value of the analytical result.
Value Remark	Remark regarding the value of the analytical result (e.g., a symbol indicating greater than, less than, or equal to).
Comment	Comment regarding the analysis.

### Field Water Quality

Field Name	Definition
PA Spring ID	Unique number assigned by PaGWIS. Used to identify the spring.
Spring Report	Link that opens the Spring Report—a document of selected information related to the spring identification, location, and hydrogeology.
Observation Date	The date the sample of spring water was analyzed in the field.
Parameter (units)	Full name of the analyzed parameter. Units of measurement are given after the name.
Value	Value of the analytical result.
Observer Name	Person who visited the spring and recorded the data.